ISSN Print 2789-8253
ISSN Online 2789-8261

Eurasian Journal of Economic & Business Studies

Volume 69
Issue 2
June 2025

UIB
SINCE 1992

University of International Business named after K. Sagadiyev
Eurasian Journal of Economic and Business Studies
Volume 69, Issue 2, 2025

Eurasian Journal of Economic and Business Studies is the double-blind peer-reviewed journal focused on publishing scientific research in the field of economic and business development in the Eurasian context. Articles on economic development, business management, organizational strategy, and improving the competitiveness of enterprises in the Eurasian region are especially encouraged.

Scope: *Eurasian Journal of Economic and Business Studies (EJEBS) performs the work based on the applicable legislation for publications and distribution of the periodic editions, UIB charter, other local normative acts, and editorial policy, accepted by the editorial board of the journal.*

The journal is indexed:

EconBiz – academic search portal for papers in business studies and economics
ZBW - German National Library of Economics, Leibniz Information Centre for Economics
BASE – German database of scientific articles and materials
ERIH PLUS - European Reference Index for the Humanities and Social Sciences
Academic Resource Index - bibliographic information and analytical database
WorldCat – the world's largest library catalog
CrossRef - international database and academic publications
Index Copernicus – online database information, including profiles of scientists
Kazakhstan citation database – database recommended by the Committee for Quality Assurance in the Field of Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan

Year of foundation – 2006

Working language: English

Frequency: 4 issues per year
DOI Prefix: 10.51176
ISSN: 2789-8253 (Print)/ 2789-8261 (Online)
Distribution: content is distributed under Creative Commons Attribution 4.0 License
Founder/Publisher: University of International Business named after K. Sagadiyev
Price and Charges of Publication: 55 000,00 KZT (120,00 USD)
Page layout: Gaukhar Kenzhegulova
Address: Kazakhstan, 050010, Almaty, 8a Abay Ave.
Phone: +7 (727) 259-80-33
Email: info@ejebs.com
Website: https://ejebs.com

Aims: the purpose of the journal is to provide high-quality coverage of various aspects of economics, entrepreneurship, business, and tourism economics, such as the integration of advanced theoretical and applied developments on topical issues of planning, organization, motivation, and control in various fields of economics. The journal publishes review articles devoted to existing and new methods, techniques, and approaches in the fields of economics, business, and tourism. The journal publishes the works of modern and innovative researchers, including significant theoretical and empirical papers.

Key topics covered in the journal: issues of economic development; international economic relations; business management and entrepreneurship; financial science and financial institutions; economics of labor and employment; sustainable development and environmental economics; marketing and tourism development strategies.

CONTENTS

Anel A. Kireyeva
Higher Education and National Development: Insights from Kazakhstan's Transition Economy 5

Makpal Bekturganova, Makpal Kurmasheva
Structural Barriers and Opportunities for Financial Inclusion of Women in Kazakhstan 19

Saule Zeinolla, Arsen Tleppayev, Rashid Kerimbayev, Lazat Spankulova
The Role of Education in Reducing Income Inequality: A Regional Analysis of Kazakhstan 34

Gulbakhyt Olzhebayeva, Temirlan Abdykadyr
The Role of Universities in Driving Innovation through Human Capital in Kazakhstan 51

Deniz Can Ekren
Integration of Islamic Values and Sustainable Tourism: The Case of FIFA World Cup Qatar 2022 65

Nazym Zaitenova, Sholpan Abzhalelova
Assessment of Bank Profitability through Structural Indicators: Evidence from Kazakhstan 79

Timur Narbaev, Bauyrzhan Aitkhozha, Andrey Samoilov, Gabriel Castelblanco
An Assessment of Financial Stability of Artificial Intelligence-based Monitoring Project in Kazakhstan 95

Meruyert Kanabekova, Gaukhar Taspenova, Galiya Mazhiyeva, Sharbat Igenbayeva, Kuralai Demeuova
Human Resource Management Configurations and Their Impact on Macroeconomic Indicators in Kazakhstan 109

Askar Adamov, Aybota Rakhmetova, Ainur Sugurova, Gulnara Tuleshova, Raushan Azbergenova
Economics of Water Supply and Household Behavior: the Transition from Self-Supply to Centralized Systems 128

Baglan Aliyeva, Liya Mukhamedyarova, Bayansulu Markhayeva, Elmira Telagussova, Yerkebulan Ydyrys
Analysis of Employment Policy Effectiveness in Kazakhstan: Regional Clustering Approach 141

Received on: 26 January 2025 Revised on: 25 April 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.488

Higher Education and National Development: Insights from Kazakhstan's Transition Economy

Anel A. Kireyeva[1]*

[1] University of International Business named after K. Sagadiyev, Almaty, Kazakhstan

Corresponding author:
* Anel A. Kireyeva – Cand. Sc. (Econ.), Professor of the University, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan.
Email: kireyeva.a@uib.kz

How to cite this article:
Kireyeva, A.A. (2025). Higher Education and National Development: Insights from Kazakhstan's Transition Economy. Eurasian Journal of Economic and Business Studies, 69(2), 5-18.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

To date, the analysis of issues related to developing educational potential and promoting intellectual development has not been conducted at the appropriate level, particularly in adapting higher education to current demands. In addition, a pressing issue exists in many countries of the CIS, including Kazakhstan, the question of whether education programs comply with international standards and labor market requirements remains significant. Therefore, this paper aims to empirically investigate the relationship between the performance of Kazakhstan's higher education system and key socio-economic indicators from 2004 to 2024, identifying systemic inefficiencies and potential directions for policy improvement. Drawing on official data from the Bureau of National Statistics, the World Bank, and the OECD, the study employs a comprehensive econometric framework, which includes correlation matrices, regression models, and principal component analysis (PCA). The results reveal a positive correlation between the contribution of education to GDP and R&D expenditure (r = 0.820) and average household income (r = 0.841), suggesting that education's economic effectiveness is strongly linked to innovation investment and income levels. Conversely, a negative relationship was observed with student enrollment, faculty size and the number of higher education institutions, suggesting that quantitative expansion alone does not enhance economic efficiency. The findings point to structural contradictions within the higher education sector, including a misalignment with labor market needs and limited integration into the innovation economy. Future research should aim to address gaps in understanding the internal quality and practical orientation of higher education programs.

KEYWORDS: Education, Higher Education, Education Policy, Transitional Economy, Economic Growth, Human Capital, University

SCSTI: 06.71.07

JEL Code: I23, O15, P20

FINANCIAL SUPPORT: This research has been funded by the Science Committee MSHE RK (grant "Modernization of the quality assurance system of higher education in Kazakhstan based on digitalization: development of approaches, mechanisms and information base" BR24992974).

EJEBS

1. INTRODUCTION

In the context of rapid changes in the global economic landscape, higher education has become increasingly important as a crucial element of national development. Higher education serves not only to create and accumulate human capital but also to play an essential role in promoting innovation, social mobility, and international competitiveness. In several countries, including Kazakhstan, it is viewed not only as a means of building human capital but also as a strategic engine for innovation, technological advancement, and long-term success. However, international research indicates that the most significant benefits of higher education are realized in countries where it integrates seamlessly with the innovation economy and aligns with market demands, such as Finland, the United Kingdom, South Korea, and the Netherlands (OECD, 2024). In these countries, a system has been built to stimulate scientific research, commercialize knowledge, and train personnel flexibly to meet specific economic needs. However, in Kazakhstan, the actual contribution of higher education to economic growth remains a subject of debate, particularly in the context of institutional transformation and the transition to a knowledge-based economy.

One of the central problems is the discrepancy between the quantitative expansion of the system - the growth in the number of students and educational institutions - and its contribution to national development indicators, such as the growth in gross domestic product (hereinafter - GDP), employment, innovation potential, and the degree of social inequality. International studies emphasize that the effectiveness of higher education is determined not so much by its scale but by the quality of management, the degree of adaptation to labor market requirements, and integration into the national innovation system.

Considering Kazakhstan as a case study of a developing state under the stage of institution-building, this study focuses on quantifying the interrelationships between the higher education system and key socio-economic indicators. In particular, attention is paid to variables such as the unemployment rate, household incomes, research and development (hereinafter - R&D) expenditures, as well as the Gini coefficient, which reflects the degree of social inequality. It is assumed that the use of econometric tools can help identify non-obvious connections and dependencies, providing a new perspective on the role of higher education in the national development system.

Despite the formal successes and positive dynamics of individual indicators, there remains debate in the scientific community about the extent to which these transformations truly contribute to the growth of economic efficiency in the education system. One key problem remains the contradiction between the quantitative expansion of the system - an increase in the number of students, teachers, and institutions - and the relatively weak contribution to the country's GDP. The question arises: Does the current form of higher education development contribute to sustainable economic growth? Or is there a structural gap between educational goals and economic reality?

Thus, this paper approaches higher education not as an isolated sector but as a structural component of national development, one whose effectiveness is determined by its integration into the innovation-driven economy and alignment with labor market demands. Kazakhstan serves here as a representative case of a transition economy undergoing institutional transformation, shifting from a centralized administrative model to a market-oriented system. Institutional volatility, uneven reforms, and structural mismatches between educational outputs and the demands of the national economy mark this transformation.

In this context, higher education plays a crucial role by contributing to the formation of human capital, supporting scientific innovation, and promoting a knowledge-based, inclusive model of economic growth. This research aims to empirically investigate the relationship between the performance of

Kazakhstan's higher education system and key socio-economic indicators from 2004 to 2024, identifying systemic inefficiencies and potential directions for policy improvement.

2. LITERATURE REVIEW

Higher education plays a unique role in ensuring economic growth, social progress and government regulation. The development of human capital through education is considered one of the most critical factors for sustainable growth, particularly in post-industrial economies. Several scientific approaches exist to understanding the impact of education on economic and social indicators, including both theoretical and empirical studies. These approaches have evolved over time, reflecting shifts in academic perspectives, as well as the transformation of education systems under the influence of globalization and digitalization. Research on the relationship between education and growth began with classical economists' work on human capital, which laid the groundwork for neoclassical theories of human capital. According to their approach, investment in education is seen as an investment that increases individual productivity and, consequently, overall economic productivity (Becker, 1991). Later, endogenous growth theory was developed, which considers knowledge and education as internal engines of economic growth (Mincer, 1974; Lucas, 1988; Romer, 1990). Augmented neoclassical growth theories, such as those by Mankiw et al. (1992), emphasize education as a crucial component of human capital that enhances labor force productivity and raises long-term income levels. These theories have created a framework to explain why countries with high levels of education show more sustained growth. However, they have been criticized for focusing too much on quantitative indicators (enrollment rates, study duration), while underestimating the importance of educational quality and institutional conditions, as well as the context of the labor market.

Subsequently, researchers' attention shifted from classical models to empirical assessments of the impact of education on the economy. Methods for assessing the contribution of education to GDP growth, labor productivity, innovation, and social mobility have been particularly actively developed. Thus, some empirical studies of economic growth models emphasize the various mechanisms by which education influences economic growth (Acemoglu, 2009; Aghion & Howitt, 2009; Jones & Vollrath, 2013). In particular, Acemoglu (2009) emphasized the role of economic institutions as a fundamental cause of differences in economic development. In turn, Aghion and Howitt (2009) noted that higher education promotes innovation, particularly in economies transitioning to a post-industrial development path. Further, Jones and Vollrath (2013) found that a certain level of education can lead to a constant influx of new ideas, which allows education to influence long-term growth rates.

One of the most cited studies was a meta-analysis by Hanushek and Woessmann (2015), which demonstrated that the quality of education, as measured by international test scores, has a stronger impact on economic growth than the number of years of study. This has shifted the focus from quantity to effectiveness and content of educational systems. Additionally, Dragoescu (2015) examined the causal relationship between education, particularly higher education, and economic growth in Romania from 1980 to 2013 using a vector error correction model. Glewwe et al. (2014) found that education contributes less to economic development in sub-Saharan Africa compared to other regions, largely due to the lower quality of schooling. However, several studies have shown that the growth of educational indicators was not accompanied by corresponding economic growth (Delgado et al., 2014; Márquez-Ramos et al., 2019). This is due to the low quality of education, its gap with the economic structure, as well as insufficient institutional support.

Many studies emphasize that in developed countries, where deep institutional and

structural transformations are underway, the role of higher education is becoming increasingly ambiguous (Kubiatko & Halakova, 2009; Popescu & Crenicean, 2012; Charles & Issifu, 2015). Kubiatko and Halakova (2009) noted that the transformative impact of information and communication technologies on traditional educational practices has led to the emergence of new forms of learning. It is well known that developed countries, striving for sustainable economic growth and a high quality of life, give priority to the development of education, scientific research and innovation (Popescu & Crenicean, 2012). Complementing these findings, Charles and Issifu (2015) confirm the importance of introducing ICT into the educational process. An analysis conducted on a sample of 3,380 students from 24 public and private educational institutions in Ghana showed that the use of technology contributes to improving the quality of education, increasing student engagement, and improving preparation for real-world work. However, some studies indicate that the impact of expanding higher education on economic growth, productivity, and innovation is limited (Vitola & Erina, 2015).

Research in recent decades has highlighted that in transition economies, where deep institutional and structural transformations are underway, the role of higher education is becoming increasingly ambiguous (Larionova et al., 2018; Mkrtchian et al., 2020; Saparova et al., 2023). Unlike stable, developed economies, education operates in a distorted market environment here, characterised by institutional instability and limited innovation potential. An analysis of reports from international organizations reveals that the key factor for success in a transitional economy is institutional quality, the state's ability to establish sustainable mechanisms for interaction among universities, businesses, and government agencies (OECD, 2024; World Bank, 2024). Without this bundle, even high investments in education do not guarantee the desired economic effect.

The higher education system in Kazakhstan has been developing in the context of a transition economy and institutional transformation since the early 2000s. The country has actively implemented international standards and reformed its educational sector, including participation in the Bologna Process, the development of academic mobility, and the promotion of university autonomy. This demonstrates the desire to integrate into the global educational space and modernize the domestic system. However, researchers have noted that reforms have primarily been structural and formal while underlying problems inherent in the post-Soviet educational model persist (Tampayeva, 2015; Riklefs et al., 2018; Kireyeva et al., 2019). In particular, research shows that the key problems remain the low practice orientation of educational programs, limited communication between universities and employers, uneven quality of educational institutions, poor development of research and R&D in the university environment (Gubaydullina et al., 2016; Nurtayeva & Nurmukhanova, 2023; Urdabayev et al., 2024).

An analysis of domestic and international literature reveals that higher education is widely regarded as a crucial factor in economic development, particularly in post-industrial and transition economies. Neoclassical theories, such as those of Becker, Mincer, and Romer, suggest a direct relationship between the quality of education and sustainable economic growth through mechanisms including the accumulation of human capital, innovation, and increased labor productivity. However, in recent years, there has been a shift in emphasis from quantitative characteristics to quality of education, institutional conditions, and compliance with labor market requirements.

Despite the positive impact of Kazakhstan's reforms and integration into the global educational landscape, structural issues persist. Additionally, the experience of other transition economies demonstrates that even substantial investments in education do not yield significant economic benefits without effective

institutional coordination between the state and universities. There is a lack of empirical research that precisely quantifies the relationship between higher education and specific indicators, such as GDP, employment, R&D expenditure, and the Gini coefficient, in the context of Kazakhstan's economic transition. Therefore, this paper aims to fill this gap in scientific literature.

3. RESEARCH METHODS

To achieve the study's purpose and disclose the tasks set, an integrative approach to data analysis was employed, incorporating both statistical and econometric methods. At the initial stage, initial data was prepared and systemized, covering the period from 2004 to 2024. Official statistical data from reputable sources, such as the Bureau of National Statistics of the Republic of Kazakhstan, were utilised, along with statistical databases from the World Bank and materials from the OECD's annual reports.

The formation of a set of variables for analysis was based on the theoretical assumptions identified during the literature review, as well as empirical studies that highlighted the multidimensional impact of higher education on the country's economic and social development. Numerous studies emphasize that higher education promotes the growth of human capital, stimulates innovation and increases the competitiveness of the economy (Acemoglu, 2009; Aghion & Howitt, 2009; Hanushek & Woessmann, 2015). On this basis, variables were selected that reflect both the resource characteristics of the educational sector and the economic and social effects resulting from its functioning.

The set of variables used in the study are shown in Table 1 in more detail.

Table 1. Variables indicating units of measurement and data sources

Code	Variable	Unit of measurement	Data source
GDP_edu	Education's contribution to GDP	Percentage of GDP	Bureau of National Statistics, World Bank
Stud	Number of students	Person	Bureau of National Statistics
Facul	Number of university teachers	Person	Bureau of National Statistics
Unempl_rate	Unemployment rate	Percentage of active population	Bureau of National Statistics, World Bank
Higher_ed_inst	Number of higher educational institutions	Units	Bureau of National Statistics, World Bank, OECD
Aver_income	Average income of the population	in tenge (KZT)	Bureau of National Statistics, World Bank
Expens_sc	R&D expenses	in tenge (KZT)	World Bank, OECD
Gini_index	The Gini coefficient	index (0 to 1)	Bureau of National Statistics, World Bank, OECD

Note: compiled by author based on Bureau of National Statistics (2024), World Bank (2024), OECD (2024)

In this regard, the selected variables and the logic of their inclusion are shown below:

(1) education's contribution to GDP: The indicator was chosen as a key integral indicator reflecting the effectiveness of the educational system in terms of its contribution to the economy;

(2) number of students (students, undergraduates, doctoral students): an indicator that characterizes the coverage of higher education and the involvement of the population in the higher education system;

(3) the number of teachers in higher education institutions: the indicator reflects the

educational system's ability to provide an appropriate level of specialist training;

(4) unemployment rate: the indicator reflects the level of compliance of educational programs with the requirements of the labor market (including the educational potential of graduates);

(5) number of higher education institutions: the indicator characterizes the structural features of the higher education system and the level of regional distribution of educational infrastructure;

(6) average household income: an indicator of the level of accessibility and demand for educational services;

(7) R&D expenditure: the indicator reflects the level of innovation activity, which is closely related to the quality of education and its ability to generate innovation;

(8) Gini coefficient: an indicator that characterizes the degree of economic inequality, enabling the assessment of the social effectiveness of the educational system.

The presented set of variables reflects the nature of the interaction between education and key economic and social indicators, thereby enabling the construction of a comprehensive analytical model. Thus, the set of variables forms the basis for statistical and econometric analysis. These indicators were carefully selected, considering their importance for studying the economic and social impact of education. A detailed diagram of the methodology steps is shown in Figure 1, which clearly demonstrates the sequence of implementation of the methodological stages of the study, from the formulation of goals and the preparation of initial data.

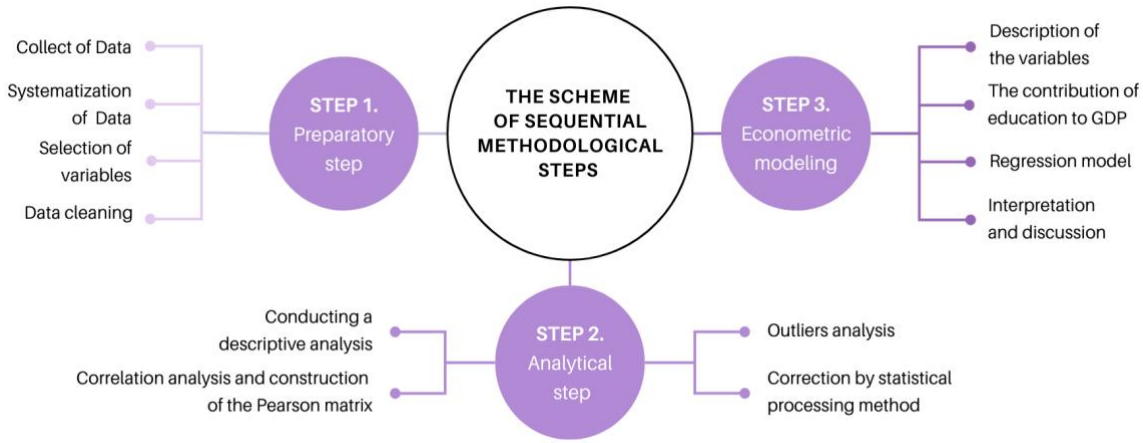

Figure 1. The scheme of the sequential methodological steps implemented in the study

The above diagram illustrates the sequence of methodological steps implemented in the study. Strict adherence to this logic has provided an integrative approach to analysis, starting with the preliminary preparation of data and ending in its in-depth statistical and economic interpretation. Using the methodology's step diagram will allow you to visualize the sequence and relationship of the analysis stages, such as data collection and preprocessing, descriptive analysis, correlation analysis, and the construction of regression models (stronger indicators). Furthermore, to determine the interrelationships between educational, economic and social variables, a complete matrix of paired Pearson correlation coefficients was constructed. This approach allowed us to establish the existence and strength of linear relationships between the studied indicators, as well as to identify the most significant variables affecting the economic contribution of education.

After forming a set of key variables and systematizing them, a descriptive statistical

analysis was carried out aimed at identifying common patterns and dynamics of changes and assessing the variability of data during the study period. Based on this, it is possible to track growth or decline trends, as well as evaluate the stability and volatility of indicators. Special attention is paid to the indicator of the contribution of education to GDP (GDP_edu), the dynamics of which are considered in the context of changes in other variables such as the unemployment rate, average income of the population, and R&D expenditure.

Table 2 presents summary statistics for all variables examined, highlighting key changes over a 20-year period.

Table 2. Summary statistics

Year	Gdp_ edu	Stud	Facul	Unempl_ rate	Higher_ ed_inst	Aver_ income	Expens_ sc	Gini index
2004	3,23	658106	40972	8,8	180	23128	11643,5	0,315
2005	2,26	747104	42333	8,4	181	28329	14579,8	0,305
2006	2,26	775762	43382	8,1	181	34060	21527,4	0,304
2007	2,63	768442	42788	7,8	176	40790	24799,9	0,312
2008	2,83	717053	41207	7,3	167	52479	26835,5	0,309
2009	2,59	633814	37814	6,6	143	60805	34761,6	0,288
2010	3,06	610264	39155	6,6	148	67333	38988,74	0,267
2011	3,59	620442	39600	5,8	149	77611	33466,82	0,278
2012	3,61	629507	40531	5,4	146	90028	43351,6	0,29
2013	3,9	571691	41224	5,3	139	101263	51253,1	0,284
2014	3,45	527226	41635	5,2	128	109141	61672,7	0,276
2015	3,43	477387	40320	5	126	121021	66347,6	0,278
2016	3,34	459369	38087	5,1	127	126021	69302,9	0,278
2017	3,56	477074	38241	5	125	142898	66600,1	0,278
2018	3,39	496209	38212	4,9	122	150827	68884,2	0,287
2019	3,15	542458	38275	4,9	124	162673	72224,6	0,289
2020	3,35	604345	38470	4,8	125	186815	82333,1	0,29
2021	4,45	576557	36307	4,9	125	213003	89028,7	0,291
2022	4,39	575511	36378	4,9	122	250311	109332,7	0,294
2023	4,46	578237	36404	4,9	116	309697	121560,1	0,285
2024	4,63	592694	37391	4,7	112	364295	172585,9	0,29

Note: compiled by author

Based on the above, pre-cleared statistics were used in the study to ensure the reliability and accuracy of the analysis. This step was necessary to eliminate possible errors related to missing data, outliers, or inconsistencies in methodological approaches across different data sources. Using purified information minimizes the risk of statistical errors and increases the accuracy of estimates of relationships between variables, ensuring the comparability of indicators over time. Purification of data is an integral part of the analytical process, particularly in long-term panel studies, where even small deviations can affect distribution structures and final conclusions. Therefore, the use of refined statistics aims to increase the validity and reliability of subsequent econometric calculations and interpretations.

4. RESULTS

Public policy in education plays a crucial role in shaping an accessible, high-quality, and effective educational system that addresses the challenges of globalization, digitalization, and socio-economic development. It determines the state's strategic priorities in education, funding mechanisms, quality standards, and measures for the integration of graduates into the labor

market. In recent decades, Kazakhstan has implemented a number of reforms aimed at modernizing higher education. One of the key areas of reform in recent years has been the reduction in the number of higher education institutions, aimed at concentrating resources, improving the quality of educational services, and strengthening control over compliance with academic standards. This has been accompanied by structural changes to the teaching staff, due to increasing demands on qualifications and increased competition for academic positions. Despite the quantitative reduction in numbers, there has been an increase in attention to research activities, as evidenced by the rise in graduate and doctoral student enrollment.

In this context, it is necessary to conduct a comprehensive assessment of the interrelationships between key variables that reflect the state and dynamics of the education system. These variables include the number of students and teachers, the unemployment rate, household income, R&D expenditure, inequality indicators, and the contribution of education to the country's GDP. Correlation analysis, which involves calculating correlation coefficients, enables the identification of the strength and direction of linear relationships between variables. This provides an empirical basis for constructing regression models and forming scientifically grounded conclusions.

Understanding correlations enables us to determine which aspects of educational policy have the greatest impact on the economy and social sphere, as well as identify possible contradictions and problem areas that require adjustments in government policies and development strategies. Additionally, the results obtained enable us to formulate recommendations for priority areas of educational policy, focusing on sustainable development and the efficient utilisation of the country's intellectual potential. Thus, to identify the relationship between the variables presented in the study, a correlation matrix was constructed (Table 3).

Table 3. Correlation matrix

Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Year	1								
Student	-0,657	1							
Facul	-0,815	0,560	1						
Unemp_rate	-0,899	0,814	0,702						
Higher_ed_ inst	-0,933	0,839	0,799	0,964	1				
Aver_income	0,937	-0,459	-0,769	-0,738	-0,814	1			
Expens_sc	0,927	-0,500	-0,732	-0,756	-0,833	0,987	1		
Gini index	-0,450	0,744	0,426	0,692	0,674	-0,283	-0,331	1	
Gdp_edu	0,817	-0,544	-0,700	-0,735	-0,749	0,841	0,820	-0,358	1

Note: compiled by author

The results showed that the contribution of education to GDP is most strongly correlated with macroeconomic indicators reflecting the country's overall development, such as the average income of the population (r = 0.841) and the amount of research and development expenditures (r = 0.820). All of this may be related to institutional reforms, increased investment in human capital, and the development of higher education infrastructure. At the same time, negative correlations of GDP_edu with a number of indicators were revealed: the number of students (- 0.544), the number of university teachers (- 0.700), the unemployment rate (- 0.735) and the number of higher education institutions (- 0.749). In other words, the quantitative growth of the higher education system does not lead to an increase in its contribution to GDP. These dependencies may indicate that the quantitative expansion of the educational sector does not always lead to a rise in its economic effectiveness, especially in conditions of uneven quality of training,

fragmentation of resources and insufficient adaptation of educational programs to the requirements of the labor market.

The results obtained suggest that there are structural contradictions in the higher education system. A corresponding increase in economic returns does not accompany an increase in enrollment and institutional capacity. Higher education is not an isolated field, but it is closely integrated into the broader context of economic development. The contribution of higher education to GDP proves to be more sensitive to economic conditions than to internal quantitative parameters of the system. This indicates that its effectiveness depends on the degree of involvement in the innovative economy, the level of research funding, and the effective demand of the population.

The weak connection between the expansion of educational infrastructure and economic growth suggests that the current model of management and regulation in higher education is not effectively transforming educational resources into economic benefits. There is a need to not only scale up but also improve the mechanisms for coupling education with the labor market and create incentives for universities to integrate into innovative value chains.

Based on the results of the correlation analysis, the variables with the strongest correlation with the indicator of education's contribution to GDP were identified. Linear regression models were constructed for further in-depth analysis of these key factors, such as the number of students, teaching staff, unemployment rate, and the number of higher education institutions. The purpose of the regression analysis was to determine the nature and direction of the influence of these variables on the economic efficiency of the higher education system. The obtained models enable a more accurate assessment of the impact of each variable on the target indicator, as well as the identification of potential structural limitations and growth opportunities in the educational sphere.

The regression results presented in Figure 2 reveal a statistically significant negative impact of both student enrollment and faculty size on GDP contribution from education.

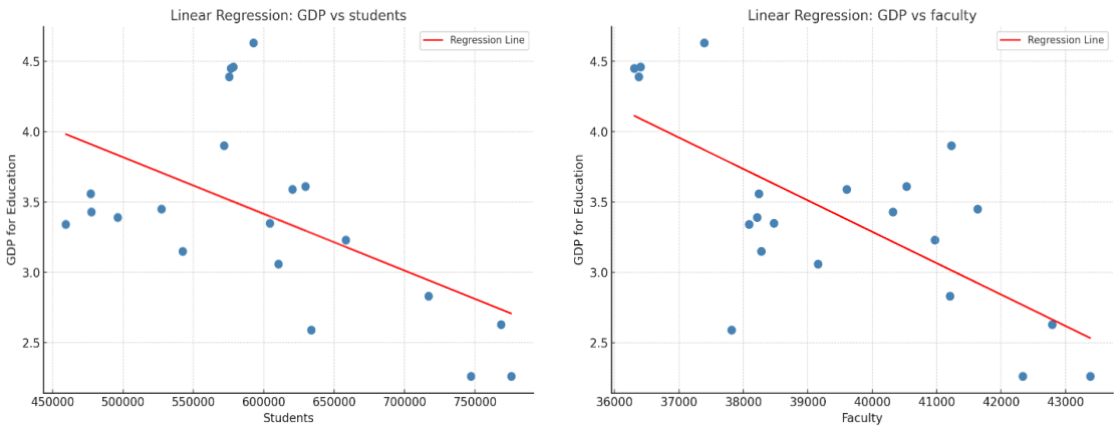

Figure 2. Relationship between student and faculty numbers and GDP contribution to education

The results of the linear regression models estimate the impact of the number of students and teaching staff on the economic contribution of the educational sector, measured through its share of GDP. Thus, both regression lines indicate that the predominance of quantitative growth without systematic quality support and strategic management does not ensure an increase in the economic efficiency of higher education. The estimates obtained indicate a statistically significant negative relationship between the independent variables and the target indicator. In particular, the increase in the number of students is associated with a

decrease in the economic impact of higher education. The growing number of students may be accompanied by an overload of the educational system, a lack of funding, or insufficient market demand for graduates. Similarly, an increase in the number of teachers also does not lead to an increase in sector's contribution to GDP, which may indicate inefficient use of human resources. This dependence may lead to a decrease in return on additional human resources, especially if growth of teaching staff is not accompanied by corresponding improvement in working conditions, motivation or quality of educational programs. These findings highlight the need for reviewing priorities of educational policies, focusing on institutional reforms, strengthening link between education and labor market, as well as developing mechanisms for assessing and improving university performance.

The regression results presented in Figure 3 reveal a statistically significant negative impact of both unemployment rate and higher education institutions on GDP contribution from education.

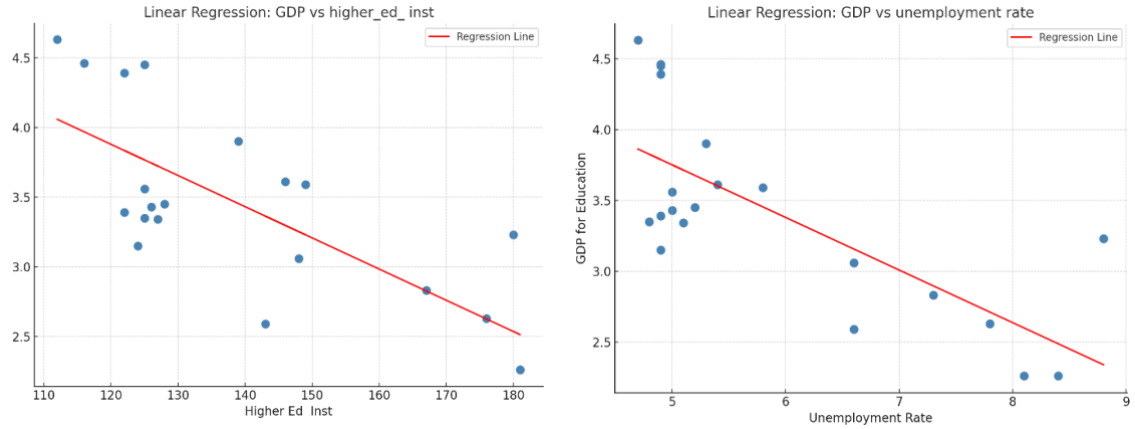

Figure 3. Relationship between unemployment rate and higher education institutions and GDP contribution of education

The results of a linear regression aimed at assessing the impact of unemployment rates and the number of higher education institutions on economic impact, measured through their contribution to GDP, demonstrate a downward trend in both regression lines. This indicates that increasing unemployment negatively affects the efficiency of the higher education system, which may be due to inconsistencies in personnel training structures with labor market requirements, poor adaptation of education programs to changing economic conditions, and a decrease in population motivation to invest in education due to limited employment opportunities. Furthermore, growth in university numbers does not necessarily lead to increased sectoral contributions to GDP. This could indicate fragmentation of education resources, uneven university quality, lack of standardization, and low concentration of scientific and financial potentials. At the same time, an increase in the number of institutions without proper institutional control and system policies can reduce the overall effectiveness of the system. This is clearly illustrated by the graph. The dependencies presented indicate that without high-quality coordination between the education system, labor market, and innovative economy, growth in institutional indicators can lead to a reduction in their actual contribution to the country's economy.

The drawing consists of two parts: the left panel and the right panel (see Figure 4). The left panel presents the results of cluster analysis based on principal component analysis (PCA) followed by the application of the K-means method for the number of clusters K=3.The clusters obtained demonstrate a clearly defined

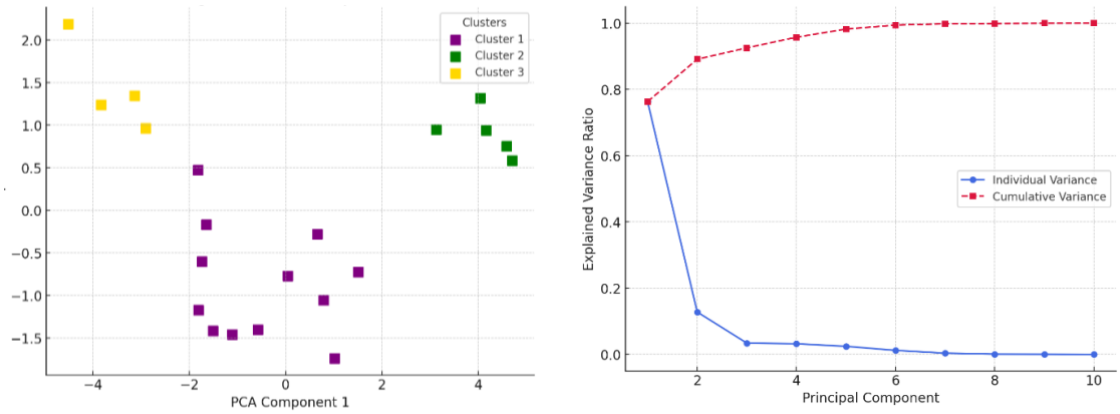

Figure 4. Clustering of education-related indicators based on PCA and Scree Plot

segmentation, reflecting the presence of three stable groups with different levels of effectiveness of the higher education system. These groups can be interpreted as clusters with similar characteristics in terms of the contribution of education to GDP, the unemployment rate, R&D spending, and household income. The identification of such groups makes it possible to substantiate the need for a differentiated approach to developing educational policy and prioritising investments in human capital. The right panel presents a Scree Plot showing the proportion of explained variance of each significant component. It can be seen from the graph that the first two components account for the most significant part of the variation, which justifies their use for visualizing clusters. The sharp decrease in the explained variance after the second component confirms the expediency of using a limited number of components in interpreting the data structure.

5. CONCLUSIONS

The purpose of this study was to examine the relationships between the development of Kazakhstan's higher education system and key socio-economic indicators for the period from 2004 to 2024. A review of scientific literature has shown that classical theories of human capital formed the basis for modern approaches to analyzing the role of education in sustainable economic growth. However, the emphasis in modern empirical research shifted, and research on countries with economies in transition was of particular interest due to the institutional instability and fragmentation of their education systems, which reduced the return on investment in human capital.

The results of the correlation analysis revealed several contradictions in Kazakhstan's higher education system. Despite an increase in the number of students and teachers, as well as universities, these quantitative indicators have a negative relationship with the economic contribution of this sector, specifically its contribution to GDP. However, indicators such as R&D spending and household income growth have a positive impact, indicating that the effectiveness of higher education is dependent on innovation and the economic environment.

The experience of Kazakhstan, as a country undergoing a transition to a market economy, demonstrates that formal reforms and the adoption of external standards, without creating a stable institutional environment, are insufficient to achieve the desired economic outcomes. Despite structural transformations aimed at integrating education into the global economy, there remains a lack of mechanisms to ensure the practical orientation of education and its integration with innovative economies.

The regression models constructed in the study demonstrated statistically significant negative correlations between the contribution of higher education to GDP and several quantitative indicators of the system. Regression analysis confirmed that quantitative parameters alone do not lead to an increase in efficiency, and emphasized the need to focus on qualitative and institutional aspects of education development. This serves as an essential argument in favor of a reorientation of public policy: from increasing the number of students to creating a highly effective, adaptive and economically closely related educational environment.

Based on the presented results, state policy in higher education requires revision of emphasis: from extensive growth and harmonization of regulations. A transition from formal expansion of the system to qualitative transformation is needed, involving the development of internal motivation for innovation among universities, responsibility for the employment of graduates, and active involvement in national and regional strategies. In a transitional economy, this implies the need for a flexible, sustainable education system capable of producing knowledge and transforming it into economic value.

The results obtained in this study raise several important issues that require further scientific investigation. Future research could focus on the internal structure of educational programs and the extent to which they are practice-oriented and meet the specific requirements of various industries. Additionally, regional analysis is a promising area, enabling the identification of differences in the effectiveness of higher education across multiple parts of the country. This is especially important for Kazakhstan, where there is a significant territorial differentiation in terms of socio-economic development, accessibility to educational services and innovation activity. Finally, the empirical base should be expanded to include data on the quality of education, such as international university rankings, test results, graduate employment rates, and the level of scientific publications.

AUTHOR CONTRIBUTION

Writing – original draft: Anel A. Kireyeva.
Conceptualization: Anel A. Kireyeva.
Formal analysis and investigation: Anel A. Kireyeva.
Development of research methodology: Anel A. Kireyeva.
Resources: Anel A. Kireyeva.
Software and supervisions: Anel A. Kireyeva.
Data collection, analysis and interpretation: Anel A. Kireyeva.
Visualization: Anel A. Kireyeva.
Writing review and editing research: Anel A. Kireyeva.

REFERENCES

Acemoglu, D. (2009). *Introduction to modern economic growth*. Princeton University Press.

Aghion, P., & Howitt, P. (2009). *The economics of growth*. MIT Press.

Becker, G. S. (1991). *Human capital: A theoretical and empirical analysis, with special reference to education* (3rd ed.). University of Chicago Press.

Bureau of National Statistics. (2024). *Bureau of National Statistics of the Republic of Kazakhstan*. Retrieved January 30, 2025 from https://stat.gov.kz/en

Charles, B., & Issifu, Y. (2015). Innovation in Education: Students' Perceptions of Implementing ICT in Learning in Second-Cycle Institutions in Ghana. *Procedia - Social and Behavioral Sciences, 197*, 1512-1519. https://doi.org/10.1016/J.SBSPRO.2015.07.103

Delgado, M., Henderson, D.J., & Parmeter, C.F. (2014). Does Education Matter for Economic Growth? *Oxford Bulletin of Economics and Statistics, 76*(3), 334-359. https://doi.org/10.1111/obes.12025

Dragoescu, R.M. (2015). Education as a Determinant of the Economic Growth. The Case of Romania. *Procedia - Social and Behavioral Sciences, 197*, 404-412. https://doi.org/10.1016/J.SBSPRO. 2015.07.156

Glewwe, P., Maïga, E.W., & Zheng, H. (2014). The Contribution of Education to Economic Growth: A Review of the Evidence, with Special Attention and an Application to Sub-Saharan Africa. *World Development, 59*, 379-393. https://doi.org/10.1016/J.WORLDDEV.2014.01.021

Gubaydullina, G.N., Myrzagaliyeva, A., Nagymzhanova, K.M., & Aurenova, M. (2016). Modern Approaches to the Pedagogical Designing of Modular Educational Programs of Higher Professional Education in the Republic of Kazakhstan. *International journal of environmental and science education, 11*, 2863-2876. https://doi.org/10.12973/ijese.2016.727a

Hanushek, E. A., & Woessmann, L. (2015). *The knowledge capital of nations: Education and the economics of growth*. MIT Press.

Jones, C. I., & Vollrath, D. (2013). *Introduction to economic growth* (3rd ed.). W. W. Norton.

Kireyeva, A.A., Lakhonin, V., & Kalymbekova, Z. (2019). Digital Transformations to Improve the Work and Distribution of the State Scholarships Programs. *Journal of Distribution Science, 17*(3), 41-47. https://doi.org/10.15722/JDS.17.3.201903.41

Kubiatko, M., & Haláková, Z. (2009). Slovak high school students' attitudes to ICT using in biology lesson. *Computers in Human Behavior, 25*(3), 743-748. https://doi.org/10.1016/j.chb.2009.02.002

Larionova, V.A., Brown, K., Bystrova, T., & Sinitsyn, E. (2018). Russian perspectives of online learning technologies in higher education: An empirical study of a MOOC. *Research in Comparative and International Education, 13*(1), 70 - 91. https://doi.org/10.1177/1745499918763420

Lucas, R. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3-42. https://doi.org/10.1016/0304-3932%2888%2990168-7

Mankiw, N. G., Romer, D., & Weil, D. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics, 107*(2), 407–437

Márquez-Ramos, L., & Mourelle, E. (2019). Education and economic growth: an empirical analysis of nonlinearities. *Applied Economic Analysis, 27*(79), 21-45. https://doi.org/10.1108/AEA-06-2019-0005

Mkrttchian, V., Kharicheva, D., Aleshina, E., Panasenko, S., Vertakova, Y., Gamidullaeva, L., Ivanov, M., Chernyshenko, V. (2020). Avatar-based learning and teaching as a concept of new perspectives in online education in post-Soviet Union countries: Theory, environment, approaches, tools. *International Journal of Virtual and Personal Learning Environments, 10*(2), 66-82. https://doi.org/10.4018/ijvple.2020070105

Mincer, J. (1974). *Schooling, experience, and earnings*. National Bureau of Economic Research.

Nurtayeva, D.K., & Nurmukhanova, G.Zh. (2023). Research and analysis of international models for higher education and business cooperation. *Bulletin of Turan University*, *2,* 322-334. https://doi.org/10.46914/1562-2959-2023-1-2-322-334

OECD. (2024). *Education at a glance 2024: OECD indicators*. OECD Publishing. Retrieved January 30, 2025 from https://www.oecd.org/education/education-at-a-glance

Popescu, M., & Crenicean, L.C. (2012). Innovation and Change in Education –Economic Growth Goal in Romania in the Context of Knowledge-Based Economy. *Procedia - Social and Behavioral Sciences, 46*, 3982-3988. https://doi.org/10.1016/J.SBSPRO.2012.06.183

Riklefs, V., Abakassova, G., Bukeyeva, A., Kaliyeva, S., Serik, B., Muratova, A., & Dosmagambetova, R. (2018). Transforming medical education in Kazakhstan: Successful case of internationalization from Karaganda State Medical University. *Medical Teacher, 40* (5), 481 - 487. https://doi.org/10.1080/0142159X.2018.1441989

Romer, P., 1990. Endogenous Technological Change. *Journal of Political Economy, 98*(5), 71-102.

Saparova N., Kireyeva, A., Orynbet, P., Alimbekova, G., & Amirova, A. (2023). Analysis of the development level of higher educational institutions in the regions of Kazakhstan. *Problems and Perspectives in Management*, 21(2), 244-256. https://doi.org/10.21511/ppm.21(2).2023.26

Tampayeva, G.Y. (2015). Importing education: Europeanisation and the Bologna Process in Europe's backyard - The case of Kazakhstan. *European Educational Research Journal, 14*(1), 74 - 85. https://doi.org/10.1177/147490411 4565154

Urdabayev, M., Ainakul, N., & Sabdenaliyev, B. (2024). Modernization of the Motivation Systems in Higher Education: Challenges and Digital Solutions. *Eurasian Journal of Economic and Business Studies*, *68*(3), 111–126. https://doi.org/10.47703/ejebs.v68i3.431

Vitola, L. & Erina, I. (2014). R&D Expenditures by Sectors of Performance and Analysis of Performance Indicators in the Baltic States. *Procedia - Social and Behavioral Sciences, 156*, 334-339. https://doi.org/10.1016/J.SBSPRO.2015.11.430

World Bank. (2024). *World development report 2024: Digital dividends for development*. World Bank. Retrieved January 30, 2025 from https://www.worldbank.org/en/publication/wdr2024

AUTHOR BIOGRAPHIES

***Anel A. Kireyeva** – Cand. Sc. (Econ.), Professor of the University, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: kireyeva.a@uib.kz, ORCID ID: https://orcid.org/0000-0003-3412-3706

Received on: 20 January 2025 Revised on: 15 April 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.492

Structural Barriers and Opportunities for Financial Inclusion of Women in Kazakhstan

Makpal S. Bekturganova[1]

Makpal T. Kurmasheva[2]*

[1] Institute of Economics Science Committee MSHE RK, Almaty, Kazakhstan

[2] University of International Business named after K. Sagadiyev, Almaty, Kazakhstan, Almaty, Kazakhstan

Corresponding author:
* Makpal T. Kurmasheva – PhD candidate, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: makpaltalgatkyzy@gmail.com

How to cite this article:
Bekturganova, M.S. & Kurmasheva, M.T. (2025). Structural Barriers and Opportunities for Financial Inclusion of Women in Kazakhstan. Eurasian Journal of Economic and Business Studies, 69(2), 19-33.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

Despite steady growth in banking resources in Kazakhstan, female engagement in credit markets remains uneven and constrained by structural imbalances. The current study aims to assess the impact of structural features of the banking sector in Kazakhstan on financial accessibility and women's involvement in credit relations. To measure structural accessibility, a composite indicator was developed using two groups of variables: resource-based indicators (interbank deposits, loans received, and customer deposits) and concentration indicators (top-5 banks' share of assets, loan portfolios, and customer deposits). The statistical materials on the regulation and development of the financial market and the National Bank of Kazakhstan and Bureau of National Statistics for 2013-2023 were used as initial data. The study results show that credit availability for women has not increased proportionally despite the steady growth of banking resources. The theoretical availability index decreased to 0.487 in 2023 due to the high concentration of the banking sector, and correlation analysis confirmed the absence of a statistically significant relationship between structural opportunities and the actual volume of women's loans. Periods with strong resource growth and moderate theoretical accessibility, such as 2018, coincided with peak credit issuance to women despite high sectoral concentration. These findings highlight the need to account for institutional, behavioral, and policy-driven factors when evaluating financial inclusion outcomes. Further research should focus on a detailed analysis of the impact of government programs and initiatives and the study of behavioral and institutional factors limiting women's financial activity.

KEYWORDS: Women, Gender, Gender Economics, Women's Business, Women's Entrepreneurship, Bank, Banking Sector, Business Environment, Financial Accessibility

SCSTI: 06.77.61

JEL Code: G21, J16, O16

FINANCIAL SUPPORT: This research has been funded by the Science Committee MSHE RK (grant "Strategic Directions of Women's Empowerment and Access to Quality Employment in Kazakhstan" No. AP22784063).

1. INTRODUCTION

Women's financial inclusion is considered one of the key indicators of sustainable socio-economic development, affecting not only personal well-being and the level of autonomy but also the overall sustainability of the economy. Approaches to ensuring women's access to finance vary significantly. In countries with a developed institutional environment, digital and technological solutions dominate, while in developing economies, basic access mechanisms, microfinance, and local initiatives are of particular importance. International experience shows that there are no universal solutions - financial inclusion is formed under the influence of the regulatory environment, behavioral factors, and the structure of the banking sector. The problem of women's financial inclusion is becoming more acute in emerging economies and countries where large-scale programs to eliminate gender inequality in access to finance are being implemented. Of particular interest is the experience of India, where women's financial activity was strengthened through the development of microfinance initiatives and self-help groups (Harvard International Review, 2023). Besides the possibility of obtaining loans, there was developed a platform for social mobilization and collective entrepreneurship. Participation in SHG significantly increases women's financial inclusion, develops resource management skills, and strengthens economic autonomy, especially in rural areas (Maldonado-Castro et al., 2024).

Despite significant attention to inclusion issues, countries with formally developed banking systems still face deep-seated limitations: high bank concentration, lack of tailored products, poorly targeted programs, distrust of financial institutions, limited skills, and entrenched social barriers. One such example is Kazakhstan, where, despite the stable growth of the banking resource base, the volume of client deposits increased from 9.7 trillion tenge in 2013 to more than 33 trillion tenge in 2023 – women's actual participation in lending remains limited. Thus, despite the growth of the overall credit potential, the volume of loans issued to women decreased from 43 billion tenge in 2018 to 24 billion tenge in 2023, and the number of loans issued decreased by more than 2.5 times over the same period (Eurasian Bank. 2023). This points to a discrepancy between formally available financial opportunities and real access for women, suggesting structural and behavioral limitations persist in the banking system. The issue of women's financial inclusion is closely linked to the nature of their participation in the economy. As regional experience in Eastern and Southern Africa shows, women are significantly more likely to be employed in informal and low-paid sectors, which reduces their chances of receiving formal financial services and credit products (UN Women, 2023). Uneven labor force participation, income instability, and limited access to social guarantees create institutional barriers that are not eliminated even with formally accessible financial infrastructure. At the same time, half of the gender income gap remains unexplained, indicating the persistent influence of discriminatory norms and practices. Women are clearly unequal in an environment where financial instruments are primarily based on confirmed employment and stable income. Thus, women's employment ceases to be an exclusively social indicator and acquires significance as a key indicator of economic resilience and the inclusiveness of the financial system.

The study aims to identify discrepancies between the banking system's potential and women's involvement in the financial sector and to form prerequisites for refining the mechanisms of gender-oriented financial policy.

2. LITERATURE REVIEW

Research on financial inclusion focuses on the relationship between the formal conditions of access to financial services and the social context of women's participation in the

economy. Women's employment is treated as a result of a complex interaction between poverty, opportunities, and the institutional environment rather than a homogeneous phenomenon. In this context, Mammen and Paxson (2000) distinguished between forms of women's employment: forced - in the absence of alternatives and low incomes - and voluntary, conditioned by economic opportunities. It is noted that income growth and economic development do not automatically guarantee women's inclusion in the formal labor market or the financial sector. Levine (2002) pointed out that the degree of efficiency of the financial system directly depends on the institutional context and the level of infrastructure development. Moreover, the level of centralization and the structure of the financial sector affect the distribution of resources, including access to credit. Sarma and Pais (2011) proposed a multidimensional concept of financial inclusion, including such dimensions as access, use, and regularity. It is marked that the presence of banking infrastructure and services does not mean the actual inclusion of the population, especially vulnerable groups. Anand and Chhikara (2013) complemented this approach by considering financial inclusion as a channel for the inclusion of new economic actors in the formal economy. Fernández-Olit et al. (2020) identified key barriers: the digital divide, spatial heterogeneity, low levels of trust, and weak adaptation of financial products to the needs of marginalized groups, including women. In developed economies, women's financial exclusion is often institutional and behavioral. In this context, Ozili (2021) emphasized that sustainable inclusion results are achieved only with targeted strategies considering specific groups' behavioral and social characteristics.

Several studies consider women as a structurally vulnerable group in terms of financial inclusion, emphasizing that financial inclusion, in their case, cannot be reduced to the formal ability to use banking services. Gender inequality is interpreted as the result of a set of institutional, cultural, normative, and attitudinal barriers that do not automatically resolve with rising incomes or the expansion of banking networks. Beck et al. (2009) and De Vita et al. (2014) found that women, particularly in emerging economies, systematically face limited access to financial products despite the availability of banks and services. Swamy (2014) showed that women in poor households' experience more significant barriers to accessing formal financial services and that financial reforms alone are ineffective without considering gender. Cámara et al. (2015) revealed that educational attainment, lack of proper documentation, and distance from financial institutions are key barriers in Peru, with women, particularly in rural areas, facing these barriers more acutely. In Nigeria, Adeyemi and Abdulmumin (2019) showed that women lag significantly behind men on all key financial inclusion indicators, from opening accounts to accessing savings and credit. The reasons cited include income and institutional discrimination, ingrained cultural attitudes, and the lack of targeted programs. In turn, the study by Omar and Inaba (2020) stated that the positive effects of financial inclusion are only seen where vulnerable groups are targeted. Women's inclusion is seen not just as an element of social justice but as a factor directly affecting poverty reduction, reducing inequality, and ensuring macroeconomic sustainability.

Some studies have comprehensively examined the constraints women face in financial and entrepreneurial inclusion, emphasizing that even in the presence of formally favorable conditions, without removing cognitive, institutional, and behavioral barriers, real accessibility for women remains limited. Wu et al. (2019) and Ariffin et al. (2020) identified key combinations of factors under which women's entrepreneurship is least realized: lack of financing, weak government support, lack of professional training, and limited access to markets. The authors emphasize that combinations of barriers, rather than individual factors, form a persistent pattern of exclusion. The study by Andriamahery and Qamruzzaman

(2022) complements this finding, focusing on the relationship between access to finance, technical competence, and financial literacy. Thus, formal access without basic skills and knowledge does not lead to entrepreneurial realization but can increase the dependence and vulnerability of women's economic position. In turn, Llados-Masllorens and Ruiz-Dotras (2022) emphasized that the level of financial knowledge affects not only the practical skills of handling resources but also confidence, trust in financial institutions, and willingness to take risks, making financial literacy not an auxiliary but a structural element of inclusion. A systematic review by Saluja et al. (2023) allowed classifying barriers at three levels: institutional (discriminatory norms, limited access to services), behavioral (low trust, lack of initiative), and technological (digital divide, weak adaptation of products). In addition, Mishra and Sahoo (2025) showed that sustainable entrepreneurial intention is formed when digital access to financial products is combined with long-term educational support. All studies emphasize that without simultaneously eliminating institutional constraints, improving financial competencies, and creating sustainable motivational attitudes, ensuring women's full and effective integration into the financial system is impossible.

The review revealed an essential gap in the literature: while there is a significant amount of research on institutional, behavioral, and social barriers, insufficient attention has been paid to the relationship between macro-level parameters of the banking system and women's actual financial activity. Most studies focus either on the social and normative component of access or on assessing individual behavior, while the structural features of the financial sector itself are considered fragmentarily.

Based on the review, key indicators were identified that reflect the banking sector's resource endowment, the level of its concentration, and the actual financial activity of women. The first group of indicators characterizes the scale and sources of liquidity in the system: these are the volumes of interbank financing, attracted loans, and client deposits, which determine the potential of banks to provide loans. The second group reflects the degree of market concentration, expressed through the share of assets, loan portfolio, and client deposits concentrated in the five largest banks. The third group covers direct empirical indicators: the volumes and number of loans issued to women due to the implementation or limitation of opportunities inherent in the system's structure. These three groups of indicators formed the basis for subsequent quantitative analysis aimed at identifying discrepancies between potential conditions and the actual involvement of women in the financial sector.

3. RESEARCH METHODS

The methodological approach is based on studies aimed at constructing integral indicators of financial inclusion, analyzing the structure of the banking sector, and comparing structural conditions with actual engagement results. The approach proposed by Sarma and Pais (2011) substantiates the need for a multidimensional assessment of financial inclusion, including dimensions such as access, use, and regularity, which formed the basis for identifying and normalizing macroeconomic indicators. The model solution by Anand and Chhikara (2013), using aggregate indices and quantitative indicators in conjunction with economic growth, became the conceptual basis for calculating integral indicators of banking resources and concentration. Fernández-Olit et al. (2020) and Ozili (2021) emphasize the importance of comparing formal conditions of access with actual manifestations of financial activity of vulnerable groups, which justified the inclusion of comparative-dynamic analysis and correlation comparison between theoretical potential and actual indicators of lending to women. The choice of variables, the logic of their combination into categorical blocks, and the standardization procedure are based on these theoretical and applied approaches. In Figure 1, the research design is resented.

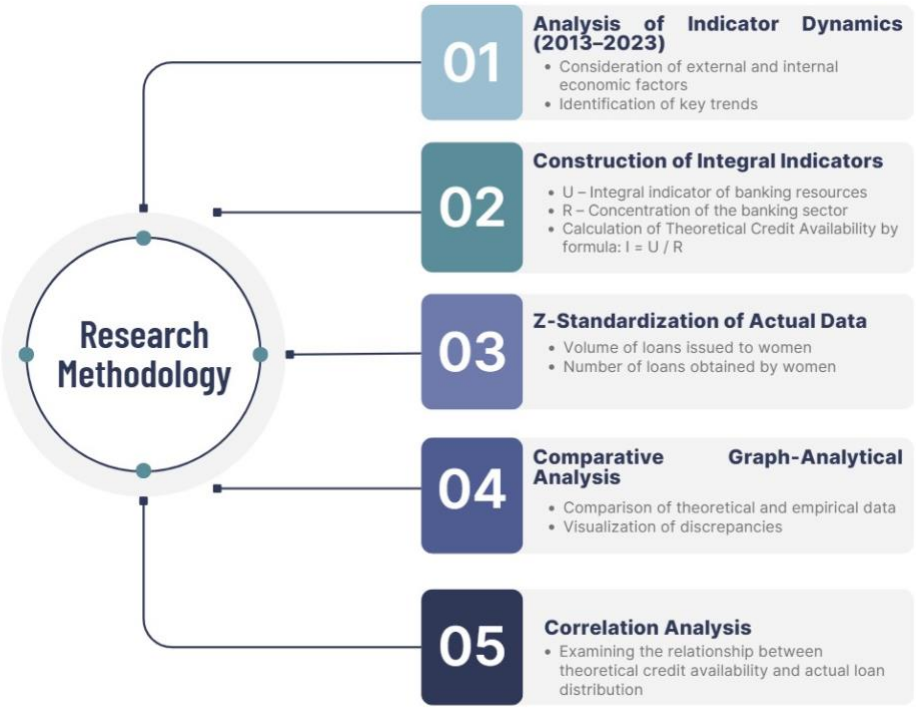

FIGURE 1. Research methodology design

The study analyzed the dynamics of key indicators characterizing the state of the banking sector and the level of women's credit activity in Kazakhstan for 2013–2023. The data sources were official statistical publications of The Agency of the Republic of Kazakhstan for Regulation and Development of Financial Market and the Bureau of National Statistics of the Republic of Kazakhstan (Bureau of National Statistics, 2024). For subsequent analysis, all indicators were classified by substantive categories: banking resources, concentration of the banking sector, and indicators of women's lending. Table 1 presents the distribution of the indicators used in the research.

TABLE 1. Structural classification of indicators for assessing gender accessibility of bank lending

No.	Indicator	Unit	Category
1	Interbank deposits	Billion tenge	Banking Resources
2	Loans received	Billion tenge	Banking Resources
3	Customer deposits	Billion tenge	Banking Resources
4	Top-5 Banks assets share	Percentage	Sector Concentration
5	Top-5 Banks loan portfolio share	Percentage	Sector Concentration
6	Top-5 Banks customer deposits share	Percentage	Sector Concentration
7	Loans to women	Billion tenge	Women's Credit Activity
8	Number of loans to women	Number	Women's Credit Activity

Note: compiled by authors

The indicators were grouped into categories, after which aggregate values were calculated based on normalization using the min-max method and subsequent calculation of arithmetic mean values. The following were determined: an integral indicator of banking resources, as an aggregate assessment of the funding volume; an integral indicator of

banking sector concentration, as a generalized measure of the centralization of financial assets and credit flows.

Further, the research methodology was based on physical and economic modeling. It was calculated as the ratio of U to R, by analogy with Ohm's law, where I is interpreted as a theoretical "current strength," a conditional level of availability of loans in a given market structure, according to the following formula (1):

$$I = \frac{U}{R} \qquad (1)$$

where:

U – the integral indicator of banking resources, reflects the overall level of liquidity and funding;

R – the integral indicator of concentration of the banking sector, characterizes the degree of centralization of financial flows in the largest banks;

I – the indicator of the availability of lending to women.

The calculated value of I (the indicator of the availability of lending to women) will allow assessing the extent to which the banking system's resource capacity—when adjusted for its structural concentration—creates conditions that either facilitate or constrain women's access to credit. This indicator will reflect the degree of alignment between the system's structural potential and its actual realization regarding female financial participation.

4. FINDINGS AND DISCUSSION

4.1 RESULTS OF THE STRUCTURAL ASSESSMENT OF CREDIT ACCESSIBILITY FOR WOMEN

Despite formally favorable conditions, women's financial inclusion remains one of the least sustainable elements in the banking lending system. The growth of resource volumes and infrastructure development are not always accompanied by an expansion of real access, which indicates the presence of hidden constraints that are not directly reflected in macroeconomic indicators. In such conditions, it is essential not only to assess the financing volume but also to analyze how the structural features of the banking sector affect the distribution of opportunities. The presented analysis aims to establish the relationship between the availability of finance and the actual participation of women, as well as identify factors that limit equal inclusion even in the presence of economic potential.

Figure 1 presents the dynamics of banking sector resources in Kazakhstan between 2013 and 2023.

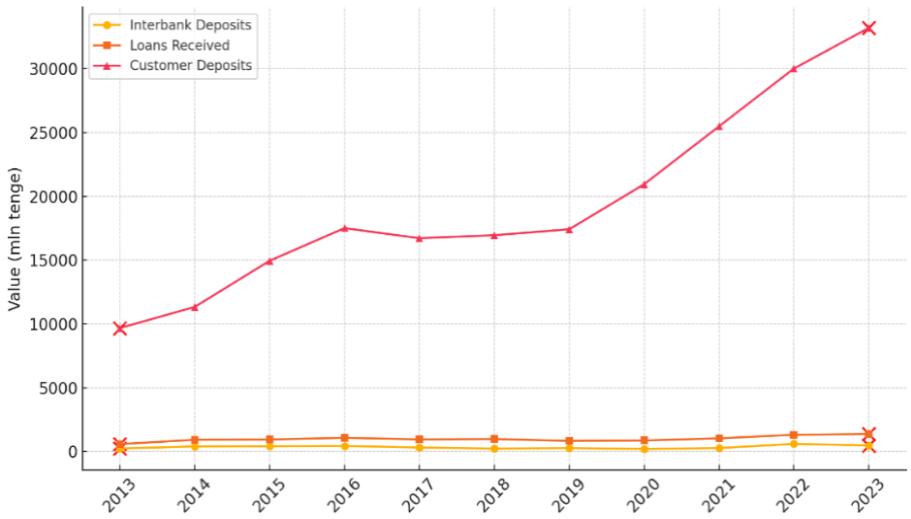

FIGURE 2. Dynamics of banking sector resources

The general trend of Kazakhstan's banking resources for the period under review (2013–2023) demonstrates stable growth, primarily due to customer deposits. If their volume was 9,678 million tenge in 2013, then by 2023, it had grown more than threefold, reaching 33,204.2 million tenge. Against the background of this trend, interbank deposits and loans demonstrated volatility and less pronounced dynamics but also had a general upward trend with periodic declines.

Several significant events considerably influenced the dynamics of the indicators. Between 2014 and 2015, the devaluation of the tenge caused a short-term change in the structure of banking resources. Thus, an increase in the inflow of customer deposits was observed due to increased uncertainty and devaluation expectations. Next, the COVID-19 pandemic (2020) had a crucial impact, resulting in a short-term decline in interbank deposits and loans associated with the uncertainty and caution of the financial sector. Despite the crisis, customer deposits continued to grow steadily. The population tended to keep funds in banks even during a crisis. When it comes to global crises, such as the Wells Fargo (2016) and Goldman Sachs scandals, it can be noted that the Kazakh economy and banking sector weakly reflected these global shocks. Instead, the dynamics of banking resources were more strongly influenced by domestic macroeconomic events and regional crises, including sharp fluctuations in oil prices and exchange rate changes in the national currency. The Kazakh economy generally responded primarily to domestic economic conditions and oil shocks rather than global financial scandals and crises.

Next, in Figure 3, there is a dynamic of banking sector concentration.

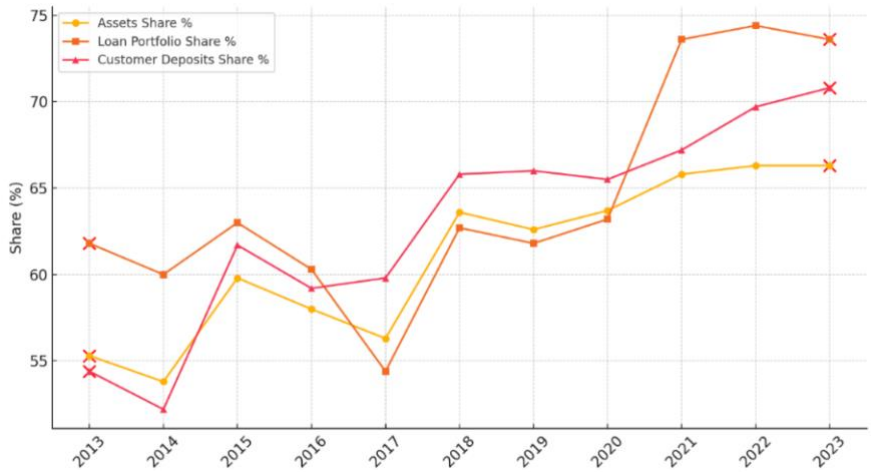

FIGURE 3. Dynamics of banking sector concentration

Overall, there has been a steady trend towards increasing concentration in the banking sector in Kazakhstan from 2013 to 2023. The share of the five largest banks in assets, loan portfolio, and customer deposits have been growing systematically: for example, assets increased from 55.3% in 2013 to 66.3% in 2023, while the share of loans reached peak values in 2021–2022 (up to 74.4%). The data reflects the growing dominant position of leading banks in the country's financial system.

The most noticeable increase in concentration occurred after 2016, including global events such as the aftermath of the Wells Fargo and Goldman Sachs scandals and global changes in bank regulation. The strengthening of the largest banks' positions is likely related to increased regulatory requirements and asset consolidation, especially after the

reorganization of several Kazakh banks in 2017. The situation had sharply worsened since the onset of the COVID-19 pandemic when market leaders began consolidating their capital in the context of global instability. Considering the connection with the global economy, it is worth noting that although global banking shocks did not directly impact, Kazakhstan followed the universal trend of strengthening resilience through concentration.

The growing share of large banks in the system means that more and more financial transactions, assets, and client resources are concentrated in a limited number of institutions. Centralization of risks. In conditions of uncertainty and crises (for example, a pandemic or instability in global markets), it is more difficult for small banks to withstand shocks. Large banks with greater capitalization and access to reserves can redistribute risks within a diversified portfolio, including between sectors and regions, reducing the likelihood of systemic failures. Large banks are the first to gain access to anti-crisis mechanisms from the state and the National Bank (preferential refinancing, regulatory relaxations, etc.). Moreover, stability becomes the key to the sustainability of the entire banking system, especially when a quick response to a crisis is important. During periods of crisis, clients tend to transfer funds to more reliable banks, which increases the concentration trend as money "flows" to large banks, strengthening their role and affecting macroeconomic stability.

Consequently, strengthening large banks is a cause of economic policy and a protective reaction to internal and external shocks, creating "anchors of stability." However, it can simultaneously reduce the competitiveness and accessibility of services for vulnerable groups, including women and small businesses.

Next, in Figure 4, there is a dynamic of loans issued to women.

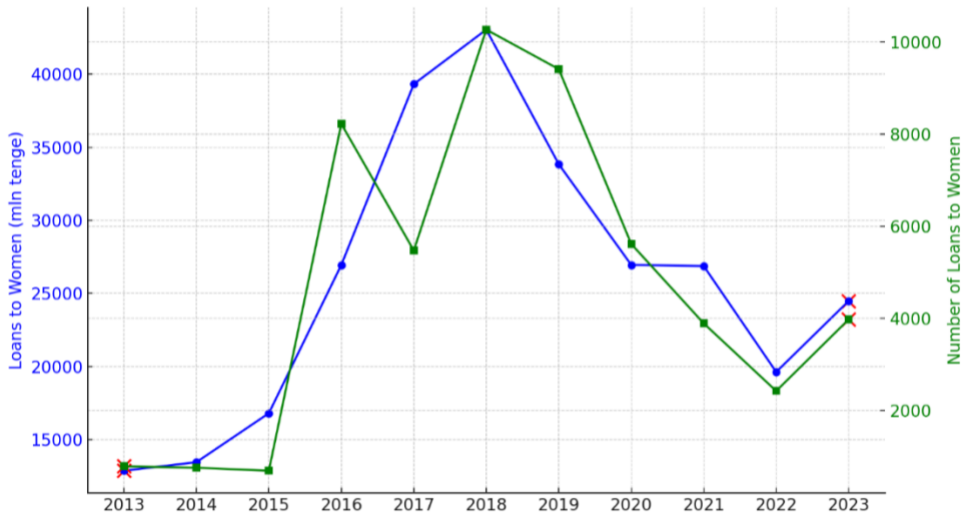

FIGURE 4. Loans issued to women: amount and quantity

The dynamics of lending to women in Kazakhstan from 2013 to 2023 demonstrates an upward trend in general until 2018: during this period, both the amounts and the number of loans issued grew steadily, and both indicators reached their peak values in 2018b, which coincides with the period of intensification of state programs to support women's entrepreneurship and expand microfinance opportunities, which created favourable conditions for involving women in financial and economic activity. However, since 2020, against the backdrop of the COVID-19 pandemic, a sharp decline in the volume and number of loans began, which continued until 2022, the weakest year in the period under review, which indicates the high vulnerability of women to global shocks, especially in

sectors where they traditionally dominate: small business, services, informal employment. In 2023, a partial recovery was observed, but the indicators remain below the 2018 level. A comparison with the previous graphs suggests that the increased concentration of the banking sector and the growth of its resources do not guarantee equal access to financing for all groups, including women. On the contrary, in the context of bank consolidation and the strengthening of risk-oriented policies, access to credit for vulnerable categories may decrease.

Thus, the analysis of three groups of indicators - banking sector resources, their concentration, and the dynamics of lending to women shows that structural changes in the banking system of Kazakhstan and external crises had different effects on different parts of the financial field. Despite the growth of total resources and the strengthening of the positions of the largest banks, the women's sector turned out to be especially sensitive to external shocks and internal transformations. It is necessary to assess the theoretical availability of loans for women based on the physical analogy with Ohm's law, which will allow a more visual and justified assessment of the correspondence between the potential of the banking system and its actual inclusiveness.

Table 2 shows results for the calculations of integrated indicators, including the results for theoretical credit accessibility indicators for women.

TABLE 2. Integrated indicators of banking resources, concentration and theoretical availability of lending to women in Kazakhstan for 2013–2023

Year	Bank resources (U)	Bank concentration (R)	Theoretical credit accessibility indicator for women (I)
2013	0,345487	0,571667	0,60435
2014	0,349291	0,553333	0,631249
2015	0,345425	0,615	0,561666
2016	0,34586	0,591667	0,584553
2017	0,34623	0,568333	0,609203
2018	0,348301	0,640333	0,543936
2019	0,34439	0,634667	0,542631
2020	0,344071	0,641333	0,536494
2021	0,343415	0,688667	0,498667
2022	0,341448	0,701333	0,486856
2023	0,342481	0,702333	0,487633

Note: compiled by authors based on calculations

The overall analysis of the theoretical credit accessibility indicator for women (I) calculated based on Ohm's model demonstrates a steady downward trend in the availability of credit resources in the context of increasing concentration in the banking sector. Despite the relative stability of total banking resources in Kazakhstan during 2013–2023 (U fluctuates in a narrow range from 0.341 to 0.349), the I value gradually decreases — from 0.631 in 2014 to 0.487 in 2023. Consequently, the growing share of assets, loan portfolio and deposits concentrated in the hands of the five largest banks (R) plays a key role in shaping the conditions for access to credit. Thus, even with a sufficient resource base, the overall availability of credit for women is theoretically declining due to the system's growing structural “resistance”. Against this background, the years demonstrating deviations from the general model are of particular interest, as they allow us to identify the influence of foreign policy and non-standard support mechanisms.

Two years deviate from the expected behaviour predicted by the model and are of particular analytical interest. The first is in 2018, when, despite one of the highest levels of banking resources over the entire period (U = 0.3483), the structural accessibility index based on the balance of resources and concentration levels in the banking sector was only 0.5439, significantly lower than the previous year

(0.6092 in 2017). The decrease in I is due to the increase in the concentration of the banking sector (R = 0.6403), which, according to the model, should have reduced access to credit. However, 2018 saw record values for the actual number and volume of loans issued to women. This discrepancy indicates that, in this case, the model calculation does not fully reflect reality. Thus, the results showed that the impact of external factors, particularly government programs to support women's entrepreneurship, which could compensate for the structural constraints inherent in the banking system and temporarily increase the inclusiveness of financial services, is also crucial. The second abnormal year is 2023. The credit availability indicator (I = 0.4876) is practically no different from the 2022 value despite a slight decrease in concentration (R decreased from 0.7013 to 0.7023) and a slight increase in the resource base (U increased to 0.3425). In 2023, a partial recovery in the activity of the women's sector is observed. Both the amount and the number of loans began to grow after a decline in 2020-2022, confirming the discrepancy between the model availability and the actual market behaviour and indicating the emergence of new incentive instruments from the state or a reorientation of the banking strategy towards retail lending. Another explanation may be the increased resilience of the women's sector to economic fluctuations after adapting to the crisis. Thus, despite the overall explanatory power of the model, individual anomalies show that in practice, the availability of credit is formed not only under the influence of quantitative resources and the structure of the banking sector but also taking into account social policy, support programs and strategies of the financial institutions themselves.

Table 3 presents standardized data on the amount and number of loans for women and calculates theoretical indicators.

TABLE 3. Comparison of theoretical credit availability with Z-standardized actual data on the amount and number of loans to women for 2013–2023

Year	Standardized amount of credits (Z)	Standardized number of credits (Z)	Theoretical credit accessibility indicator for women (I)
2013	-1,368	-1,178	0,60435
2014	-1,306	-1,187	0,631249
2015	-0,953	-1,207	0,561666
2016	0,117	1,07	0,584553
2017	1,422	0,239	0,609203
2018	1,815	1,689	0,543936
2019	0,844	1,429	0,542631
2020	0,117	0,282	0,536494
2021	0,109	-0,239	0,498667
2022	-0,655	-0,683	0,486856
2023	-0,143	-0,214	0,487633

Note: compiled by authors based on calculations

An analysis of the comparison between standardized actual lending indicators for women and the theoretical credit accessibility indicator for women (I), calculated based on the Ohm model, reveals both stable patterns and significant discrepancies between the potential capabilities of the banking system and actual results. During 2013–2023, the value of the constructed indicator of accessibility demonstrates a steady decline – from 0.631 in 2014 to 0.488 in 2023 – with relatively stable banking resources, reflecting the growth of concentration in the banking sector and the formation of institutional barriers to accessing financing. Thus, the I indicator indicates structural potential, allowing diagnosing periods in which credit market conditions were objectively more or less favourable for women's economic activity. However, a direct comparison with actual indicators reveals

discrepancies of particular analytical interest. Thus 2018, with one of the lowest values for the constructed accessibility indicator (0.544), record values were recorded for the amount and number of loans issued to women (Z = 1.815 and 1.689, respectively). The model does not consider the influence of exogenous factors, primarily government support programs, subsidies, and concessional financing mechanisms. Similarly, at the beginning of the study period (2013–2014), despite high theoretical accessibility, actual indicators were extremely low, likely due to demand-side constraints: low levels of awareness, financial literacy, or institutional barriers. Since 2020, both approaches have experienced a decline due to the pandemic; however, in 2023, there has been a partial recovery. At the same time, the calculated access index stayed limited, indicating a possible reliance on policy-driven support.

Thus, the I model is effective as a diagnostic tool: it identifies periods and areas in which the system could provide access and compares them with actual implementation. Deviations from the model indicate where additional interventions were necessary or where external incentives were effective. This does not diminish the model's value but instead emphasizes its analytical function - as a basis for building a more flexible and comprehensive forecasting tool. In the future, the model can be expanded by considering political, behavioural and macroeconomic factors, from the specifics of state support to indicators of trust and financial involvement of women. This approach will provide a deeper understanding of the mechanisms of financial inclusion and the sustainability of the women's sector in transforming the banking space.

Table 4 shows the results of the correlation analysis.

TABLE 4. Correlation relationships between theoretical availability of credit and actual indicators of women's activity

Variable	Pearson's Correlation	Loans_amount_(Z)	Loand count (Z)	Theoretical_credit_accessibility_for_women (I)
1. Loans_amount_(Z)	Pearson's r	-	-	-
	p-value			
2. Loand count (Z)	Pearson's r	0.867	-	-
	p-value	< .001		
3. Theoretical_credit_accessibility_for_women	Pearson's r	-0.148	-0.151	-
	P-value	0.665	0.658	
* p < .05, ** p < .01, *** p < .001				

Note: compiled by authors based on calculations

The correlation analysis shows that there is a weak negative relationship between the theoretical indicator of women's access to credit and the standardized values of the amount (r = –0.148) and quantity (r = –0.151) of issued loans, which is not statistically significant (p > 0.65), indicating a discrepancy between the structural potential of the banking system (estimated through the $I = U/R$ model) and the actual credit activity of women. In contrast, there is a strong positive relationship between the amount and quantity of loans (r = 0.867, p < .001). The results revealed the logical dependence: as the total volume of lending increases, the number of issued loans also increases. Thus, the model indicator I effectively reflects the conditions of the system. However, I cannot fully explain the actual results without considering additional factors such as government support, bank behaviour, and social restrictions.

4.2 DISCUSSION OF STRUCTURAL AND INSTITUTIONAL FINDINGS

A comprehensive analysis of the data for 2013-2023 confirms several findings in the literature while revealing some discrepancies.

Sarma and Pais (2011), Anand and Chhikara (2013) find that the resource base alone does not ensure equal access to finance. In the Kazakhstani context, the results show that the growth of bank resources, especially customer deposits, was accompanied by unstable dynamics of women's financial activity, especially during periods of external shocks, consistent with the findings of Ozili (2021). The author emphasizes the limitations of structural models without considering behavioral and social factors. The most significant discrepancy between the theoretical potential and the actual results was observed in 2018 when the sharp increase in lending to women did not coincide with improving institutional conditions, which is in line with the findings of Swamy (2014) and Saluja et al. (2023) on the role of external interventions and support programs in overcoming barriers. The results showed no consistent relationship between structural conditions and women's participation, which is also emphasized in the works of Beck et al. (2009), Adeyemi and Abdulmumin (2019). As pointed out by Levine (2002), a high concentration of the banking sector can create systemic barriers to equal distribution of access, which was also confirmed by the analysis results. At the same time, studies by Mishra and Sahoo (2025) and Llados-Masllorens and Ruiz-Dotras (2022) show that the formation of sustainable financial participation of women is possible only with a combination of infrastructural conditions with long-term educational and motivational support. Thus, the obtained results allow us to conclude that there is a need to revise the financial policy mechanism. In addition to assessing the liquidity and sustainability of the banking system, it is necessary to institutionalize targeted measures to ensure equal access, develop women's microfinance programs, reduce transaction and information barriers, and create specialized financial products).

5. CONCLUSIONS

The analysis confirmed the stated objective of the study — persistent discrepancy between the formally available financial resources in the banking system and the actual level of women's participation in credit relations. Despite sufficient liquidity, developed infrastructure, and growth in customer deposits, indicators of actual credit activity among women do not demonstrate stable improvement. The estimated indicator of accessibility, based on the relationship between the volume of resources and the degree of concentration, shows that even during periods of high theoretical accessibility (according to the model), the volume and number of loans received by women remained low or decreased. The results confirm the existence of systemic constraints beyond macroeconomic indicators. Consequently, it can be concluded that women's financial activity is not a derivative of economic processes. Moreover, women's economic activity has become an indicator of the sustainability and inclusiveness of growth. The indicator of women's financial inclusion is becoming a criterion for the quality of economic development since it directly reflects the ability of the financial system to ensure equal access to resources in the context of a global reorientation towards the principles of sustainability and inclusiveness. In the context of implementing the Sustainable Development Goals (SDGs), expanding women's access to finance affects not only individual economic autonomy but also sthe level of household wealth, income distribution, the dynamics of social mobility, and the sustainability of domestic consumption markets. The highest level of credit activity among women was recorded in 2018 — a period not accompanied by institutional or macroeconomic failures, the effect of the successful implementation of support programs. Further, women became less economically active, which correlates with Kazakhstan's transition to new tax mechanisms: joining the World Trade Organization, introducing electronic tax reporting, and revising the mandatory declaration system. Introducing reforms aimed at increasing transparency and tax discipline has created additional administrative and procedural barriers, which strongly affect

women engaged in entrepreneurial or self-employed activities in conditions of incomplete formalization. At the same time, excluding government programs, the banking sector has demonstrated low adaptability in lending to women, remaining fragmented and irregular. This situation indicates the need to revise the financial support model.

Increased concentration in the banking sector was accompanied by a narrowing of credit opportunities for vulnerable groups despite the growth of liquidity. The distribution structure of financial flows had a restraining effect on the implementation of potential access opportunities. Calculating the structural indicator of accessibility revealed inconsistency between theoretical parameters and actual results, especially when women's activity reached a maximum against the background of formally restrained conditions.

Comparing the theoretical indicator with empirical data, there is no direct relationship between the characteristics of the banking system and women's actual participation in credit relations. High activity rates were recorded mainly during periods of external support programs and not due to changes in conditions in the system itself. Thus, equal access to finance requires a liquidity balance and a stable institutional environment.

Along with credit measures, institutional support for women's economic activity is required: creating accessible forms of running a micro business, introducing simplified reporting for women with children, and developing tax regimes that do not depend on marital status. Particular attention should be paid to eliminating informal indicators of unreliability from financial practice - such as participation in social programs or a low declared income - which automatically reduce the chances of receiving financial services. Women's involvement should not be considered an object of compensation policy but a full-fledged sign of maturity and sustainability of the financial system. Eliminating institutional and status barriers becomes a task of social justice and a condition for systemic sustainability and economic growth.

Women's participation in the financial sector is determined by a combination of factors: market structure, level of competition, availability of adapted products, and targeted support mechanisms. If the focus is maintained exclusively on resource indicators, despite the formal stability of the banking system, there is a risk of reproducing inequality of access.

AUTHOR CONTRIBUTION

Writing – original draft: Makpal S. Bekturganova, Makpal T. Kurmasheva.
Conceptualization: Makpal S. Bekturganova, Makpal T. Kurmasheva.
Formal analysis and investigation: Makpal S. Bekturganova, Makpal T. Kurmasheva.
Funding acquisition and research administration: Makpal S. Bekturganova.
Development of research methodology: Makpal S. Bekturganova, Makpal T. Kurmasheva.
Resources: Makpal T. Kurmasheva.
Software and supervisions: Makpal S. Bekturganova, Makpal T. Kurmasheva.
Data collection, analysis and interpretation: Makpal S. Bekturganova, Makpal T. Kurmasheva.
Visualization: Makpal T. Kurmasheva.
Writing review and editing research: Makpal S. Bekturganova.

REFERENCES

Adeyemi, K. S., & Abdulmumin, B. A. (2019). Financial Inclusion in Nigeria: Are Women Disadvantaged? *Fountain University Osogbo Journal of Management, 4*(2), 93–104. Retrived from https://management.fountainjournals.com/index.php/ojm/article/view/107/90

Ariffin, A. S., Baqutayan, S. M. S., & Mahdzir, A. M. (2020). Enhancing women entrepreneurship development framework: Policy & institution gap and challenges in the case of Malaysia. *Journal of Science, Technology and Innovation Policy, 6*(2), 22-33. https://doi.org/10.11113/jostip.v6n2.58

Andriamahery, A., & Qamruzzaman, M. (2022). Do access to finance, technical know-how, and financial literacy offer women empowerment through women's entrepreneurial development? *Frontiers in psychology, 12*, 776844. https://doi.org/10.3389/fpsyg.2021.776844

Anand, S., & Chhikara, K. S. (2013). A theoretical and quantitative analysis of financial inclusion and economic growth. *Management and Labour Studies, 38*(1-2), 103-133 https://doi.org/10.1177/0258042X13498009

Beck, T., Demirguc-Kunt, A.L., & Honohan, P. (2009). Access to financial services : measurement, impact, and policies. *World Bank Research Observer, 24*, 119-145. https://doi.org/10.1093/wbro/lkn008

Bureau of National Statistics. (2024). *Bureau of National Statistics of the Republic of Kazakhstan*. Retrieved January 20, 2025 from https://stat.gov.kz/en

Cámara, N., Peña, X., & Tuesta, D. (2015). Factors that matter for financial inclusion: Evidence from Peru. *Aestimatio: The IEB International Journal of Finance, 10,* 10-31. https://doi.org/10.5605/IEB.10.1

De Vita, L., Mari, M., & Poggesi, S. (2014). Women entrepreneurs in and from developing countries: Evidences from the literature. *European Management Journal, 32*(3), 451-460. https://doi.org/10.1016/j.emj.2013.07.009

Eurasian Bank. (2023). *Godovoy otchyot 2023* [Annual report 2023]. https://kase.kz/files/emitters/EUBN/eubnp_2023_rus.pdf

Fernández-Olit, B., Martín Martín, J. M., & Porras González, E. (2020). Systematized literature review on financial inclusion and exclusion in developed countries. *International Journal of Bank Marketing, 38*(3), 600-626. https://doi.org/10.1108/IJBM-06-2019-0203

Harvard International Review. (2023, October 17). *Financial feminism: The evolution of microfinance and self-help groups in India*. https://hir.harvard.edu/financial-feminism-the-evolution-of-microfinance-and-self-help-groups-in-india/

Levine, R. (2002). Bank-based or market-based financial systems: which is better? *Journal of financial intermediation, 11*(4), 398–428. https://doi.org/10.1006/jfin.2002.0341

Llados-Masllorens, J., & Ruiz-Dotras, E. (2022). Are women's entrepreneurial intentions and motivations influenced by financial skills? *International Journal of Gender and Entrepreneurship, 14*(1), 69-94. https://doi.org/10.1108/IJGE-01-2021-0017

Maldonado-Castro, J., Gallego-Losada, R., & Montero-Navarro, A. (2024). Mapping the intellectual structure of microfinance and women's empowerment: A bibliometric analysis. *Heliyon, 10*, e39563. https://doi.org/10.1016/j.heliyon.2024.e39563

Mammen, K., & Paxson, C. (2000). Women's work and economic development. *Journal of economic perspectives, 14*(4), 141–164. https://doi.org/10.1257/JEP.14.4.141

Mishra, S., & Sahoo, C. K. (2025). Impact of Sustainable Financial Literacy and Digital Financial Inclusion on Women's Sustainable Entrepreneurial Intention. *Corporate Social Responsibility and Environmental Management*, 1–13. https://doi.org/10.1002/csr.3174

Omar, M. A., & Inaba, K. (2020). Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis. *Journal of economic structures, 9*(1), 37. https://doi.org/10.1186/s40008-020-00214-4

Ozili, P. K. (2021). Financial inclusion research around the world: A review. *In Forum for Social Economics, 50* (4), 457–479. https://doi.org/10.1080/07360932.2020.1715238

Saluja, O. B., Singh, P., & Kumar, H. (2023). Barriers and interventions on the way to empower women through financial inclusion: a 2 decades systematic review (2000–2020). *Humanities and Social Sciences Communications, 10*(1), 1-14. https://doi.org/10.1057/s41599-023-01640-y

Sarma, M., & Pais, J. (2011). Financial inclusion and development. *Journal of International Development, 23*(5), 613-628. https://doi.org/10.1002/jid.1698

Swamy, V. (2014). Financial inclusion, gender dimension, and economic impact on poor households. *World Development, 56*, 1–15. https://doi.org/10.1016/j.worlddev.2013.10.019

Wu, J., Li, Y., & Zhang, D. (2019). Identifying women's entrepreneurial barriers and empowering female entrepreneurship worldwide: a fuzzy-set QCA approach. *International Entrepreneurship and Management Journal, 15*(3), 905–928. https://doi.org/10.1007/s11365-019-00570-z

AUTHOR BIOGRAPHIES

Makpal S. Bekturganova – PhD, Institute of Economics Science Committee MSHE RK, Almaty, Kazakhstan. Email: bekturganova.makpal@gmail.com, ORCID ID: https://orcid.org/0000-0003-1708-8208

***Makpal T. Kurmasheva** – PhD candidate, University of International Business named after Kenzhegali Sagadiev, Almaty, Kazakhstan. Email: makpaltalgatkyzy@gmail.com, ORCID ID: https://orcid.org/0000-0002-4357-0287

Received on: 07 February 2025 Revised on: 25 April 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.505

The Role of Education in Reducing Income Inequality: A Regional Analysis of Kazakhstan

Saule Z. Zeinolla[1] | **Arsen T. Tleppayev**[1]* | **Rashid K. Kerimbaev**[2] | **Lazat Spankulova**[2]

[1] Kazakh-German University, Almaty, Kazakhstan
[2] Al-Farabi Kazakh National University, Almaty, Kazakhstan

Corresponding author:
*Tleppayev A.T.– PhD, Kazakh-German University, Almaty, Kazakhstan. Email: arsentlp@gmail.com

How to cite this article:
Zeinolla, S.Z., Tleppayev, A.T., Kerimbaev, R.K. & Spankulova, L. (2025). The Role of Education in Reducing Income Inequality: A Regional Analysis of Kazakhstan. Eurasian Journal of Economic and Business Studies, 69(2), 34-50.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

In the context of increasing social stratification, the assessment of factors affecting income inequality is becoming particularly important. This article examines the influence of socioeconomic factors, including access to education and human capital development, on Kazakhstan's income inequality level. The Fixed Effects Model is used as an empirical approach, allowing for consistent regional characteristics and minimizing unexplained data variability. The methodological base is built on panel data for 16 regions, covering the period from 2001 to 2022, comprising 352 observations. The regression model estimates obtained showed statistically significant correlations between the analyzed factors and the level of income inequality. In particular, an increase in the level of education and an increase in the subsistence level contribute to a decrease in the Gini coefficient (coefficient for the subsistence level = -3.32e-06; $p < 0.01$). On the contrary, an increase in the proportion of the population with incomes below the subsistence level (coefficient = 0.000766; $p < 0.01$), unemployment (coefficient = 0.010659; $p < 0.01$), as well as inflation (coefficient = 0.000851; $p < 0.01$) lead to an increase in income inequality. The results indicate that regions with higher educational opportunities and investment in human capital exhibit lower levels of inequality. The findings underscore the need to develop policies that expand access to quality education and reduce regional disparities, thereby mitigating social and economic inequality. Further research should focus on analyzing the role of educational institutions at the micro level and examining the nonlinear effects of regional education policies.

KEYWORDS: Economy, Regional Economy, Economic Development, Economic Inequality, Human Capital, Knowledge Economy, Higher Education, Unemployment

SCSTI: 06.81.23

JEL Code: I24, O15, R11

FINANCIAL SUPPORT: This research was funded by the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant "A systematic approach to monitoring, analysis and assessment of the quality of higher education in Kazakhstan" BR21882434).

1. INTRODUCTION

In Kazakhstan, a student's ability to obtain higher education primarily depends on his or her family's financial well-being. People from low-income families often face significant challenges, including limited access to quality primary education, limited awareness of available scholarships, and the economic burden of tuition fees. These factors significantly reduce their chances of enrolling in the country's leading universities. A vicious circle of inequality is reproduced: limited access to education constrains social mobility, increasing the income gap. Meanwhile, improving the availability and quality of higher education can become a powerful lever in the fight against inequality. Education expands people's economic opportunities, increasing their chances of getting a well-paid and stable job and forming a more conscious attitude to social justice, civic responsibility and involvement in public life. Investments in education are the driving force not only of personal achievements but also of the foundation of sustainable socioeconomic development. In this regard, the study of regional differences in the availability of education and its impact on income distribution is of key importance. Spatial inequality is widely recognized in modern economic science as a significant barrier to balanced regional development, especially in countries with significant socioeconomic diversity. With its significant regional differences in income, employment and infrastructure development, Kazakhstan is a vivid example of the need for a comprehensive analysis of these processes. In the modern world, the study of spatial inequality is considered one of the urgent tasks of regional economics and economic geography. At the same time, differences in the levels of development of regions can be as significant as those between individual states. The high level of socioeconomic inequality in the regions of Kazakhstan, as well as its negative consequences for the country's economic growth and the development of human capital, are alarming. In recent years, growing scholarly attention has been devoted to exploring the influence of investment in innovation and human capital on regional economic growth. This encompasses spending on research and development (R&D), technological advancement, healthcare, education, broader socioeconomic conditions within regions, and the transmission of knowledge and financial flows across them. A significant body of literature examines how such expenditures affect regional development, particularly in regions across Europe and the United States.

While much of this research focuses on intra-country dynamics, such as the movement of innovation and human capital across domestic regions, interregional spillovers between neighbouring countries are also plausible, primarily when strong economic and cultural linkages exist. Numerous studies address mutual regional influences on economic performance. However, when multiple countries are analysed collectively, researchers often treat them as a single macro-region and examine how all other regions jointly affect each region – an approach seen in Rodríguez-Pose and Crescenzi (2003), who analysed 15 European countries.

Despite this, there is limited insight into which specific regions and through which indicators exert the most significant influence on regional growth. Various methodological frameworks have been proposed to investigate the drivers of regional development. The study adopts a methodological approach similar to those applied in other countries and post-Soviet regions. These studies assess the cumulative effect of innovation and human capital spillovers from all other regions. The distinctive contribution of our work lies in disaggregating these effects, separately evaluating the impact of spillovers originating from other domestic regions and those in neighbouring countries.

2. LITERATURE REVIEW

Contemporary research on the role of endogenous factors in national economic growth can be traced back to foundational theoretical contributions from the 1950s and

1960s. Within this framework, economic growth is commonly attributed to two core components: capital accumulation and labour input, both underpinned by knowledge as a key driver. The transmission of knowledge from scientific domains to society occurs primarily through the education system. At the same time, its application to enhance societal welfare depends on effective collaboration between the scientific and business communities. At the national scale, human capital is a comprehensive category encompassing the intellectual dimension of labour resources.

Jaffe et al. (1993) highlighted the critical importance of R&D investments, emphasizing the positive impact of the geographical concentration of public and private research institutions on regional economic performance. Earlier, Aghion and Howitt (1992) introduced a three-sector endogenous growth model comprising intermediate goods production, technological innovation, and research activity. Their study also explores a U-shaped relationship between competition and innovation intensity, interpreting "knowledge" as a socially embedded phenomenon arising from individual interactions (Checchi, 2003). Using a dynamic panel model, German-Soto et al. (2021) tested the hypothesis that innovation is a principal engine of regional growth. Evidence from Mexican regions confirms this positive relationship, albeit with notable heterogeneity across territories and sectors.

Russian scholars note the limited future contribution of labour to growth under a business-as-usual scenario, projecting a negative impact until 2035 (Akindinova et al., 2017). They introduce a refined approach to growth accounting by employing a modified human capital index, which differentiates between structural and cyclical components. This framework integrates educational and health outcomes into GDP dynamics. Assuming continued investment activity and stable labour productivity trends within a moderate external environment, Russia's long-term growth rate is expected to hover around 1%. An article by Sulaiman et al. (2017) examined the long-term relationship between income inequality and economic growth in Malaysia, utilizing ARDL modelling on data spanning 1970–2014. The authors confirm the Kuznets hypothesis, which states that inequality increases in the initial stages of per capita GDP growth but declines in the long run. Education and foreign direct investment contribute to reducing inequality, whereas trade openness, on the contrary, tends to increase it. The study is notable for its use of a long time series and a focus on policy recommendations to support the bottom 40% of the income population. Ramos et al. (2012) examined the effect of overeducation on regional economic growth in the European Union. Using panel data and micro-level information from IPUMS-I, the authors show that the overall level of education and the mismatch between education and employment significantly affect growth. Both formal education indicators and the presence of "overeducated" workers have a positive effect, especially at the regional level. The work emphasizes the importance of considering the qualitative aspects of human capital when developing regional economic policy. In addition to the costs of innovation, the region's human capital factors and socioeconomic conditions are essential for economic growth. In this direction, the results of Ashirbekova et al. (2023) are interesting, as they study the dynamics and differentiation of incomes among the population of Kazakhstan using statistical and factor forecasting methods. A survey of 7475 respondents revealed significant inequality: more than half of the respondents experience difficulties even with basic expenses. The constructed regression model significantly impacted income from factors such as minimum wage, pension, and subsistence minimum. The Gini coefficient calculated based on the survey data (0.735) differs significantly from the official one (0.281), indicating a deep level of subjective polarization. The work emphasizes revising social standards and developing policies to reduce inequality.

Contemporary research demonstrates a robust link between educational characteristics

and levels of social inequality (Yang & Chan, 2017). One of the most comprehensive studies is the meta-regression analysis by Abdullah et al. (2015), which, based on data from 44 countries, shows that improvements in educational indicators, including enrollment and years of schooling, lead to a decrease in the Gini coefficient. Chicchi (2003) analyzed the relationship between income inequality and access to education, using data from 108 countries from 1960-1995. The results show that high-income inequality limits access to education, especially at the secondary level, with gender differences pointing to the impact of financial constraints on families. Coady and Disioli (2017) also emphasized the need to consider differences across age groups and countries, indicating that the impact of education on inequality is more substantial in developing countries. Sylwester (2003) found a small but inverse effect of college attendance on income inequality. A cross-national study by Jeng et al. (2019) showed a similar picture: higher levels of education are associated with lower inequality, although the effect varies by region and economic situation. The study by Agranovich and Dreneva (2021), based on data from OECD countries and Russia, adds an international perspective. The authors found a negative relationship between educational attainment, enrollment, education financing, and the Gini coefficient. The relationship between years of schooling (r=-0.64), education financing, and inequality was robust. A positive correlation was also found between inequality and class size and the proportion of students with low PISA scores. This emphasizes the role of educational coverage and the quality of the educational environment. The evidence confirms that access to education, as well as the structure, organization, and financing of the education system, significantly impact the level of social inequality. These effects vary depending on the stage of development and the country's institutional structure.

Education is considered one of the key mechanisms for reducing income inequality, especially in developing and transition economies (Gylfason & Zoega,2003). Mauro and Carmeci (2003) analyzed data from 19 OECD countries and demonstrated that investment in education contributes to economic growth. However, its effectiveness decreases when unemployment rates are high. This confirms the importance of considering the labour context when formulating education policy. Verbic et al. (2009) provided evidence from Slovenia that increasing public expenditure on education, combined with tax reductions, can foster GDP growth while contributing to a more equitable income distribution. In a related context, Sapkota and Bastola (2015) demonstrate that periods of economic recession in the United States are associated with rising college enrollment rates, which, over time, support a reduction in income disparities. However, the relationship between education and labour market outcomes is more complex in countries facing elevated youth unemployment. For example, Alçin et al. (2021) find that expanding access to tertiary education does not necessarily reduce youth unemployment, especially when there is a structural mismatch between the qualifications the education system provides and the actual labour market demands.

Social and family factors also play an important role. Lehti et al. (2019) and Coelli (2009) show that parental job loss significantly reduces young people's chances of continuing education, which can perpetuate intergenerational inequalities. These studies highlight the importance of providing targeted social support to students and adopting a comprehensive approach to education policy.

Thus, it can be concluded that theoretical and practical views on economic growth and inequality, considered in the literature, highlight the important role of human capital, education and innovation as internal driving forces of sustainable development. In light of the increasing socioeconomic stratification in the regions of Kazakhstan, studying how access to education and its level can affect income inequality is particularly relevant. Research confirms that investments in education and health care, and forming a favourable

institutional environment, serve as the foundation for inclusive and equitable development. However, there is also a reverse perspective. Without a targeted and regionally balanced educational policy, an increase in educational level may not significantly affect combating inequality or may even exacerbate it under unequal access to opportunities.

3. RESEARCH METHODS

This paper uses a quantitative approach using econometric modeling based on assessing the key determinants (factors) affecting the development of domestic tourism in Kazakhstan. In addition, for the reliability of the analysis, other methods were used, including SWOT analysis, to assess the strengths and weaknesses, opportunities and threats shaping the tourism industry.

This study uses an econometric model to analyse the impact of key macroeconomic factors on the level of income inequality in Kazakhstan, measured using the Gini coefficient (GINI). The panel data method with fixed effects was used to estimate the parameters, which allows for considering the unchanging regional characteristics that affect inequality. The Gini coefficient is regarded as a dependent variable, and indicators such as consumption income, inflation, subsistence minimum, the share of the population below the subsistence minimum, and the unemployment rate are considered explanatory variables. Panel data combines time series and data on several subjects (individuals, companies, countries, etc.).

Panel data models:

- Fixed Effects (FE) model - considers the individual characteristics of each object that do not change over time.

- Random Effects (RE) model - assumes that the individual characteristics of the objects are random and uncorrelated with the explanatory variables. The Hausman Test chooses between fixed effects (FE) and random effects (RE) models.

Test hypotheses:

H0 (null hypothesis): there is no difference between the FE and RE estimates, and random effects are consistent.

H1 (alternative hypothesis): random effects are correlated with explanatory variables. Therefore, the fixed effects model is preferable.

The FE model is more suitable if individual effects are not random and depend on explanatory variables. The RE model is more efficient if individual differences are random and uncorrelated with independent variables.

The model uses data from 2001 to 2022 and covers 16 regions of Kazakhstan, with 352 observations in total. The Gini index was calculated using the following functional relationship according to formula (1):

$$Gini = f\left(\begin{matrix}\text{CONSINC,INFL,PRMIN,}\\ \text{UNDERPRMIN,UNEMPL}\end{matrix}\right) \quad (1)$$

where:

CONSINC – average consumption income (in tenge);

INFL – inflation rate (in percentage);

PRMIN – poverty relief minimum (in tenge);

UNDERPRMIN – proportion of population with income below the poverty relief minimum (in percent);

UNEMPL – unemployment rate (in percent).

4. RESULTS AND DISCUSSION

The study involved constructing an econometric model to identify and quantify the key factors influencing the number of domestic tourists. The model was estimated using the ordinary least squares (OLS) method based on data from 2013–2024. The econometric analysis included an estimate of the regression coefficients (Table 1), an analysis of their statistical significance, and a test of the model for autocorrelation (Table 2). Additionally, graphs were constructed to demonstrate the trends of the variables under study (Figure 2) and time series (Figure 3).

In Table 1, there are results for least squares model.

TABLE 1. Least squares model, observations from 2013-2024

Predictor	Coefficient	St. error	Statistics	P-value
Const	-4.98584e+06	1.96140e+06	-2.542	0.0440
GDP	0.0508075	0.0117957	4.307	0.0051
Share_of_tourism_GDP	447484	170463	2.625	0.0393
Organizations	637.838	277.987	2.294	0.0616
Accommodation_Revenue	-0.00481190	0.00592297	-0.8124	0.4476
Hotel_Occupancy	115301	69385.9	1.662	0.1476

Note: compiled by authors

This section presents the main empirical results of the study and their interpretation in terms of the influence of socioeconomic factors on the level of income inequality in the regions of Kazakhstan. Based on the constructed econometric model of panel data, a quantitative analysis of the relationship between the Gini coefficient and several explanatory variables was carried out, including consumption income, inflation, subsistence minimum, unemployment rate and share of the population living below the subsistence minimum. The coefficients obtained allow us to estimate the direction and strength of the impact of each factor on income inequality.

The analysis covers the period from 2001 to 2022 and reflects both long-term trends and short-term fluctuations at the regional level. Additionally, graphic materials illustrate the dynamics of key indicators by regions and cities of national significance. This allows for a deeper understanding of territorial differences and identification of patterns characteristic of individual regions. The discussion of the results is carried out considering the current context of the country's economic development, including structural reforms, regional programs and educational policy. This approach provides a comprehensive understanding of the mechanisms by which inequality is formed and can serve as a basis for recommendations for reducing it. Consumer income growth is observed in almost all regions of the country (see Figure 1).

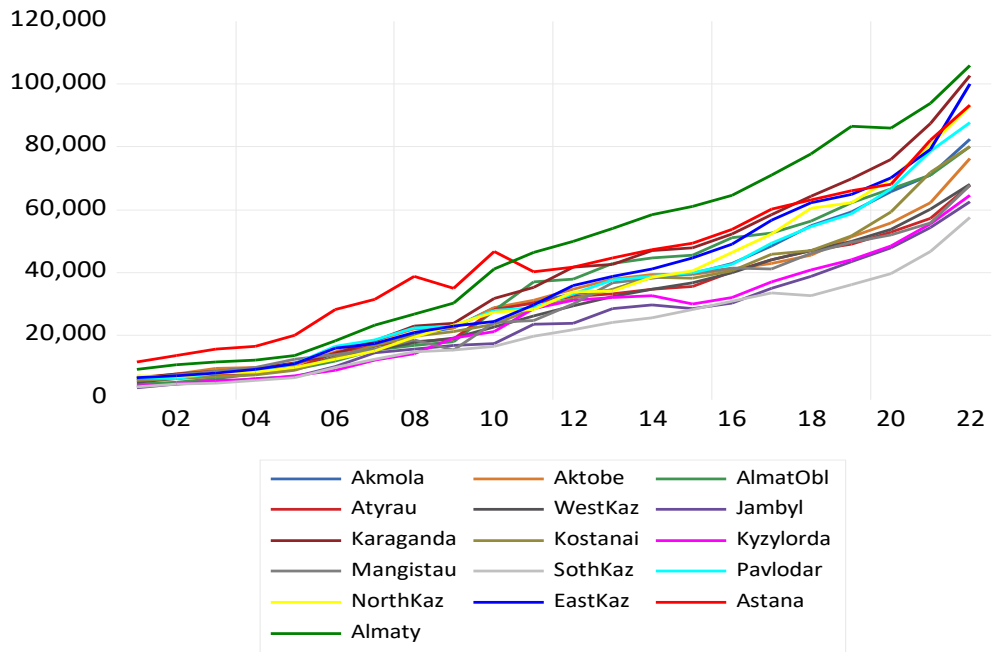

FIGURE 1. Dynamics of consumption income by regions of Kazakhstan for 2000-2022

Figure 1 shows the dynamics of consumption income for different regions of Kazakhstan from 2000 to 2022. The graph shows the trajectory of consumption income for each region, which generally differs in the growth trend, but the nature of the growth is not uniform. For example, Almaty's income dynamics have been growing steadily over time, showing an increase in income. At the same time, the indicators for Astana also show growth but with sharper fluctuations. The graph shows that most regions show an upward trend, indicating that consumption income in most regions increased in the period under review. Some lines intersect, which means a change in the rank of regions by income level at different points in time, and it is essential to understand how this affects inequality in general.

Figure 2 shows the dynamics of the funds ratio for different regions and cities of national significance.

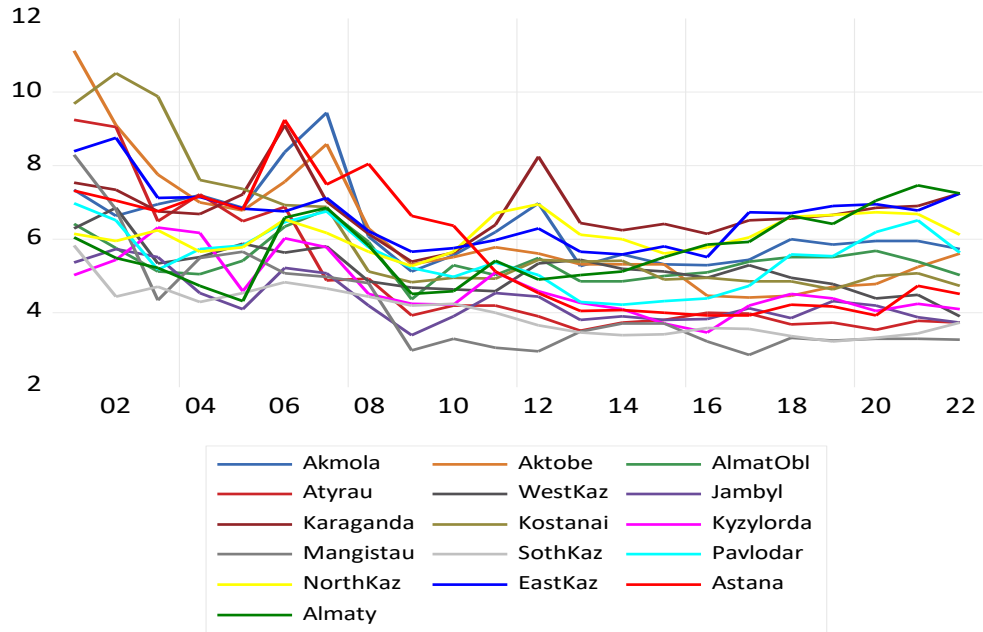

FIGURE 2. Dynamics of the fund coefficient by regions and cities of republican significance in Kazakhstan for 2000-2022

The fund's ratio reflects the ratio of investment volume to the size of the economy or income, which indicates investment activity or capitalization in the country for more than twenty years. The data show fluctuations in the fund's ratio over time for each region, with some sharp ups and downs, which may reflect changes in investment policy, economic climate or other external factors affecting the stock market or investment activity.

Overall, the trajectories of the lines exhibit considerable volatility, reflecting the variability of the fund ratio across different regions during the analyzed periods. The average value of fluctuations in the fund ratio across all regions and years is approximately –0.101, indicating a slight downward trend over time. The following cases are among the most notable changes in the coefficient of funds. In Akmola region (2008), the coefficient decreased by 3.3662, falling from 9.4318 in 2007 to 6.0656. In Atyrau region (2003), a significant decline of 2.5543 was recorded. A similar reduction occurred in Mangistau region (2003), amounting to 2.4715, and in Aktobe region (2008), where the coefficient declined by 2.2938. Conversely, substantial growth was observed in Astana city (2006), with an

increase of 2.4225, and in Almaty city (2006), where the increase reached 2.2683. These fluctuations suggest that, over the past two decades, major investment flows and income growth have been predominantly concentrated in the two major urban centers (Astana and Almaty), rather than in the peripheral regions.

Particular attention should be paid to changes in the Gini coefficient, which vary by region and year (see Figure 3).

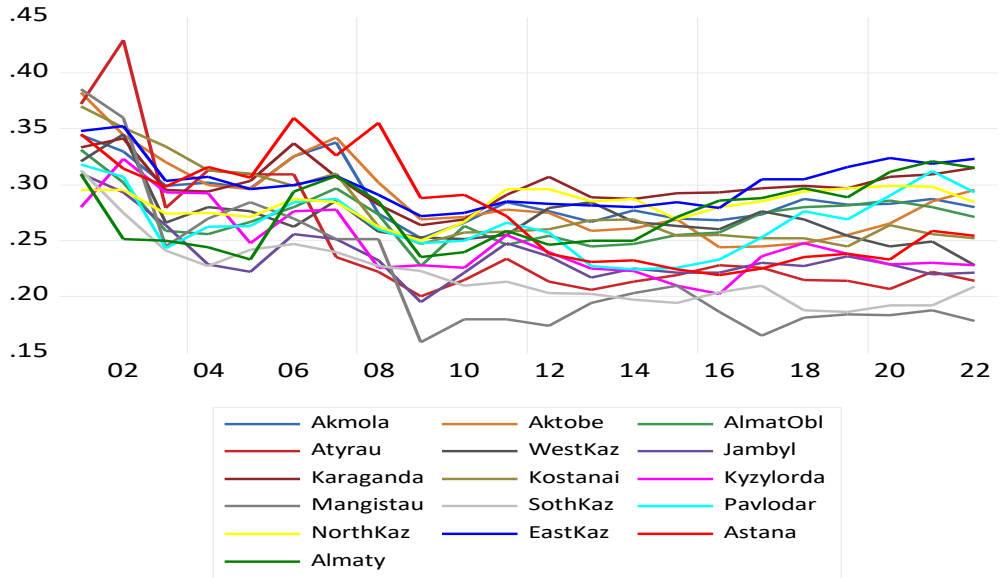

FIGURE 3. Dynamics of the Gini coefficient by regions and cities of republican significance of Kazakhstan for 2000-2022

The Gini coefficient ranges from 0 to 1, where 0 indicates perfect equality (everyone in society has the same income) and 1 indicates perfect inequality (one person gets all the income and everyone else gets nothing). The average Gini coefficient, about 0.267, measures a society's degree of income inequality (see Table 1).

TABLE 1. Descriptive characteristics of variables

Parameter	Gini	Income used for consumption	Inflation	Minimum subsistence level	Proportion of population living below the subsistence level	Unemployment rate
Mean	0.266901	33395.85	108.4000	17474.02	13.20521	6.394483
Median	0.268500	30483.50	107.3000	15865.00	5.300000	5.400000
Max	0.429000	105896.1	127.1000	52367.00	70.70000	13.90000
Min	0.159000	3421.500	103.2000	3685.000	0.400000	4.400000
Standard Error	0.041906	22545.75	4.054662	10855.40	15.85969	1.946484
Skewness	0.179925	0.737149	2.139501	0.783766	1.630829	1.277307
Kurtosis	3.316653	2.965032	7.268138	2.910611	4.612429	4.016619

Note: calculated by the authors in the Eviews program

The value of 0.267 indicates a moderate level of inequality in income distribution across regions of Kazakhstan. This is a relatively low value of the Gini coefficient, which may indicate a more equal income distribution in society compared to other countries where the Gini coefficient may be higher.

In the context of economic policy, countries strive to reduce the Gini coefficient through various social and economic measures such as

taxation, social payments and economic growth in poor regions to reduce economic inequality and improve the social well-being of the population.

Significant changes in the Gini coefficient over the specified period were observed in several regions. In Atyrau region in 2003, the most notable drop in the Gini coefficient was recorded, with a decrease of 0.150 compared to the previous year, indicating a sharp decline in inequality. In Mangistau region in 2003, the coefficient decreased by 0.115, reflecting a substantial reduction in income disparity. Another significant decrease was registered in Mangistau in 2009, amounting to 0.092. In East Kazakhstan in 2003, the Gini coefficient fell by 0.079, while in Atyrau in 2007 the decline was 0.074.

These significant changes likely reflect the impact of economic strategy, income redistribution, or other socioeconomic factors that have caused changes in inequality in these areas. During the period under review, the Gini coefficient changed 73 times, indicating instability of this indicator across the country. One of the key indicators is the cost of living, fluctuations of which directly affect the level of social well-being (see Figure 4).

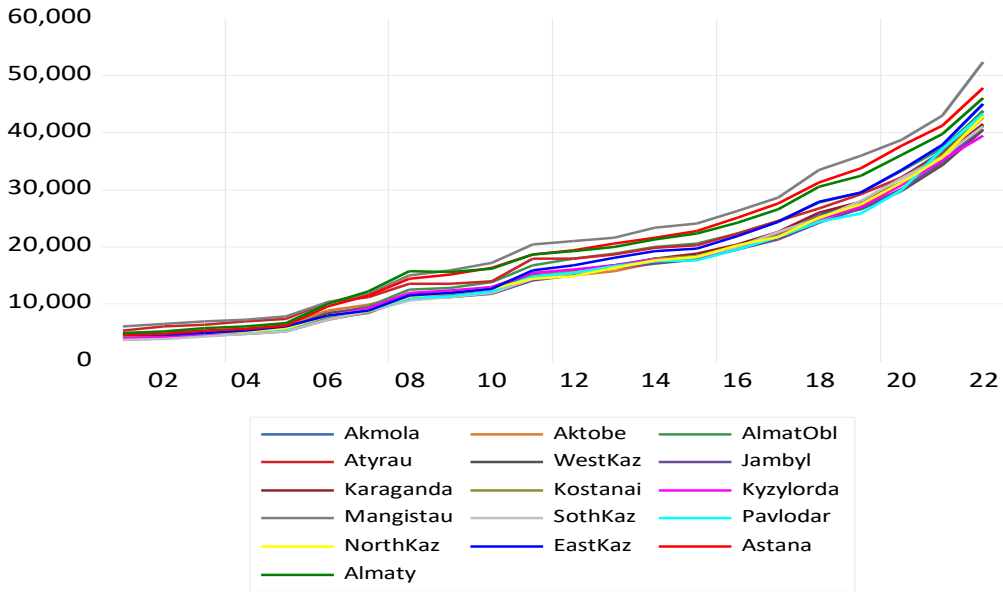

FIGURE 4. Changes in the subsistence minimum indicator by regions and cities of republican significance of Kazakhstan for 2000-2022

To analyze the dynamics of the subsistence minimum in Kazakhstan, key indicators and deviations from average values are considered. The subsistence minimum is commonly used as a criterion for determining the minimum income required to meet basic human needs, and changes in this indicator can significantly impact the economic well-being of the population. The average cost of living for the period under review was 17,474.02, which shows the basic cost of living in different areas. The highest cost of living was 52.367, which may indicate periods of economic growth or inflation. The lowest was 3.685, which may indicate economic crises or a significant drop in living costs in specific periods. The standard deviation of the cost of living was 10.855.4, which indicates significant fluctuations in this indicator over the years.

Analysis of the dynamics shows significant fluctuations in the cost of living in different regions and periods. The most considerable deviations can be associated with economic factors, such as changes in the state's economic policy, inflation, or the influence of international economic conditions. Particularly

noticeable changes in the cost of living can be observed during periods of economic crises, which can accompany an increase in the number of people below the poverty line.

An increase in the proportion of the population living below the subsistence level indicates an increase in poverty and inequality (see Figure 5).

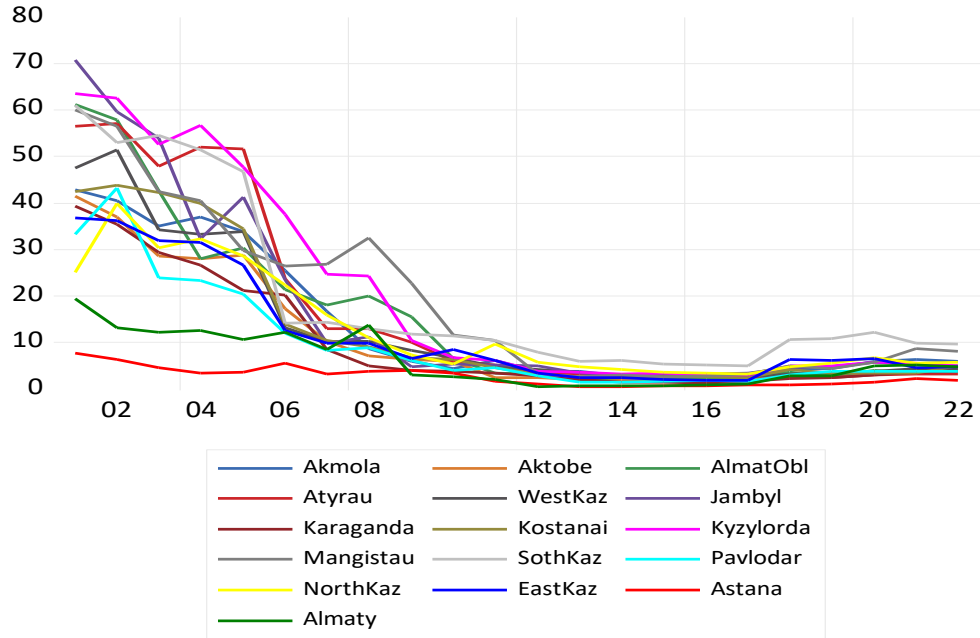

FIGURE 5. Change in the number of people with incomes below the subsistence level by regions and cities of republican significance of Kazakhstan for 2000-2022

The diagram shows the indicator's dynamics characterising the population's share below the poverty line, directly affecting the Gini coefficient. This means that the growth in the number of poor people increases economic inequality. The overall picture of the dynamics of the share of the population living below the poverty line indicates uneven distribution by region. Impact on the Gini coefficient: The growth of this indicator indicates an increase in income inequality, which is important for developing social policy and measures to combat poverty. The indicator demonstrates a statistically significant impact on income inequality, as confirmed by t-test results and the corresponding p-values. Fluctuations in the share of individuals with incomes below the subsistence level may reflect broader economic downturns or shifts in state social policy. These dynamics require detailed examination to uncover their root causes and inform the development of effective policy countermeasures. A sustained increase in the proportion of the population living below the poverty line can exacerbate social tensions and have detrimental effects on public health and general societal well-being.

The unemployment rate, as one of the important economic factors, also has an impact on inequality (see Figure 6).

The graph illustrates the dynamics of the unemployment rate, which is one of the key factors influencing the Gini coefficient and has a strong positive correlation with economic inequality. The average unemployment rate across the observed regions and periods is 6.394%, with fluctuations ranging from a minimum of 4.4% to a maximum of 13.9%, indicating a high degree of variability depending on macroeconomic conditions and regional characteristics. The standard deviation of the indicator is 1.946, which suggests a considerable level of instability in unemployment levels across different areas.

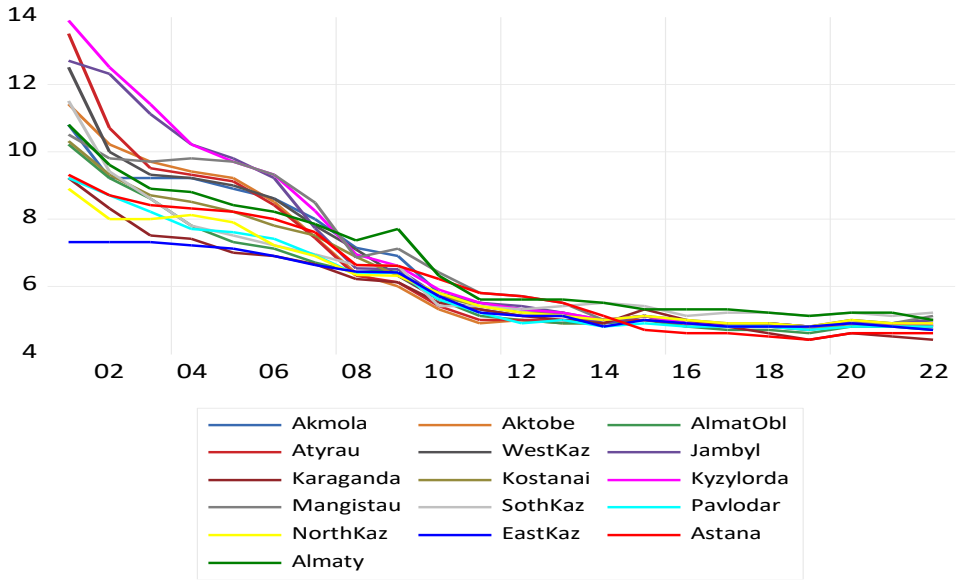

FIGURE 6. Changes in unemployment rates by regions and cities of republican significance in Kazakhstan for 2000-2022

Notably, the maximum value of 13.9% likely reflects periods of economic downturn or structural transformation in the regional labor markets. In contrast, the lowest value of 4.4% may correspond to phases of relative financial stability or the effectiveness of targeted employment policies.

In addition, a correlation matrix was constructed to assess interrelationships among the variables included in the model. The analysis of correlation coefficients revealed both expected and potentially ambiguous associations, requiring further interpretation in the context of regional and temporal specifics.

Futhermore, correlation analysis confirmed the link between poverty, unemployment and the level of inequality (see Figure 7).

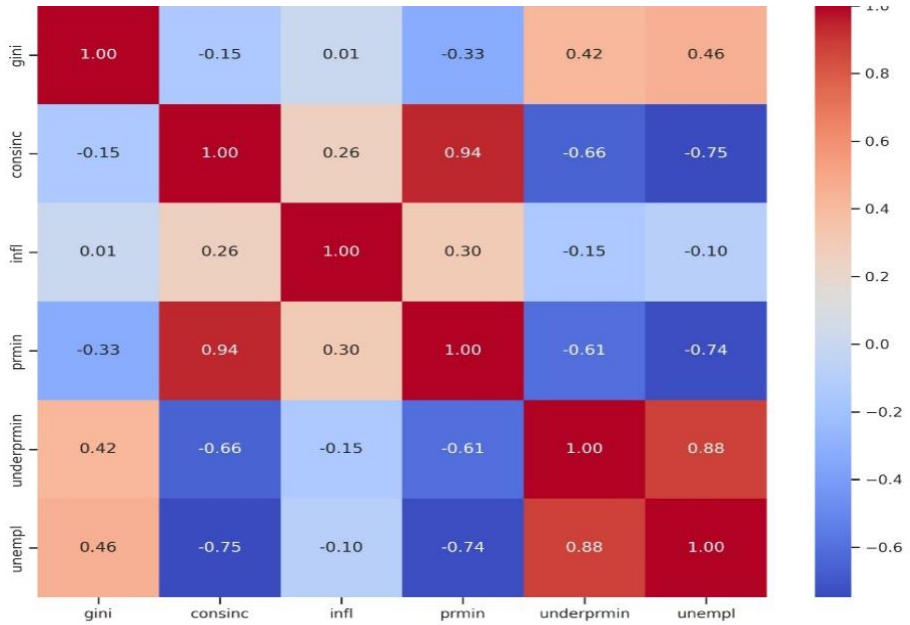

FIGURE 7. Correlation matrix

The most pronounced positive correlation is observed between the Gini coefficient, the unemployment rate (r = 0.46), and the share of the population with incomes below the subsistence level (r = 0.42). This confirms the hypothesis that the growth of unemployment and poverty contributes to increased income inequality. On the contrary, the subsistence level demonstrates a moderately negative correlation with the Gini coefficient (r = -0.33), which may indicate a compensating role of social support in reducing inequality. Of particular interest are the robust correlations observed between certain independent variables, most notably between consumption income and the subsistence minimum (r = 0.94), as well as between the unemployment rate and the proportion of the population living below the poverty line (r = 0.88). Such values indicate the possible presence of multicollinearity, which can distort the regression analysis results. In such cases, additional diagnostics and, if necessary, model adjustments are recommended. In general, the correlation analysis confirms the significance of the selected variables. It allows for a more reasonable interpretation of their impact on the level of income inequality in the regions of Kazakhstan. A matrix of scatter plots was constructed to visually assess the nature of the relationships between the model variables. This tool allows us to see the presence of linear and nonlinear dependencies between variables and identify potential outliers and distribution features. A visual representation of the relationships between the variables of the model is presented in the form of scattering diagrams (see Figure 8).

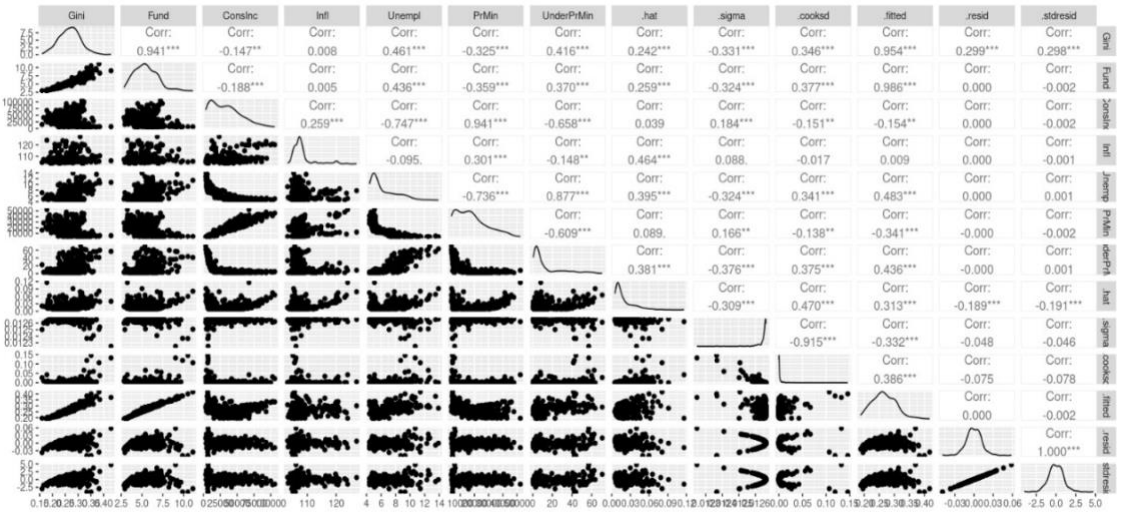

FIGURE 8. Scatterplot Matrix

The graphs clearly show a positive relationship between the variables consinc (consumption income) and prmin (subsistence minimum), which is logical from the point of view of economic content: income growth is accompanied by an increase in the subsistence minimum. Also, one can note the dense clustering of points between unempl (unemployment rate) and underprmin (the share of the population below the poverty line), which indicates a strong relationship between unemployment and poverty in the regions.

Some variables demonstrate curvilinear or weakly expressed relationships. For example, the relationship between gini and infl (inflation) is not visually pronounced, which is confirmed by the low correlation coefficient. However, there is a diagonal trend between gini and underprmin, as well as gini and unempl, indicating a positive relationship.

In addition, the diagonal histograms of the variable distribution indicate the presence of asymmetry and different density of values, which may affect the model's specification. This is

especially noticeable for the variables unempl and underprmin, which are unevenly distributed and have long tails. Thus, visual analysis of scatterplots complements quantitative assessments and allows for a better understanding of the data structure before building a model. A Hausman test was performed to compare fixed and random effects, and the results showed that the fixed effects model was preferable (Table 2).

TABLE 2. Hausman test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	29.745977	5	0.0000

Note: calculated by authors in the Eviews program

The statistical significance of the explanatory variables and the outcomes of the Hausman test support the robustness and validity of the chosen econometric specification. The findings reveal the directional influence of each factor on income inequality and provide an empirical foundation for shaping targeted socioeconomic policies aimed at its mitigation. A detailed presentation of the model estimations and the interpretation of results is provided in the following sections. Specifically, the model investigates the relationship between the Gini coefficient, used as a proxy for income inequality, and a range of economic indicators and structural conditions.

The resulting regression specification is summarized in Table 3.

TABLE 3. Panel data model for Gini

Variable	**Coefficient**	**Standard Deviation**	**t-statistics**	**Probability**
CONSINC	2.12E-06	2.43E-07	8.710068	0.0000
INFL	0.000851	0.000323	2.636149	0.0088
PRMIN	-3.32E-06	4.91E-07	-6.771422	0.0000
UNDERPRMIN	0.000766	0.000194	3.943869	0.0001
UNEMPL	0.010659	0.001891	5.636876	0.0000
C	0.083823	0.033341	2.514127	0.0124

Note: calculated by authors in the Eviews program

The interpretation of the estimated regression coefficients provides insights into the influence of selected socio-economic indicators on income inequality in Kazakhstan. The positive coefficient for consumption income (2.12E-06) indicates that income inequality tends to increase as average consumer income rises. This may suggest that income growth is unevenly distributed across different social groups, with higher-income households benefiting more from economic expansion. The coefficient for inflation (0.000851) is also positive, implying that higher inflation is associated with greater inequality. Conversely, the negative coefficient for the subsistence minimum (–3.32E-06) suggests that raising the poverty threshold is related to a decrease in inequality, possibly reflecting the effectiveness of social policy interventions aimed at supporting vulnerable populations. Additionally, the positive coefficient for the share of people with income below the subsistence minimum (0.000766) confirms that as poverty deepens, income inequality worsens. Finally, the coefficient for unemployment (0.010659) is also positive, indicating that rising unemployment levels contribute to increasing disparities in income distribution.

The main variables included in the model demonstrate varying effects on the Gini coefficient, reflecting their influence on

income inequality. Consumption income positively impacts the Gini coefficient, suggesting that economic inequality tends to rise as consumer income increases, potentially due to uneven income distribution across population segments. Inflation also shows a positive relationship with the Gini coefficient, indicating that high inflation may disproportionately affect lower-income groups, thereby exacerbating inequality. In contrast, the cost of living negatively impacts the Gini coefficient, which may imply that increases in the subsistence minimum contribute to reducing inequality, possibly through effective social protection mechanisms. The poverty rate positively correlates with the Gini coefficient, suggesting that a higher proportion of the population living below the poverty line correlates with increased inequality. Finally, the unemployment rate significantly positively affects the Gini coefficient, confirming that higher unemployment contributes to growing economic disparities.

The t-test and p-levels confirm the statistical significance of all indicators, indicating the reliability of the results. The model also includes country-fixed effects, considering unaccounted country characteristics that can affect the Gini coefficient. The R-squared of the model is 0.734, indicating that the model explains about 73.4% of the variations in the Gini coefficient. This model provides a deeper understanding of the factors affecting economic inequality in different countries and can be a basis for developing policies to reduce inequality and increase economic welfare.

5. CONCLUSIONS

The model and the information provided give grounds to believe that significant indicators lead to the consequences of the income gap in Kazakhstan. The increase in consumption income and the fluctuations directly depend on the colour, confirming the power of state policy in social support and economic management for the governance gap. The cost of living and unemployment also play a key role in shaping the socioeconomic structure of society and income distribution.

Further in-depth analysis of each region separately, taking into account the specifics of its economic development and social policy, is required for a more detailed analysis and interpretation of the data and for developing specific proposals for improving inequality. Based on the data obtained, the following general recommendations can be formulated based on areas of activity.

Social support: Strengthen social support for the most vulnerable segments of the population, especially in regions with a high proportion of the population with an income below the subsistence minimum.

Economic incentives. The design and implementation of targeted economic incentives to reduce unemployment and foster entrepreneurship can significantly promote a more equitable income distribution—inflation control. Maintaining effective inflation control mechanisms is essential to protecting living standards, particularly in regions experiencing elevated price increase rates, where inflation disproportionately affects low-income households.

Regional development: Promote regional development through investment in infrastructure, education and health care, which can reduce regional disparities and help reduce inequality.

The presented model and analysis allow us to conclude that economic and social factors significantly impact inequality in Kazakhstan. To achieve significant results in the fight against inequality, it is necessary to implement comprehensive measures to improve the population's economic well-being and reduce the social gap between different segments of society and regions of the country. A detailed analysis of each aspect of the model and graphs requires significant work and is beyond the scope of this answer. However, the presented review provides directions for further research and practical actions in the fight against inequality in Kazakhstan.

Several specific recommendations can be proposed based on analysing Kazakhstan's

income inequality model and considering foreign experience in this area. These recommendations include proven approaches and innovative methods that can help reduce inequality.

1. Redistribution of profits through the tax system.

Progressive income tax, as well as wealth and inheritance taxes. This practice is widespread in Scandinavia and helps reduce income gaps without slowing economic growth and introducing or increasing taxes on wealthy citizens while reducing the tax burden on the poor, tightening control over tax payments, and combating tax evasion.

2. Improving access to excellent education

Human capital theory states that investing in education increases productivity and stimulates economic development. Providing equal opportunities for quality education for all groups is critical to reducing inequality and expanding programs to help students from low-income families, including scholarships and subsidies, to improve education quality in rural and remote areas.

3. Developing the labour market and reducing unemployment

Efficient employment policies, including support for job creation, vocational training and retraining, are essential for reducing income gaps. Germany sets a positive example with its dual vocational education and training system, successfully integrating young people into the labour force. Policies should also include measures to stimulate businesses to create jobs, especially in high-tech and environmentally friendly industries. In addition, developing continuing education and advanced training programmes that meet the changing demands of the modern labour market is critical for the flexibility of the workforce.

4. Social support and protection

The concept of the welfare state assumes an active role for governments in providing social protection and reducing poverty. Expanding social support programs, such as unemployment benefits, child benefits, and assistance to the elderly, can mitigate income inequality and protect vulnerable groups. Moreover, introducing social insurance mechanisms helps reduce the risks associated with loss of earnings and increases overall economic stability.

5. Infrastructure and regional development

Renewal of infrastructure and promotion of regional growth to reduce interregional differences, which leads to a more equitable distribution of economic opportunities and a reduction in social stratification. Investments in transport, communications, healthcare and education in less developed regions. Support for small and medium-sized businesses in the regions. These measures require a comprehensive approach and coordination of actions at all levels of government, as well as the active participation of the public and businesses. Foreign experience confirms that reducing inequality is possible with targeted policies and investments in the social sphere and education.

AUTHOR CONTRIBUTION

Writing – original draft: Saule Z. Zeinolla, Arsen T. Tleppayev, Rashid K. Kerimbaev.
Conceptualization: Saule Z. Zeinolla, Arsen T. Tleppayev, Lazat Spankulova.
Formal analysis and investigation: Saule Z. Zeinolla, Arsen T. Tleppayev, Rashid K. Kerimbaev
Funding acquisition and research administration: Saule Z. Zeinolla, Arsen T. Tleppayev, Lazat Spankulova.
Development of research methodology: Saule Z. Zeinolla, Arsen T. Tleppayev, Rashid K. Kerimbaev.
Resources: Saule Z. Zeinolla, Arsen T. Tleppayev, Rashid K. Kerimbaev
Software and supervisions: Saule Z. Zeinolla, Arsen T. Tleppayev, Lazat Spankulova.
Data collection, analysis and interpretation: Arsen T. Tleppayev, Rashid K. Kerimbaev
Visualization: Saule Z. Zeinolla.
Writing review and editing research: Saule Z. Zeinolla, Arsen T. Tleppayev, Lazat Spankulova.

REFERENCES

Abdullah, A. J., Doucouliagos, H., & Manning, E. (2015). *Does education reduce income inequality? A meta-regression analysis*. https://doi.org/10.1111/joes.12056

Aghion, P., & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica, 60*(2), 323–351. https://doi.org/10.2307/2951599

Agranovich, M. L., & Dreneva, A. A. (2021). How are the characteristics of national educational systems related to social inequality? *The Education and Science Journal, 23*(9), 81–114. https://doi.org/10.17853/1994-5639-2021-9-81-114 (In Russ.)

Akindinova, N. V., Chernyavskiy, A. V., & Avdeeva, D. A. (2017). Effectiveness of budget expenditures in Russia and OECD countries. *Issues of Economics, 2,* 30–61. https://doi.org/10.32609/0042-8736-2017-2-30-61 (In Russ.)

Alçin, S., Erdil Şahin, B., & Hamzaoğlu, M. (2021). Analysis of the relationship between education and youth unemployment: Evidences from Turkey and Spain. *Journal of Life Economics, 8*(2), 185–192. https://doi.org/10.15637/jlecon.8.2.04

Ashirbekova, L. Zh., Sansyzbayeva, Kh. N., Askerov, A. A., & Grabowska, M. (2023). Incomes of the population of Kazakhstan: Differentiation and forecast. *Eurasian Journal of Economic and Business Studies, 67*(2), 119–132. https://doi.org/10.47703/ejebs.v2i67.289

Checchi, D. (2003). Inequality in incomes and access to education: A cross-country analysis (1960–1995). *Labour, 17*(2), 153–201. https://doi.org/10.1111/1467-9914.00226

Coady, D., & Dizioli, A. G. (2017). Income inequality and education revisited: Persistence, endogeneity and heterogeneity. *Applied Economics, 50*(25), 2747–2761. https://doi.org/10.1080/00036846.2017.1406659

Coelli, M. B. (2009). *Parental job loss, income shocks and the education enrolment of youth* (Research Paper No. 1060). University of Melbourne.

German-Soto, V., Soto Rubio, M., & Gutierrez Flores, L. (2021). Innovation and regional economic growth: Evidence from Mexico. *Problemas del Desarrollo, 52*(205). https://doi.org/10.22201/iiec.20078951e.2021.205.69710

Gylfason, T., & Zoega, G. (2003). Education, social equality and economic growth: A view of the landscape. *CESifo Economic Studies, 49*(4), 557–579. https://doi.org/10.1093/CESIFO/49.4.557

Jaffe, A. B., Trajtenberg, M., & Henderson, R. (1993). Geographic localization of knowledge spillovers as evidenced by patent citations. *The Quarterly Journal of Economics, 108*(3), 577–598. https://doi.org/10.2307/2118401

Jeng, R., Gane, J., & Lages, R. (2019). *Effect of education on income inequality: A cross-national study*. https://www.semanticscholar.org/paper/12ef1ea734cd2928d170be4a77008f9669c279f9

Lehti, H., Erola, J., & Karhula, A. (2019). The heterogeneous effects of parental unemployment on siblings' educational outcomes. *Research in Social Stratification and Mobility, 64*, 100439. https://doi.org/10.1016/j.rssm.2019.100439

Mauro, L., & Carmeci, G. (2003). Long run growth and investment in education: Does unemployment matter? *Journal of Macroeconomics, 25*(1), 123–137. https://doi.org/10.1016/S0164-0704(03)00010-7

Ramos, R., Surinach, J., & Artís, M. (2012). *Regional economic growth and human capital: The role of overeducation*. Grup d'Anàlisi Quantitativa Regional (AQR-IREA), University of Barcelona.

Rodríguez-Pose, A., & Gill, N. (2003). The global trend towards devolution and its implications. *Environment and Planning C: Government and Policy, 21*(3), 333–351. https://doi.org/10.1068/c0235

Sapkota, P., & Bastola, U. (2015). On the relationship between the business cycle and college enrollment in the U.S.: A time series approach. *Economics and Business Letters, 4*(1), 7–16. https://doi.org/10.17811/EBL.4.1.2015.7-16

Sulaiman, N. F. C., Yussof, I., Zaidi, M. A. S., & Sulaiman, N. (2017). Long run relationship between income inequality and economic growth: Evidence from Malaysia. *International Journal of Academic Research in Business and Social Sciences, 7*(6), 73–88. https://doi.org/10.6007/IJARBSS/v7-i6/2945

Sylwester, K. (2003). Enrolment in higher education and changes in income inequality. *Bulletin of Economic Research, 55*(3), 249–262. https://doi.org/10.1111/1467-8586.00173

Untura, G. A., & Kaneva, M. A. (2021). *An approach to modeling and assessing the effects of non-spatial proximity: Innovations in Russian regions*. Institute of Economics and Industrial Engineering, SB RAS. https://www.ieie.su/assets/conf/granberg2021/files/untura_kaneva.pdf (in Russ.)

Verbic, M., Majcen, B., & Cok, M. (2009). *Education and economic growth in Slovenia: A dynamic general equilibrium approach with endogenous growth* (MPRA Paper No. 17817). University Library of Munich, Germany. Retrieved January 30, 2025 from https://mpra.ub.uni-muenchen.de/17817/

Yang, C.-C., & Chan, S.-J. (2017). Is higher education expansion related to increasing unemployment rates? A comparative analysis of Japan, South Korea, and Taiwan. *International Journal of Chinese Education, 5*(2), 162–186. https://doi.org/10.1163/22125868-12340066

AUTHOR BIOGRAPHIES

Saule Z. Zeinolla – PhD, Faculty of Economics and Entrepreneurship, Kazakh-German University, Almaty, Kazakhstan. Email: zeinollasaule@gmail.com, ORCID ID: https://orcid.org/0000-0002-9504-9629

***Arsen T. Tleppayev** – PhD, Faculty of Economics and Entrepreneurship, Kazakh-German University, Almaty, Kazakhstan. Email: arsentlp@gmail.com, ORCID ID: https://orcid.org/0000-0001-9754-3383

Rashid K. Kerimbayev – Cand. Sc. (Math.), Senior Lecturer at al-Farabi Kazakh National University, Almaty, Kazakhstan. Email: ker@mail.ru, ORCID ID: https://orcid.org/0000-0003-4615-741X

Lazat S. Spankulova – Doc. Sc. (Econ.), Professor, Al-Farabi Kazakh National University, Almaty, Kazakhstan. Email: spankulova@mail.ru, ORCID ID: https://orcid.org/0000-0002-1865-4681

Received on: 20 February 2025 Revised on: 01 May 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.506

The Role of Universities in Driving Innovation through Human Capital in Kazakhstan

Gulbakhyt Olzhebayeva[1]*

Temirlan Abdykadyr[1]

Madina Rakhimberdinova[2]

[1] University of International Business named after K. Sagadiyev, Almaty, Kazakhstan
[2] D. Serikbayev East Kazakhstan Technical University, Ust-Kamenogorsk, Kazakhstan

Corresponding author:
*Gulbakhyt Olzhebayeva – PhD candidate, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: g.olzhebayeva@gmail.com

How to cite this article:
Olzhebayeva, G., Abdykadyr, T. & Rakhimberdinova, M. (2025). The Role of Universities in Driving Innovation through Human Capital in Kazakhstan. Eurasian Journal of Economic and Business Studies, 69(2), 51-64.

Conflict of interest:
author(s) declare that there is no conflict of interest.

EJEBS

ABSTRACT

This research aims to assess the impact of human capital elements, including graduates, postgraduate students, and educational expenditures, on the level of innovation activity in the regions of Kazakhstan. Research is based on a quantitative panel analysis of Kazakhstani regions, namely correlation and regression, from the National Bureau of Statistics in the years 2000-2023. The empirical results show that Gross Regional Product (GRP) and the number of PhD students significantly and positively affect innovation activity. A 1% increase in GRP corresponds to a 0.75% rise in the number of innovative enterprises, while a 1% rise in the number of PhD students leads to a 0.23% increase in innovation. In contrast, the number of university graduates and educational expenditures did not demonstrate statistically significant effects. The findings suggest the need for targeted policy interventions, including support for doctoral research, the creation of innovation clusters, and region-specific strategies. The research highlights the importance of economic capacity and advanced research personnel in fostering regional innovation while also pointing to institutional and structural barriers that may inhibit the effective translation of educational investments into innovation outcomes. Policy implications include the need for region-specific innovation strategies and greater alignment between academic institutions and enterprise needs. Future research should incorporate mixed methods, explore intra-regional differences, and investigate time-lag effects in educational investments on innovation performance.

KEYWORDS: Human Capital, Education, Higher Education, Innovation Policy, Knowledge, Economy, Business Development

SCSTI: 06.81.27

JEL Code: I25, O15, O30

FINANCIAL SUPPORT: This research has been funded by the Science Committee MSHE RK (grant "Modernization of the quality assurance system of higher education in Kazakhstan based on digitalization: development of approaches, mechanisms and information base" BR24992974).

1. INTRODUCTION

In the current context of rapid technological change, including the advancement of artificial intelligence and the global shift toward a green economy, human capital has become a strategic asset for a country's innovative competitiveness (Bai & Li, 2011; Garlick, 2014). Human capital is particularly crucial for developing countries such as Kazakhstan, where sustainable development and economic modernization depend on the quality of human resources. Universities serve as educational institutions and centres of scientific research and platforms for industry collaboration. They foster knowledge transfer, stimulate innovative activity, and contribute to developing regional innovation ecosystems by producing qualified human capital, conducting research, and engaging in partnerships with industry (Destefanis et al., 2023).

However, despite the existence of regulatory frameworks and strong political will, Kazakhstan continues to face a range of structural and institutional barriers that hinder the effective integration of the academic sector into the innovation-driven economy (Jonbekova et al., 2025). The main challenges include weak institutionalization of university-industry collaboration, limited incentives for faculty engagement in applied research, low levels of student involvement in real-world innovation projects, and a persistent mismatch between graduates' competencies and labor market needs. Furthermore, technology transfer offices and other structures within the higher education system have yet to fully fulfil their intended roles in facilitating knowledge transfer and the commercialization of research outputs (Kireyeva et al., 2020). The gap between academic knowledge production and its practical application in the economy remains substantial, an issue of particular concern as Kazakhstan seeks to compete globally and integrate into international scientific and innovation networks. While the importance of university-industry collaboration for innovation is widely recognized, there is a limited empirical understanding of how different components of academic human capital, namely, faculty, students, and graduates, contribute to collaboration in the context of emerging economies, particularly in Kazakhstan.

Despite national policies to foster innovation and strengthen partnerships between higher education institutions and industry, Kazakhstan has not yet achieved a sustainable or institutionalized model of university and industry engagement. Existing efforts often lack depth, continuity, and strategic alignment with labor market and innovation system needs. Moreover, the role of human capital within Higher education institutions is frequently underutilized or fragmented, with insufficient integration of faculty research, student involvement, and graduate employment into industry.

The research employs correlation and a fixed effects panel regression model using data from 16 regions over the period 2000-2022. By focusing on key indicators such as the number of faculty members, students, PhD graduates, and government expenditures on education, the analysis aims to capture the extent to which academic human capital influences innovation outcomes at the regional level.

The findings of this research carry important implications for policy, higher education, and regional development in Kazakhstan. First, the demonstrated link between academic human capital and regional innovation activity suggests that investments in higher education, particularly in faculty development and advanced graduate training, can serve as strategic levers for innovation-driven growth. Policymakers should consider increasing funding for universities and creating incentives for research collaboration and knowledge transfer between academia and industry. Second, the results emphasize the need to strengthen institutional mechanisms, such as technology transfer offices, to facilitate the practical application of academic research. Finally, the research underscores the value of regional differentiation in innovation policy: supporting universities based on their specific capacities and local economic contexts can

enhance the overall effectiveness of national innovation strategies. Addressing these issues could significantly improve Kazakhstan's ability to integrate into global knowledge networks and transition toward a sustainable, knowledge-based economy.

The research paper is organized as follows. Section 2 provides a theoretical framework for the innovation system and the role of higher education in regional development. Section 3 outlines the methodological approach, including data sources, variable selection, and the fixed effects panel regression model. Section 4 reports the main empirical findings, interprets their significance, and offers a discussion of the results, linking them to broader policy and institutional implications. Finally, Section 5 concludes the paper, summarizing key insights and proposing directions for future research.

This research aims to assess the impact of human capital elements, including graduates, postgraduate students, and educational expenditures, on the level of innovation activity in the regions of Kazakhstan. The research focuses on four hypothese

H_1: Gross Regional Product (GRP) significantly affects innovation activity.

H_2: The number of university graduates affects innovation activity.

H_3: Government expenditure on education affects innovation activity.

H_4: The number of PhD students influences regional innovation.

2. LITERATURE REVIEW

Innovation is widely recognized as a fundamental driver of economic growth and sustainable development, where human capital and universities are central actors (Wozniak, 1984; Florax & Folmer, 1992). Thus, this section considers the influence of innovation on economic development, human capital for innovation, the role of universities, and university-industry relationships. Innovative activity and Gross regional product play pivotal roles in regional economic development. According to the endogenous theory of economic growth (Lucas, 1988; Romer, 1990), innovations are a key factor for sustainable regional development that increases productivity and impacts GRP. Regions with a developed innovation infrastructure, active research and development, and strong links between universities and businesses tend to show higher economic growth rates. Moreover, innovation contributes to improved productivity in enterprises, increasing the probability of survival and sustainable growth amid increasing global competition (Florida et al., 2008). Empirical studies demonstrate a stable positive correlation between a region's innovation activity level and its economic indicators, primarily GRP (Crescenzi & Rodríguez-Pose, 2012).

Innovation is a key driver of economic growth and sustainable development, where new technologies, products, and business models are created that reshape national and regional economies (Gómez & Sequeira, 2012). It also enhances the social well-being of the population and the national economy's competitiveness, especially in developing countries, where innovation is a driver of accelerated development (Maksimovic et al., 2012; Algan & Cahuc, 2014). It forms the foundation for knowledge creation and innovation spillovers, enhancing productivity and ensuring the competitiveness of the national economy (Bottazzi & Peri, 2003; Feng et al., 2012; Islam et al., 2014). Contemporary research confirms that human capital combines knowledge, skills, and competencies primarily accumulated within the higher education system (Teslenko et al., 2021; Pereira et al., 2025).

Innovative, social, and economic development of regions depends on forming, accumulating and using human capital (Kato et al., 2015). The ability of regions to create and retain human capital varies significantly, directly affecting their innovation dynamics and social and economic development (Sánchez-Barrioluengo & Consoli, 2016; Kozhushko, 2021). Students, graduates, and academic staff constitute a critical component of this capital, directly contributing to

innovation outputs. Empirical evidence shows that the share of university graduates positively affects the number of patent applications (Leten et al., 2014), while regions with a higher concentration of university researchers demonstrate more intensive technological activity (Intarakumnerd, 2017). At the same time, human capital serves as a central resource that determines the innovative capacity of both individual organizations and entire regions (Norasingh & Southammavong, 2017; Crescenzi & Jaax, 2017).

The development and design of innovative solutions are primarily driven by the level of academic human capital accumulated within universities, as it provides the foundation for knowledge generation, technological advancement, and research-based approaches to innovation and development (Passaro et al., 2018). In addition, universities form high-quality human capital that will continue to work in enterprises in the future (van den Berge, 2018; Jackson et al., 2022). Companies that engage in joint R&D activities with universities tend to employ graduates, particularly PhD holders, with advanced research training and specialized knowledge (Buenstorf & Heinisch, 2020). This is because doctoral students have technical and research competencies and are familiar with the logic of academic knowledge production.

The role of higher education institutions in shaping human capital and driving regional innovation has become a central focus in contemporary research and policy discussions. Research emphasizes that human capital is mainly formed in the higher education system (Leonchuk & Gray, 2019;). In this regard, a special role is given to universities, which, in addition to the educational function, perform a research and innovation mission, actively participating in the creation of knowledge, the development of skills and the formation of the infrastructure necessary for the growth of regional capacity (Peters, 2020). Modern universities are strategic players in regional innovation ecosystems that generate positive externalities, including knowledge spillovers into business, thereby facilitating the technological renewal of companies (Kong et al., 2022).

Historically, universities and industry have maintained strong ties in education and research, allowing them to effectively combine resources and efforts to implement innovative projects (Albats et al., 2020). University-industry relations foster knowledge spillover, develop human capital and research commercialization. It develops the innovative capacity of regions and increases competitiveness (Toth et al., 2020; Zapata-Cantu, 2020). Moreover, university and industry partnerships adapt and shape educational programs in line with labour market demand (Berbegal-Mirabent et al., 2020).

Kazakhstan also pays attention to the significant role of innovation in economic development, which is supported by a range of studies (Nurpeisova et al., 2020; Dinzhanova & Bayetova, 2022), where innovative activity correlates with economic growth. Furthermore, human capital positively impacts the development of innovations (Doshmanova et al., 2024). Despite policy efforts to develop university-industry partnerships to stimulate innovation and improve the alignment of human capital training with labor market requirements (Yembergenova et al., 2020; Jonbekova et al., 2025), Kazakhstan has not yet achieved a sustainable and effective model of academic-industry integration. The lack of institutionalized interaction mechanisms and the limited effectiveness of technology transfer offices indicate a persistent gap between universities and industry (Kireyeva et al., 2020). Kuchumova et al. (2023) emphasize that the active involvement of academic staff in university-industry partnerships is a key condition for effectively implementing joint research projects and increasing the applied value of academic research. The participation of academic staff not only helps strengthen the links between science and industry but also ensures the transfer of knowledge adapted to the real needs of the economy. However, there is a lack of research impact of graduates on innovation. Despite the availability of research

on innovation in Kazakhstan, there is no systematic review of Kazakhstani and Central Asian studies on the topic of universities and innovation that comprehensively addresses the above-mentioned themes.

To sum up, it can be noted that modern empirical literature consistently emphasizes the importance of human capital as an intermediary between universities and industry in the innovation process. In international practice, there is a tendency to strengthen interactions through personnel, research, and institutional channels.

3. RESEARCH METHODS

The research is based on secondary data from 2000 to 2023 from the Bureau of National Statistics of the Republic of Kazakhstan. A quantitative research design is employed to analyze regional-level data across Kazakhstan. Correlation analysis examines the strength and direction of relationships between variables and identifies potential multicollinearity issues. Subsequently, panel regression analysis is applied to assess the impact of selected economic and educational indicators on the level of regional innovation activity. The analysis covers 16 regions of Kazakhstan. Regions that formed recently, namely Abay, Zhetisu, and Ulytau, were omitted due to unrepresentativeness and lack of data (was formed in 2022).

The selection of variables for this research is grounded in theoretical reasoning and empirical literature on the determinants of regional innovation. After clearing data, the following variables are used in Table 1.

TABLE 1. Descriptive statistics

Variable	Code	Obs.	Mean	Std Dev	Min	Max
Year	YEAR	304	2013,61	6,06	2000	2023
Level of innovative activity	INNOV ACT	304	119,36	1131,18	0,11	13173
Number of faculty members	FACULTY	304	2222,45	3055,86	32	14599
Number of students	STUD	304	32289,79	38485,31	3815	228838
Gross regional product	GRP	304	2677878,9	3122792,91	119500,4	24895989,6
Number of graduates (students)	GRAD	304	8098,16	9231,43	841	55281
Public expenditure on education	EXP	304	17612894,8	36979711,5	53012	246341662
PhD students	PHD	304	176,59	505,12	0	3482
Number of enterprises with innovations	INNOV ENTERP	304	125,22	188,99	1	1182
Number of higher educational institutions	HEI	304	8,05	11,05	1	69

Note: compiled by authors

The choice of these variables allows a comprehensive analysis of factors influencing innovation activity at the regional level. The research takes into account economic indicators and characteristics of human capital and institutional infrastructure, which allows for identifying systemic relationships between the development of the higher education system and the level of innovation capacity of the regions of Kazakhstan.

Figure 1 displays the core steps of the research.

The research consists of the following stages: data collection, data clearing, data analysis, and recommendation development. The initial stage consists of obtaining statistical data.

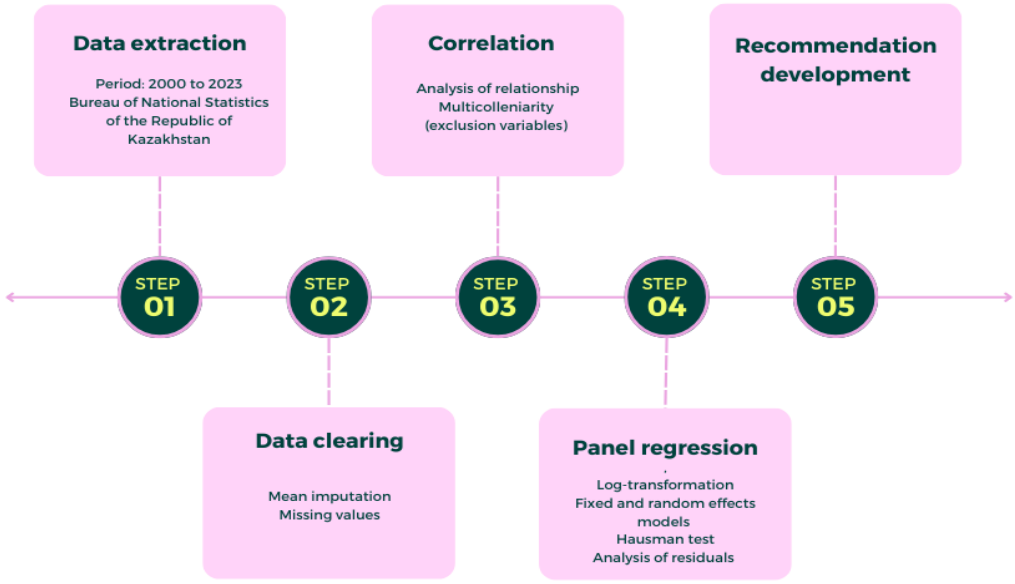

Figure 1. Stages of research

Once collected, the data undergoes a cleaning process to enhance analytical accuracy. During this phase, missing values are addressed by applying mean imputation, and the dataset is cleaned to ensure consistency and accuracy for subsequent analysis.

Pearson correlation is used to detect the impact between two variables and calculated through the following formula (1)

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2 \sum_{i=1}^{n}(y_i-\bar{y})^2}} \qquad (1)$$

where:

x_i, y_i – the individual values of the variables x and y;

$\bar{x}$, $\bar{y}$ – the mean values of variables x and y, respectively;

n – number of observations.

Correlation determines multicollinearity between variables. As a result, the number of faculty members, students, and HEIs was excluded. Also, the variable level of innovative activity is excluded because of statistical insignificance ($p > 0{,}05$).

Regression of panel data helps to consider time and region peculiarities. The regression models are built with fixed and random effects models through Rstudio (version 2024.12.1+563). The choice of regression is motivated by the aim of the research to determine the impact of social, economic, and educational factors on the level of innovation activity among enterprises at the regional level. All continuous quantitative variables used in the regression model were transformed using the natural logarithm to ensure statistical robustness and interpretability.

To avoid undefined values due to zero logarithm, variables such as graduate and PhD were log-transformed using the adjustment ln(x+1), which retains zeros in the data while maintaining transformation integrity.

Regression calculated through formula (2):

$$\ln(y_{it}) = \beta_0 + \beta_1 \ln(GRP_{it}) + \beta_2 \ln(graduate_{it}) + \beta_3 \ln(exp_{it}) + \beta_4 \ln(PhD_{it}) + u_{it} \qquad (2)$$

where:

y_{it} – number of innovative enterprises in region i at time t;

GRP_{it} – Gross Regional Product;

$graduate_{it}$ – number of university graduates;

exp_{it} – government expenditure on education;

PhD_{it} – number of PhD students;

u_{it} – error term.

The Hausman test was employed, which tests for the presence of correlation between individual effects and the regressors, to determine whether the fixed effects or random effects model is more appropriate. Hausman test calcualted through formula (3):

$$H = \left(\widehat{\beta_{RE}} - \widehat{\beta_{FE}}\right)^{\top}\left[Var\left(\widehat{\beta_{RE}}\right) - Var\left(\widehat{\beta_{FE}}\right)\right]^{-1}\left(\widehat{\beta_{RE}} - \widehat{\beta_{FE}}\right) \quad (3)$$

where:

$\widehat{\beta_{RE}}$ – the estimated coefficient from the random effects model;

β_{FE} – the estimated coefficient from the fixed effects model.

Test results (χ^2 = 23.864, df = 4, p = 0.000085) indicate about statistical significant difference between fixed and random effect models. Thus, the random effect model is inconsistent, which is why the fixed effect model is chosen.

This research is subject to several limitations, including (1) data due to an unbalanced panel structure, (3) potential endogeneity of some explanatory variables, and (3) absence of lagged variables, which could help capture delayed effects, particularly in the case of education-related investments.

4. FINDINGS

As an initial step in the empirical analysis, pairwise correlations were examined to assess the interrelationships among the core variables. Table 1 presents the Pearson correlation matrix, which assesses the degree and direction of relationships between the selected indicators.

TABLE 2. Correlation matrix

Code	INNOV ACT	FACUL	STUD	GRP	GRAD	EXP	PHD	INNOV ENTERP	HEI
INNOV ACT	1	0.012	0.02	-0.075	-0.018	-0.041	-0.031	0.484	0.035
FACUL	0.012	1	0.974	0.528	0.957	0.693	0.737	0.545	0.965
STUD	0.02	0.974	1	0.478	0.958	0.647	0.688	0.502	0.968
GRP	-0.075	0.528	0.478	1	0.463	0.779	0.786	0.679	0.409
GRAD	-0.018	0.957	0.958	0.463	1	0.61	0.635	0.449	0.925
EXP	-0.041	0.693	0.647	0.779	0.61	1	0.907	0.745	0.57
PHD	-0.031	0.737	0.688	0.786	0.635	0.907	1	0.765	0.619
INNOV ENTERP	0.484	0.545	0.502	0.679	0.449	0.745	0.765	1	0.448
HEI	0.035	0.965	0.968	0.409	0.925	0.57	0.619	0.448	1

Note: compiled by authors

Correlation analysis determined a statistically significant and weak relationship between indicators of human capital, economic development and innovative activity in the regions of Kazakhstan. The highest relationship was defined between components of higher education. For instance, the number of faculty members correlated with students(r = 0.974) and graduates (r = 0.957), which reflected a balanced growth in the number of faculty and students in universities.

There was a significant positive correlation between the number of PhD students and educational expenditures (r = 0.907), indicating that regions investing significantly in education also tended to support the development of doctoral programs. Interestingly, a significant interaction between the number of PhD students and the number of innovative enterprises (r = 0.765) was also observed. The most likely cause of this was the critical role of

highly qualified research personnel in driving regional innovation activity.

The correlation between overall innovation activity (INNOV ACT) and the number of innovative enterprises (INNOV ENTERP) is r = 0.484, reflecting a moderate positive relationship. At the same time, the correlations between innovation activity and other variables such as GRAD (r = -0.018), STUDENT (r = 0.02), GRP (r = -0.075), and EXP (r = -0.041) were either extremely weak or negative. These findings suggest the absence of an apparent linear influence of these factors on the level of innovation in the regions during the period under research.

To further investigate the determinants of regional innovation activity, a fixed effects regression model was used to estimate the impact of selected economic and educational indicators on the number of innovative enterprises, as presented in Table

TABLE 3. Results of fixed effect model

Variable	Coefficient	Standard error	P-value
ln_GRP	0.752	0.105	<0.001
ln_graduate	-0.091	0.170	0.600
ln_exp	0.027	0.086	0.750
ln_PhD	0.230	0.054	<0.001

Note: compiled by authors

The regression results indicate that a 1% increase in the gross regional product (GRP) is positively associated with a 0.75% increase in the number of innovative enterprises, suggesting a strong linkage between regional economic performance and innovation capacity.

Similarly, the number of PhD students also has a positive and statistically significant effect on the innovative activity of enterprises at the 1% significance level (β = 0.23). In contrast, the variables ln_exp (public expenditure on education) and ln_graduate (the number of graduates) did not have a statistically significant effect on the number of innovative enterprises.

The model explains 64% of the within-group variance ($R^2 = 0.641$), indicating that the included predictors account for a substantial proportion of the variability in the dependent variable. The F-statistic value of 126.64 with $p < 0.001$ confirms the model's high overall statistical significance, underscoring the selected variables' reliability in explaining regional differences in innovative activity.

A fixed effects panel regression model was employed to predict the logarithmic number of innovative enterprises (ln(y)) across Kazakhstan's regions, using average values of GRP, number of graduates, public education expenditures, and PhD student enrollment. While the model demonstrates strong overall explanatory power ($R^2 \approx 0.64$), residual analysis revealed consistent deviations between actual and predicted values at the regional level, as presented in Table 4.

TABLE 4. Regional predicted vs actual ln(y) based on fixed effects model

Region	Average ln(y)	Predicted ln(y)	Residual (Actual - Predicted)
Akmola	3.36	10.48	-7.12
Aktobe	3.96	10.97	-7.01
Almaty	3.91	11.05	-7.15
Atyrau	3.46	11.11	-7.65
West Kazakhstan	3.19	10.73	-7.54
Zhambyl	3.79	10.46	-6.67
Karaganda	4.82	11.76	-6.94
Kostanay	4.12	10.71	-6.59

Kyzylorda	3.52	10.50	-6.98
Mangystau	3.03	10.86	-7.83
Pavlodar	3.99	11.12	-7.13
North Kazakhstan	3.75	10.19	-6.44
Turkestan	3.25	10.88	-7.64
East Kazakhstan	5.15	11.15	-6.00
Astana city	4.82	12.18	-7.37
Almaty city	5.71	12.90	-7.19

Note: compiled by authors

The residuals for all regions are negative, indicating that the predicted values of ln(y) systematically exceed the actual observed values, which suggests that although the explanatory variables are strong predictors nationally, regional-level conditions may be inhibiting the transfer of resources into innovation. Residuals range from –7.00 to –7.65. For example, Akmola region has an average ln(y) of 3.36, but the model predicts 10.48 (residual = –7.12). Atyrau region shows the most significant discrepancy, with a predicted ln(y) of 11.11 and an actual of 3.46 (residual = –7.65).

5. DISCUSSION

This study investigated the impact of human capital elements, including graduates, postgraduate students, and educational expenditures, on the level of innovation activity in the regions of Kazakhstan. While earlier studies have explored the impact of graduates and postgraduate students on the level of innovation activity in international contexts, there has been limited attention to these dynamics within Kazakhstan's regional framework. Moreover, few studies have systematically analyzed how human capital indicators contribute to regional disparities in innovation performance.

We found that economic development and PhD students are statistically significant predictors of innovative activity in the regions. Strong correlations were defined between indicators of the higher education system. Also, PhD students showed a strong and significant relationship with innovational enterprises, while other human capital indicators indicated a weak or insignificant correlation. Our study suggested that the higher education system had structural consistency, which did not translate into innovative outcomes. At the same time, PhD student indicators highlighted the role of research capacity in innovative ecosystems.

Regarding H_1, the finding showed a strong correlation between regional economic performance and innovation capacity that aligned with the findings of Crescenzi and Rodríguez-Pose (2012), who argued that economically dynamic regions are more likely to generate and sustain innovation due to greater availability of resources, better infrastructure, and stronger institutional support. Thus, economic capacity is critical in fostering innovation, likely due to greater accessibility of resources, investment, and infrastructure (Peters, 2020). Thus H_1 is confirmed.

Regarding H_2, contrary to previous research, this study did not find a significant relationship between the number of university graduates and innovation activity (Yao et al., 2023; Evers & Ostergaard, 2025). Insignificant impact might indicate structural delays in the implementation of educational policies, a weak link between the education system and the innovation market, or their limited involvement in research and entrepreneurship. Thus, H_2 is rejected.

Concerning H_3, government expenditure on education does not affect innovation activity. It is crucial to acknowledge that educational investments have a significant long-term effect on both economic growth and innovative capacity development. While the immediate impact of such investments on specific innovation metrics may appear limited, the underlying enhancement of human capital

translates into meaningful outcomes over an extended period. Thus, H_3 is rejected.

Referring to H_4, the PhD-students relationship supports the view that advanced academic expertise contributes significantly to knowledge creation, technology transfer, and innovation uptake at the regional level. The training of highly qualified scientific personnel contributes to the development of regional innovative capacity, probably due to the strengthening of the research environment, the involvement of PhD students in R&D projects and their integration into the higher education system and industry cooperation (Buenstorf & Heinisch, 2020; Yang et al., 2025). H_4 is confirmed.

In line with García-Estévez & Duch-Brown (2020), HEIs positively affected innovative enterprises (0.448). Innovative activity in the regions did not directly depend on the level of economic development and resources of the higher education system. There were institutional barriers, weak integration of science and business, and an insufficient level of innovative infrastructure. These findings reflect the structural interdependence between higher education capacity and regional economic strength. Economically developed regions invest more heavily in education and have more PhD students.

The consistent overestimation of predicted innovation activity across all regions, as revealed by the regression residuals, highlighted such persistent regional barriers as (1) weak university-industry collaboration, (2) limited R&D infrastructure, and (3) inefficient policy mechanisms that hinder the effective transformation of resources into innovation.

This research had several limitations. Firstly, the model used is based on aggregated regional data, which did not allow for the analysis of intra-regional differences. Secondly, the study relied solely on quantitative data and did not include a qualitative dimension, for example, institutional culture, the level of R&D management, or the nature of relationships between industry and research institutions. Thirdly, the time lags between investments in human capital and their actual impact on innovation activity may not have been fully captured by the chosen model. Therefore, further research is needed using mixed-method approaches and more granular data to gain a more accurate understanding of the mechanisms through which human capital influences innovation.

6. CONCLUSION

The research aimed to assess the impact of human capital, namely, students, graduates, PhD students, and faculty, on the development of innovative activity in Kazakhstan. Firstly, the literature review indicated that human capital is critical in driving innovation and regional economic development. Universities are key intermediaries linking education, research, and industry needs. While international evidence highlights the success of strong university-industry collaborations, Kazakhstan still faces structural barriers in fostering such partnerships, limiting the full potential of its innovation ecosystem.

Secondly, the study employed correlation and panel regression analysis using data from 2000 to 2023. Correlation analysis was also conducted to identify relationships between variables and structural dependencies. Logarithmic transformations were applied, multicollinearity was addressed, and a fixed effects model was implemented to assess within-group differences.

Thirdly, the results show that Gross Regional Product and the number of PhD students exert the most significant impact on the development of innovative enterprises. In contrast, variables such as the number of graduates and educational expenditures did not show statistically significant effects in the short term. This indicates that developing academic research and training highly qualified personnel are more critical factors for fostering innovation growth.

Based on the results, the following measures are proposed:

(1) increase government investment in education, particularly in regions with low

innovation activity, focusing on the development of research infrastructure and the support of promising educational programs;

(2) create incentives to train and retain researchers, including grant programs, academic mobility opportunities, and additional remuneration for research activities;

(3) expand access to specialized educational programs and research infrastructure (laboratories, research centers);

(4) implement a system of grants and additional scholarships to motivate talented PhD students and support their research work;

(5) organize joint research projects with businesses and industrial enterprises to foster practical skills and accelerate the implementation of scientific developments;

(6) enhance collaboration between universities and enterprises through the formation of scientific and educational clusters, shared laboratory facilities, and targeted research initiatives;

(7) provide targeted support for innovative companies in regions with high scientific potential by offering tax incentives, subsidies, and establishing specialized development funds;

(8) introduce a system for monitoring and regularly evaluating innovation policy, involving the collection and analysis of relevant data and the participation of specialized research institutes and experts in refining strategic priorities.

Thus, the research highlights the significance of a complex approach for fostering innovative activity. The offered measures reveal innovative capacity and make the basis for economic prosperity and technological renovation.

Future studies should focus on exploring the mechanisms that enhance the effectiveness of university-industry collaborations. Additionally, further investigation is needed into the specific barriers to R&D funding and knowledge commercialization, employing qualitative or mixed-method approaches. Comparative studies across regions with varying innovation capacities would help policymakers better understand context-specific requirements, enabling more targeted and effective innovation policy interventions.

AUTHOR CONTRIBUTION

Writing – original draft: Gulbakhyt Olzhebayeva.
Conceptualization: Gulbakhyt Olzhebayeva, Temirlan Abdykadyr, Madina Rakhimberdinova.
Formal analysis and investigation: Gulbakhyt Olzhebayeva, Temirlan Abdykadyr.
Funding acquisition and research administration: Gulbakhyt Olzhebayeva, Temirlan Abdykadyr.
Development of research methodology: Gulbakhyt Olzhebayeva, Madina Rakhimberdinova.
Software and supervisions: Gulbakhyt Olzhebayeva, Madina Rakhimberdinova.
Data collection, analysis and interpretation: Gulbakhyt Olzhebayeva, Temirlan Abdykadyr.
Visualization: Gulbakhyt Olzhebayeva, Temirlan Abdykadyr, Madina Rakhimberdinova.
Writing review and editing research: Gulbakhyt Olzhebayeva, Temirlan Abdykadyr.

REFERENCES

Albats, E., Bogers, M., & Podmetina, D. (2020). Companies' human capital for university partnerships: A micro-foundational perspective. *Technological Forecasting and Social Change, 157,* 120085. https://doi.org/10.1016/j.techfore.2020.120085

Algan, Y., & Cahuc, P. (2014). Trust, growth, and well-being: New evidence and policy implications. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 2A, pp. 49–120). Elsevier. https://doi.org/10.1016/B978-0-444-53538-2.00002-2

Bai, J. H., & Li, J. (2011). Regional innovation efficiency in China: The role of local government. *Innovation: Organization & Management, 13*(2), 142–153. https://doi.org/10.5172/impp.2011.13.2.142

Berbegal-Mirabent, J., Gil-Domenech, D., & Ribeiro-Soriano, D. E. (2020). Fostering university-industry collaborations through university teaching. *Knowledge Management Research & Practice, 18*(3), 263–275. https://doi.org/10.1080/14778238.2019.1638738

Bottazzi, L., & Peri, G. (2003). Innovation and spillovers in regions: Evidence from European patent data. *European Economic Review, 47*, 687–710. https://doi.org/10.1016/S0014-2921(02)00307-0

Buenstorf, G., & Heinisch, D. P. (2020). When do firms get ideas from hiring PhDs? *Research Policy, 49*(3), Article 103913. https://doi.org/10.1016/j.respol.2019.103913

Crescenzi, R., & Jaax, A. (2017). Innovation in Russia: The territorial dimension. *Economic Geography, 93*(1), 66–88. https://doi.org/10.1080/00130095.2016.1208532

Crescenzi, R., & Rodríguez-Pose, A. (2012). *Innovation and regional growth in the European Union*. Springer. https://doi.org/10.1007/978-3-642-17761-3

Destefanis, S., Maietta, O. W., Mazzotta, F., & Parisi, L. (2023). Firm survival and innovation: Direct and indirect effects of knowledge for SMEs. *Economics of Innovation and New Technology, 33*(7), 926–954. https://doi.org/10.1080/10438599.2023.2263371

Dinzhanova, G. S., & Bayetova, M. T. (2022). Human capital in the innovative economy: Manufacturing industry. *Economy: Strategy and Practice*, *17*(1), 144–154. https://doi.org/10.51176/1997-9967-2022-1-144-154

Doshmanova, S., Bolatova , B., Kunurkulzhayeva, G., Sultanmuratova , N., & Ospanova , A. (2024). Impact of Scientific Activity and Innovation on Economic Competitiveness: An Analysis of Kazakhstan. *Eurasian Journal of Economic and Business Studies*, *68*(1), 44-57. https://doi.org/10.47703/ejebs.v68i1.355

Evers, G., & Ostergaard, C. R. (2025). Graduate hiring as a human capital outcome of university-industry innovation collaboration. *Industry and Innovation*, 1–25. https://doi.org/10.1080/13662716.2025.2482040

Feng, H.-I., Chen, C.-S., Wang, C.-H., & Chiang, H.-C. (2012). The role of intellectual capital and university technology transfer offices in university-based technology transfer. *The Service Industries Journal, 32*(6), 899–917. https://doi.org/10.1080/02642069.2010.545883

Florax, R., & Folmer, H. (1992). Knowledge impacts of universities on industry: An aggregate simultaneous investment model. *Journal of Regional Science, 32*(4), 437–466. https://doi.org/10.1111/j.1467-9787.1992.tb00199.x

Florida, R., Mellander, C., & Stolarick, K. (2008). Inside the black box of regional development—Human capital, the creative class and tolerance. *Journal of Economic Geography, 8*(5), 615–649. http://www.jstor.org/stable/26161285

Garlick, S. (2014). The Impact of Place in Building Human Capability. *Journal of Adult and Continuing Education, 20*(2), 67-78. https://doi.org/10.7227/JACE.20.2.6

Gómez, M. A., & Sequeira, T. N. (2012). Phases of economic development: Do initial endowments matter? *The B.E. Journal of Macroeconomics, 12*(1). https://doi.org/10.1515/1935-1690.2401

Government of the Republic of Kazakhstan. (2017). *Digital Kazakhstan: State Program for Digital Development (Resolution No. 827, December 12, 2017)*. Adilet Legal Information System. https://adilet.zan.kz/eng/docs/P1700000827

Government of the Republic of Kazakhstan. (2019). *State Program of Industrial and Innovative Development for 2020–2025 (Resolution No. 1050, December 31, 2019)*. Adilet Legal Information System. https://adilet.zan.kz/eng/docs/P1900001050

Intarakumnerd, P. (2017). Human resource management and coordination for innovative activities in production networks in Asia: A synthesis. *Asian Journal of Technology Innovation, 25*(2), 199–205. https://doi.org/10.1080/19761597.2017.1385957

Islam, R., Ang, J. B., & Madsen, J. B. (2014). Quality-adjusted human capital and productivity growth. *Economic Inquiry, 52*(2), 757–777. https://doi.org/10.1111/ecin.12052

Jackson, D., Riebe, L., & Macau, F. (2022). Determining factors in graduate recruitment and preparing students for success. *Education and Training*, *64*(5), 681–699. https://doi.org/10.1108/ET-11-2020-0348

Jonbekova, D., Kuchumova, G., Kim, T., Mukhamejanova, D., Gimranova, D., Abdildin, Y., & Alimkhanova, D. (2025). Motivations, benefits, and challenges of university-industry partnerships in

Kazakhstan. *International Journal of Educational Research, 130*, 102486. https://doi.org/10.1016/j.ijer.2024.102486

Kato, M., Okamuro, H., & Honjo, Y. (2015). Does founders' human capital matter for innovation? Evidence from Japanese start-ups. *Journal of Small Business Management, 53*(1), 114-128. https://doi.org/10.1111/jsbm.12094

Kireyeva, A. A., Turdalina, S., & Akhmetova, Z. B. (2020). Analysis of the efficiency of technology transfer offices in management: The case of Spain and Kazakhstan. *Journal of Asian Finance, Economics and Business, 7*(8), 735–746. https://doi.org/10.13106/jafeb.2020.vol7.no8.735

Kong, D., Zhang, B., & Zhang, J. (2022). Higher education and corporate innovation. *Journal of Corporate Finance, 72*, 102165. https://doi.org/10.1016/j.jcorpfin.2022.102165

Kozhushko, R. (2021). Human capital as a key factor in the development of university innovation. *Management, 33*(1), 52-60. https://doi.org/10.30857/2415-3206.2021.1.5

Kuchumova, G., Bilyalov, D., & Jonbekova, D. (2023). Faculty engagement in university-industry research partnerships: Findings from a developing country. *Studies in Higher Education, 48*(9), 1455–1467. https://doi.org/10.1080/03075079.2023.2203135

Leonchuk, O., & Gray, D. O. (2019). Scientific and technological (human) social capital formation and Industry-University Cooperative Research Centers: A quasi-experimental evaluation of graduate student outcomes. *Journal of Technology Transfer, 44*(5), 1638–1664. https://doi.org/10.1007/s10961-017-9613-9

Leten, B., Landoni, P., & Van Looy, B. (2014). Science or graduates: How do firms benefit from the proximity of universities? *Research Policy, 43*(8), 1398–1412. https://doi.org/10.1016/j.respol.2014.03.005

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

Maksimovic, L., Grbic, M., & Mihajlovic, V. (2012). Impact of technological innovation on competitiveness of transition countries. *Actual Problems of Economics*, (133), 394–403.

Norasingh, X., & Southammavong, P. (2017). Firm-level human resource management and innovation activities in production networks: A case study of Lao handicraft firms. *Asian Journal of Technology Innovation, 25*(2), 288–309. https://doi.org/10.1080/19761597.2017.1385970

Nurpeisova, A. A., Niyazbekova, Sh. U., & Yessymkhanova, Z. K. (2020). Factors of innovative development of the economy of the Republic of Kazakhstan: Analysis and assessment. *Bulletin of the Karaganda University. Economy Series, 99*(3), 92–100. https://doi.org/10.31489/2020ec3/92-100

Passaro, R., Quinto, I., & Thomas, A. (2018). The impact of higher education on entrepreneurial intention and human capital. *Journal of Intellectual Capital, 19*(1), 135–156. https://doi.org/10.1108/JIC-04-2017-0056

Pereira, M. S., Cardoso, A., El Sherbiny, N. M., da Silva, A. F. C., Figueiredo, J., & Oliveira, I. (2025). Exploring the dimensions of academic human capital: Insights into enhancing higher education environments in Egypt. *Social Sciences, 14*(2), 72. https://doi.org/10.3390/socsci14020072

Peters, S. (2020). Human capital formation and inclusive growth through infrastructure. In B. Susantono, D. Park, & S. Tian (Eds.), *Infrastructure financing in Asia* (pp. 153–181). Asian Development Bank Institute.

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5), 71–102. https://doi.org/10.1086/261725

Sánchez-Barrioluengo, M., & Consoli, D. (2016). Regional human capital and university orientation: A case study on Spain. *Science and Public Policy, 43*(6), 798–811. https://doi.org/10.1093/scipol/scw032

Teslenko, V., Melnikov, R., & Bazin, D. (2021). Evaluation of the impact of human capital on innovation activity in Russian regions. *Regional Studies, Regional Science, 8*(1), 109–126. https://doi.org/10.1080/21681376.2021.1900744

Tóth, A., Juhász, T., & Kálmán, B. (2020). The role of innovation and human factor in the development of East Central Europe. *Montenegrin Journal of Economics, 16*(1), 251–274. https://doi.org/10.14254/1800-5845/2020.16-1.17

van den Berge, W. (2018). Bad start, bad match? The early career effects of graduating in a recession for vocational and academic graduates. *Labour Economics, 53*, 75–96. https://doi.org/10.1016/j.labeco.2018.05.011

Wozniak, G. D. (1984). The adoption of interrelated innovations: A human-capital approach. *The Review of Economics and Statistics, 66*(1), 70-79. https://doi.org/10.2307/1924697

Yang, J. J., Li, S. L., & Li, C. F. (2025). Graduate education and enterprise innovation. *Applied Economics Letters, 32*(3), 391–397. https://doi.org/10.1080/13504851.2023.2272695

Yao, H., Gu, X., & Yu, Q. (2023). Impact of graduate student expansion and innovative human capital on green total factor productivity. *Sustainability, 15*(2), 1721. https://doi.org/10.3390/su15021721

Yembergenova, D., Kumar, A., & Haris, I. (2020). Effects of government regulatory provisions on the innovative behaviour of HEIs and economic advancement: The case of Kazakhstan. *Industry and Higher Education, 35*, 679–690. https://doi.org/10.1177/09504222209854

Zapata-Cantu, L. (2020). Boosting innovation in emerging markets: The moderating role of human capital. *International Journal of Emerging Markets, 16*(3), 604–624. https://doi.org/10.1108/ijoem-01-2019-0015

AUTHOR BIOGRAPHIES

***Gulbakhyt Olzhebayeva** – PhD candidate, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: g.olzhebayeva@gmail.com, ORCID ID: https://orcid.org/0000-0002-4964-2747

Temirlan Abdykadyr – Researcher, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: tabdykadyr@gmail.com, ORCID ID: https://orcid.org/0009-0001-2963-5291

Madina Rakhimberdinova – PhD, Professor, D. Serikbayev East Kazakhstan Technical University, Ust-Kamenogorsk, Kazakhstan. Email: rmu_uk@mail.ru, ORCID ID: https://orcid.org/0000-0001-9009-8686

Received on: 26 March 2025 Revised on: 04 April 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.486

Integration of Islamic Values and Sustainable Tourism: The Case of FIFA World Cup Qatar 2022

Deniz Can Ekren[1]*

[1] College of Islamic Studies, Hamad Bin Khalifa University, Doha, Qatar

Corresponding author:
*Deniz Can Ekren – M. (Sc.), College of Islamic Studies, Hamad Bin Khalifa University, Doha, Qatar.
Email: denizcanekren@gmail.com

How to cite this article:
Erken, D.C. (2025). Integration of Islamic Values and Sustainable Tourism: The Case of FIFA World Cup Qatar 2022. Eurasian Journal of Economic and Business Studies, 69(2), 65-78.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

Hosting international mega-sporting events is increasingly seen as a tool of soft power and a way to promote sustainable development, national values, and tourism culture. The article aims to analyze how Islamic values have been integrated into the strategy of sustainable development and tourism legacy implemented during the FIFA World Cup Qatar 2022. Methodologically, the work is based on a qualitative approach combining a case study (based on the example of the 2022 World Cup) and autoethnography, which made it possible to combine the institutional and personal levels of analysis. The empirical base includes structured diary entries by the author, accumulated over eight years of professional participation in the preparation and implementation of sustainability and legacy programs, as well as secondary sources – scientific publications, official FIFA documents and government reports. The results of the study show that in a number of key areas (environmental sustainability, cultural exchange, social responsibility) there is a similarity between the goals of FIFA and Islamic values, which confirms the conscious localization of global standards. Islamic values were not just a background but were actively used in decision-making, programming, and communication with an international audience. In conclusion, it is recommended that religious and cultural values be integrated more deeply into the practice of sustainable development, especially in non-Western contexts, to ensure greater cultural relevance and acceptance in society.

KEYWORDS: Tourism, Sports Tourism, Tourism Economy, Islamic Values, Sustainable Development, Social Responsibility

SCSTI: 06.39.01

JEL Code: L83, M54, Z12

FINANCIAL SUPPORT: The study was not sponsored.

1. INTRODUCTION

In recent decades, holding international sports mega-events has become strategically important for states seeking to position themselves and achieve a wide range of socio-economic and cultural objectives. Events such as the Olympics and FIFA World Cup are seen as powerful instruments of "soft power", influencing the development of tourism, investment appeal, modernisation of infrastructure, and strengthening national identity. However, as Brannagan and Giulianotti (2018) argued, this projection of soft power can be double-edged, as it may also expose host nations to "soft disempowerment", a form of reputational risk that arises from intensified global scrutiny of domestic policies and sociocultural norms, particularly in non-Western contexts such as Qatar. In this context, special attention is paid to the tourism sector, which has become one of the major beneficiaries of mega-events. The increase in international tourist arrivals, the development of cultural, religious, and event tourism, and the creation of a positive image for the host country all contribute to tourism's growth as a sustainable development driver.

Hamil and Chadwick (2010) supported this view, describing sports as a deeply embedded sociocultural phenomenon. Today, sports have evolved into a global industry with profound economic, political, social, and technological impacts. Governments increasingly use sports events to attract visitors, boost economies, and garner media attention (Bowdin et al., 2011).

Qatar, the first Muslim Arab country to host the 2022 FIFA World Cup, provides unique empirical material for rethinking the relationship between global sustainability standards (including the UN Sustainable Development Goals) and Islamic ethical principles. With Qatar hosting the latest edition of the FWC, which is widely considered one of the most significant global events, attracting billions of viewers worldwide, this research adopts a unique perspective to examine Qatar's role as a host nation. This research uses Qatar's hosting of the FIFA World Cup™ (FWC) as a case study to examine its alignment with Islamic values - Adl (justice), Mizan (balance), Amanah (responsibility), and Maslahah (public good). These principles, rooted in the Quran and Sunnah, promote inclusivity, harmony with nature, and community well-being, aiming for a lasting legacy beyond the event.

The study employs an autoethnographic approach, drawing on over eight years of the author's direct experience, including roles such as Legacy Analyst, CSR Specialist, and Sustainability Manager. This perspective offers nuanced insights into Qatar's legacy and sustainability programming, complemented by secondary research on mega-events and Islamic values.

The research addresses key questions on the legacies of mega-events, the role of Islamic values in Qatar's sustainability agenda, and lessons for future legacy strategies. Doing so contributes to the literature on mega-events and Islamic ethics and proposes a framework to guide event organizers in leveraging Islamic principles for sustainable development. This study uses the FWC 2022 case study to explore mega-event legacies' positive societal, environmental, and economic impacts. It advocates for a return to Islamic values and ethics to deepen understanding of sustainable development, aligning with Senturk's (2022) concept of "rooted revival".

The study follows a structured pattern: Section 2 examines the literature on the legacy of mega-events, sustainable development, and Islamic values; Section 3 describes the methodology; Section 4 presents the results of a case study of the 2022 FIFA World Cup; Section 5 contains discussion; Section 6 concludes with a conclusion.

2. LITERATURE REVIEW

The concept of legacy, its definition, and its impacts have been widely debated by scholars like Chappelet and Junod (2006). They emphasised the need for a comprehensive approach addressing financial, economic, social, and environmental aspects while defining legacy as planned or unplanned,

positive and negative - tangible or intangible structures - that outlast the event.

Scholars like Sherwood et al. (2004, 2005) proposed using the "triple bottom line" model to evaluate event legacies. This framework examines the economic, socio-cultural, and environmental impacts of events, aligning with the Brundtland Report's vision for sustainable development, meeting current needs without compromising the future (Brundtland, 1987). Elkington (1998) asserted that organizations in the 21st century should be evaluated based on three core components of the triple bottom line: economic prosperity, social equity, and environmental quality.

Fredline et al. (2005) identified key performance indicators within these domains to balance positive and negative impacts and potential trade-offs. Economic indicators include net income-to-expenditure ratio, visitor spending, local economic benefits, and macro-level contributions like GDP growth, employment rates, and industry changes, supported by studies like Li and Mccabe (2013).

Deery and Jago (2010) outlined the positive and negative social impacts of events on host communities in their work. Positive effects include improved living standards, community pride, cultural preservation, new infrastructure, and enhanced skills. Negative impacts may involve higher living costs, traffic congestion, crime, pollution, and damage to natural or historical sites (Fredline et al., 2003). While mega-events are often framed as catalysts for development, Shin and Li (2013) challenge this narrative, revealing the underlying social costs and contradictions of large-scale urban regeneration projects.

For environmental impacts, indicators include carbon emissions, energy and water usage, waste management, and recycling efforts (Bowdin et al., 2011). Beesley and Chaplin (2011) highlighted the need for strategic planning to assess economic, social, and environmental impacts, mitigate risks, and capitalize on opportunities for long-term benefits. However, a historical review of mega events hosted since 2000, including the Olympic Games and FIFA World Cup, revealed mixed legacies, with some countries faring better than others in achieving wider legacy objectives. Figure 4 is also a testament to the globalization of sports, namely the FIFA World Cup and Olympic games, highlighting how sports extend beyond national boundaries, reaching the continents of Australia, Asia, Europe, Africa, and South America. This further reinforces the scholarly perspective on the globalization of sports, particularly football, as discussed by Dolles and Söderman (2005), Horton (2011), Lee and Kim (2016), and Elamin et al. (2023), among others.

The link between sustainable development and religion has been explored extensively. The fundamental difference between the United Nations-led development agenda in the form of Sustainable Development Goals (SDGs) and the Islamic value-driven approach lies in the comprehensive worldview and guidance offered by Islam encompasses all facets of life, including the relationship between humanity and the environment, as referenced in Ahmed (1998). According to Sarkawi et al. (2016) argued that modern sustainability concepts overlook Muslims' religious duty to maintain balance in resource management and respect natural order as acts of worship to seek God's mercy and achieve Jannah (Heaven), the ultimate goal. Al-Jayyousi et al. (2023) examined how Islamic principles can inform climate policy and enhance institutional practices.

The Holy Quran emphasizes Islamic values - Adl (justice), Mizan (balance), Amanah (responsibility), and Maslahah (public good), highlighting humanity's stewardship (Khalifah) and the importance of balancing resource use with environmental protection. Bsoul et al. (2022) argued that we can only encourage responsible resource management, environmental protection, and sustainable development through improved ethical and moral relationships toward nature. However, this responsibility extends beyond the individual to wider public policy implications. The concept of maslahah (public good) underscores the importance of policy and

actions benefitting society. These values, forming the foundation of this research, are structured in the Bayt Al Maslahah model illustrated in Figure 1 below.

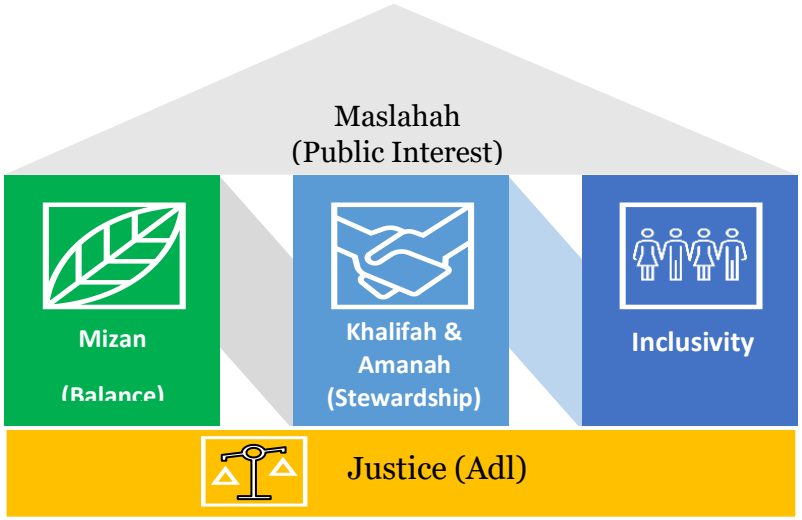

FIGURE 1. Bayt Al Maslahah - Five core Islamic Principles that drive sustainability and legacy thinking

The presented diagram visualizes a conceptual model that reflects the integration of Islamic values into an approach to sustainable development and the design of socially significant initiatives. It is made as a symbolic house, with each structural part reflecting an ethical principle rooted in Islamic faith. Equity (Adl) is the model's foundation, interpreted as the basis for all social, environmental, and economic sustainability. All components aim to achieve the highest goal represented at the top - the public good, which serves as a synthesis of efforts to ensure sustainable development with moral imperatives. Therefore, the model provides a theoretical construct and a practical framework for creating sustainable policies and programs focusing on long-term public benefits and cultural relevance. It is particularly important, in the context of international mega-events, to develop Islamic and cultural tourism and to position Muslim countries as responsible actors in global sustainable development. The principles reflected in this model can be applied to designing tourism initiatives that combine ethical expediency, respect for cultural legacy, and the promotion of socially-oriented values.

3. METHODOLOGY

This study follows a qualitative research strategy that combines case study and autoethnographic methods to examine the social, environmental, and economic legacies of the FWC 2022 in Qatar. Simultaneously, the research explored how Islamic values and ethics can inform and enrich understandings of sustainable development through the lens of Recep Şentürk's (2022) concept of rooted revival, which emphasizes the adaptation of global frameworks to local moral and epistemological foundations.

The study adopts a case study strategy with the FWC 2022 in Qatar serving as the contemporary phenomenon under investigation using multiple sources of evidence (Yin, 2018). As a mega-event situated in a non-Western context, organized for the first time by an Arab Muslim country, the World Cup offers a fertile ground for examining legacy impacts beyond typical Western paradigms. This is complemented by ethnographic methods to uncover lived experiences, cultural narratives, and social dynamics surrounding the event's implementation and aftermath (Creswell & Poth, 2018). To overcome the limitation of

providing a surface level or detached analyses in legacy studies, this research integrates autoethnography as a key component.

Through reflective engagement, this approach allows the researcher, situated within the Qatari context, to offer insider insights into the socio-cultural meanings of sustainability, Islamic ethics, and legacy formation. The decision to incorporate autoethnographic approach stemmed from its ability to provide such nuanced understanding of personal experiences, complementing conventional research methods gaps outlined by Amos (2022).

Data collection sources included journal entries, reflective practices and secondary literature on mega-event legacies and Islamic values. The author kept a structured journal over eight years, documenting personal observations, lessons learned, and professional encounters related to FWC 2022. Reflective practices were undertaken to assess how these experiences align or contrast with Islamic ethical values, legacy discourse, and local public sentiment. These personal accounts were supplemented with secondary research from literature on mega-events and Islamic values.

Within the framework of the study, a consistent set of steps was implemented to identify the relationship between Islamic values and sustainable development. Specifically, the steps below are:

(1) goals and research questions were formulated, focusing on the social, environmental and economic aspects of the legacy of mega-events in the Islamic context;

(2) a methodological approach based on a combination of case study and autoethnography was chosen, which made it possible to combine the analysis of empirical data with the author's personal experience and professional observations;

(3) systematic accumulation of data, including the maintenance of a structured diary for eight years, reflexive practices and the collection of secondary information from scientific publications, official documents and the media;

(4) based on the collected material, a qualitative analysis was conducted with elements of a thematic approach aimed at identifying key motivations and correlations between sustainability practices and Islamic ethical principles such as fairness, balance, responsibility, and the public good;

(5) the interpretation of the data obtained from the perspective of research reflection, comparison with the theoretical model of Bayt Al Maslahah, as well as the formulation of conclusions and recommendations on integrating Islamic values into organizing international events. This step-by-step approach provided a holistic understanding of the phenomenon under study and allowed us to develop relevant proposals for future research and practice.

The study does not violate privacy standards and is based on personal observations and publicly available information. All personal data involved in the reflection has been depersonalized. The research was conducted from a position combining elements of insider and outsider approaches. Thus, during the analysis, there was access to internal processes, value-based solutions and social dynamics in the organization. Cultural and religious affiliation with the Islamic tradition has provided a deeper understanding of implementing and communicating Islamic ethical principles. Like any autoethnographic approach, this study is subject to the risk of subjectivity. However, the author's conscious reflexivity and critical review of the data obtained minimizes this risk.

This paper recognizes the possibility of focusing on positive interpretations consistent with promoted Islamic values while not adequately highlighting organizational shortcomings, especially in those aspects that relate directly to legacy programs. There is also a risk of perceiving the perspective presented as universal, when other groups, including local Qatari citizens, non-Muslim observers, and critics may view the event and its legacy differently.

4. RESULTS

In recent decades, hosting mega sporting events has become a strategic instrument for countries aiming to improve their international visibility and pursue diverse development objectives. Mega sporting events significantly impact sociological, political, cultural, and economic spheres, fostering connections to global society (Horne & Manzenreiter, 2006). However, the developmental trajectories resulting from such events vary considerably across host nations.

Among recent FIFA World Cup host countries, Qatar stands out as the smallest yet wealthiest country per capita to host the FIFA World Cup. In terms of its per capita wealth and its ability to invest in global events without economic strain, Qatar presents a unique case of leveraging resource wealth for global engagement.

Figure 2 illustrates the stark contrast in GDP per capita among the last four FIFA World Cup host countries, emphasizing Qatar's exceptional economic position.

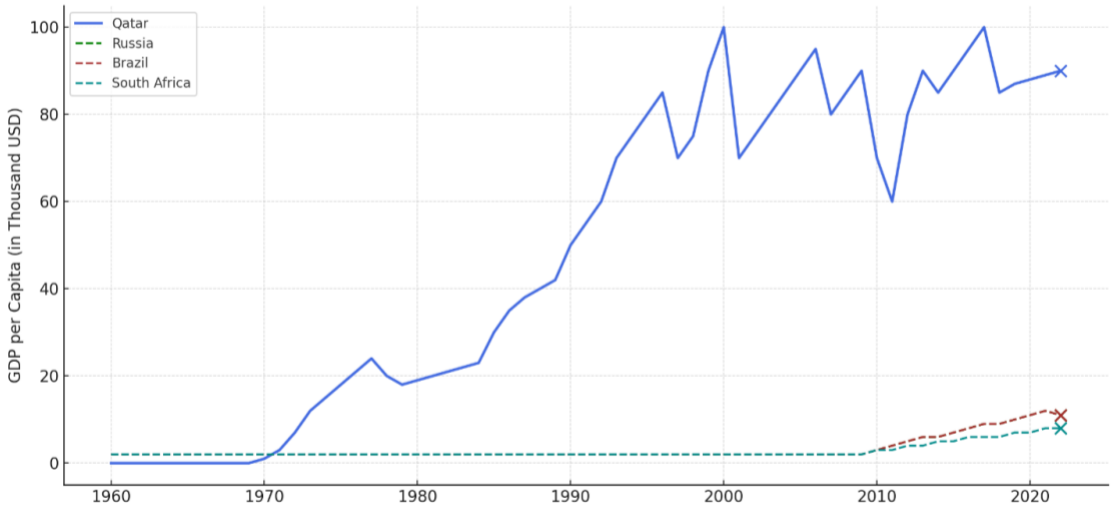

FIGURE 2. Comparison between the last four countries to host the FIFA World Cup in terms of GDP per capita in USD, 1960-2022

Note: compiled based on the source World Bank (2022)

Qatar stands out as the smallest yet wealthiest nation per capita to host the FIFA World Cup, with a GDP per capita of $87,661 in 2022, surpassing South Africa ($6,766) by more than 13 times and Russia ($15,270) by over 6 times. Cornelissen et al. (2011) discussed the necessity of conducting sustained legacy evaluations over several decades to ensure long-term positive impacts. Li and McCabe (2013) outlined the stages of legacy—short, medium, and long-term. Early signs of positive transformation from the FIFA World Cup 2022 include advancements in infrastructure, such as the development of sporting facilities, urban expansion, and improved transport networks. Brannagan and Giulianotti (2018) marked those nations leveraging soft power, such as Qatar, risk "soft disempowerment," which attracts global scrutiny over issues like human rights, environmental impact, financial costs, and the post-event use of facilities. Addressing these concerns requires comprehensive research to evaluate criticisms and the Qatari government's strategies for mitigation over short, medium, and long-term periods.

The rapid acceleration in key sectors such as highways, bridges, tunnels, intersections, sewerage networks, and cycling tracks reflects a significant transformation in Qatar's infrastructure, demonstrating the country's commitment to building world-class facilities

while aligning with sustainable development goals. Figure 3 illustrates the rapid acceleration of infrastructure development in Qatar between the periods of 1950-2013 and 2013-2022.

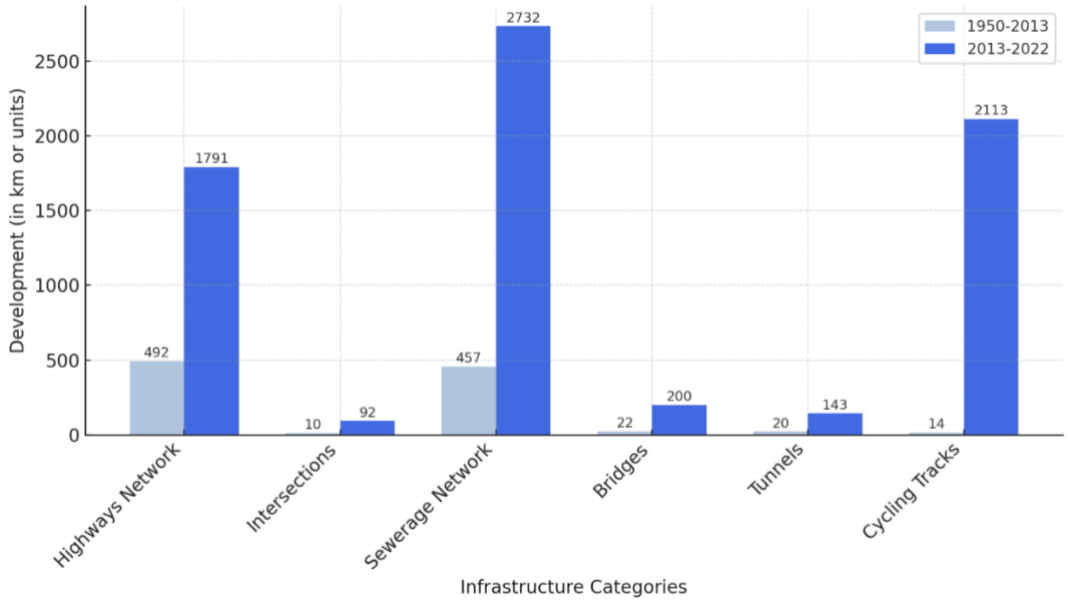

FIGURE 3. Comparison between infrastructure development in Qatar between 1950-2013 to 2023-2022

Note: compiled based on source Supreme Committee for Delivery and Legacy (2022)

Qatar's hydrocarbon wealth allowed it to host the mega-event without sacrificing investment in essential public services like healthcare and education or incurring significant debt, unlike the Athens 2004 Olympics and Brazil's 2014 and 2016 events (Becatoros, 2012; Smith, 2012). While questions remain about the utilization of Qatar's FIFA World Cup 2022 infrastructure, most stadiums have seen use during the AFC Asian Cup 2023 and Qatar Stars League matches. EuroNews (2023) reports that Ahmad Bin Ali and Al Janoub stadiums will have their capacities halved, with 40,000 seats donated to sub-Saharan African nations to develop football infrastructure yet to materialize. However, conversion and maintenance costs for these facilities could pose long-term challenges if underutilized over their 30-50-year lifecycle.

Despite criticism, Qatar's country brand index improved significantly, rising from 70 in 2010 to 18 in 2020, showcasing its progress in achieving hard and soft legacy goals even before hosting the FIFA World Cup. These include physical transformation, increased global recognition, and positioning Qatar as a hub for business and tourism with lasting benefits.

Tourism has also surged post-event, nearly doubling from 2.1 million visitors in 2019 to over 4 million in 2023 (see Figure 4 for details).

Qatar's hosting of the 2022 World Cup aligned with its Sustainability Strategy. There was a prioritized cultural exchange, Islamic culture, customs, and values, dispelling stereotypes and promoting broader acceptance of Islam. Despite facing criticism, particularly from Western media, regarding issues like

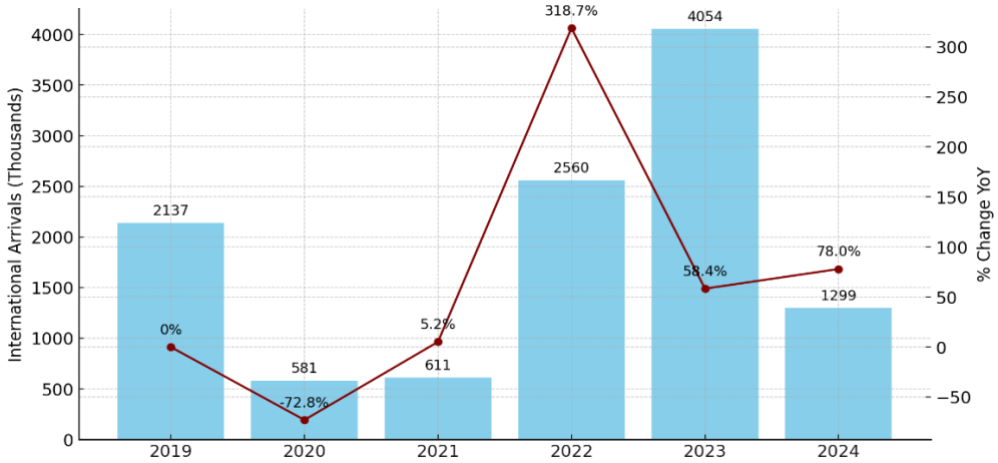

FIGURE 4. International arrivals to Qatar by year, 2019-2024

Note: compiled based on source Supreme Committee for Delivery and Legacy (2022)

Qatar's hosting of the 2022 World Cup aligned with its Sustainability Strategy. There was a prioritized cultural exchange, Islamic culture, customs, and values, dispelling stereotypes and promoting broader acceptance of Islam. Despite facing criticism, particularly from Western media, regarding issues like workers' welfare and LGBTQ+ rights, Qatar's efforts to foster understanding and address cultural divides were significant. Green (2021) and Elamin (2023) documented how criticisms of Qatar often transformed into Islamophobic narratives, reinforcing a divisive 'East vs. West' discourse. Nevertheless, in 2024, figures showed promising growth (already 1.3 million visitors recorded in January-February) in international arrivals to Qatar. However, maintaining these numbers over the long term may be influenced by various factors, which makes it challenging to attribute future tourism impacts solely to the FIFA World Cup. The World Cup served as a significant platform for cultural exchange. Despite criticism, Qatar proved that a Muslim Arab nation could host an exceptional World Cup, praised by FIFA's president as the best. Fans echoed this sentiment, with 78% in a BBC poll (Figure 5) naming it the 'best of the century.

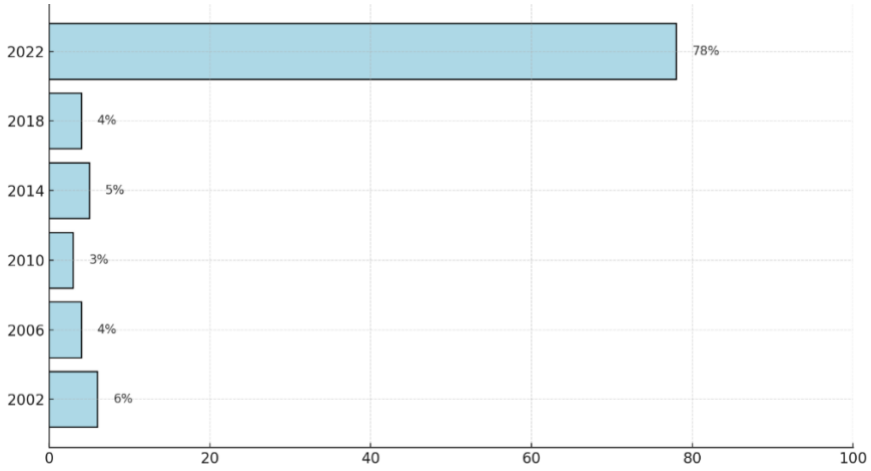

FIGURE 5. BBC poll on best World Cup of the century

Note: compiled on source BBC Sport (2022)

Islamic Worldview by Design or by Chance

In his foreword to Qatar National Vision (QNV) 2030, Amir Sheikh Tamim bin Hamad Al-Thani emphasized the importance of economic and social justice, harmony with nature, and strong Islamic and family values. While Qatar did not explicitly aim to promote these values during the FIFA World Cup 2022, they were still influential, reflecting Qatar's Arab and Muslim identity. Islamic principles emerged through cultural exchange and efforts to showcase the region's identity on the global stage.

This research identifies seven areas where Qatar's leadership integrated Islamic values with FIFA's sustainability guidelines. These areas demonstrate alignment in sustainability and CSR strategies but divergence in alcohol policies and LGBTQ+ promotion. The following Table 1 illustrates these areas of convergence and divergence.

TABLE 1. Convergence and divergence of values between FIFA's Sustainability Agenda and Islamic Principles during FIFA World Cup 2022

No.	FIFA Driven Sustainability Agenda	Islamic Value Driven Decision Making	Convergence or Divergence of Values
1	Cultural Exchange	Promoting mutual understanding and tolerance	Convergence / Shared values
2	Sustainability at the heart of the FWC 2022	Emphasis on long-term sustainability	Convergence / Shared values
3	Corporate Social Responsibility Programs and Establishment of Waqf (Generation Amazing Foundation)	Encouraging social responsibility and charitable actions	Convergence / Shared values
4	Dawa efforts to promote Islamic principles	Promoting Islamic values through cultural exchange	Convergence / Shared values
5	Welcoming the world but opposing the acceptance of LGBTQ+ movement	Upholding traditional Islamic values and beliefs	Divergence
6	Banning alcohol in wider public parks and stadiums	Aligning with Islamic principles on alcohol consumption	Divergence
7	Donation of assets after the tournament to earthquake victims in Turkey and Syria	Charity and helping those in need (Waqf concept)	Neutral position

Note: author's elaboration

Cultural Exchange

The FIFA World Cup 2022 served as a platform for cultural exchange, with the strongest focus on the rich history, culture, and hospitality. Thus, cultural understanding aligned with FIFA's sustainability strategy has become a fine foundation for promoting inclusivity and diversity in line with Islamic principles, and through investments such as the Museum of Islamic Art, Qatar deliberately delivered a diverse collection of Islamic artifacts, thus making itself a cultural hub (Salim, 2013).

In 2019, Qatar further solidified its cultural influence with the opening of the National Museum, which focuses on three chapters of Qatari history. Located near Souq Waqif and the Museum of Islamic Art, it contributes to the cultural district in Doha's historic center. Moreover, visa regulations were relaxed, which attracted international visitors and promoted Qatar's cultural richness, supporting the country's position as a cultural hub (Davis, 2022).

Sustainability at the Heart of the FWC 2022

The FIFA World Cup 2022 was also a key area where FIFA's sustainability agenda converged with Islamic values, particularly those outlined in Qatar National Vision (QNV)

2030. Organizers committed to five key areas of the Sustainability Strategy: human capital development and worker rights, inclusive tournament experience, driving economic growth, implementing innovative environmental solutions, and advocating for good governance and ethical business standards. The set efforts resulted in earning the ISO 20121 certification for event sustainability (ISO, 2024).

The FWC 2022 organizers implemented a Sustainable Procurement Policy that addressed the preparation, delivery, and post-event activities to safeguard human rights, enhance worker well-being, promote economic growth, and foster environmental responsibility across the supply chain. A governance structure was established between FIFA, The FWC Qatar 2022 LLC, and the Supreme Committee for Delivery & Legacy. This structure included a Sustainability Steering Group for strategic oversight and a Sustainability Working Group responsible for implementation and reporting progress. Progress reports were published to ensure transparency, detailing goals and outcomes during and after the tournament.

Key sustainability achievements highlighted in the Supreme Committee for Delivery & Legacy's post-event report include:

- stadiums designed to be 30% more energy-efficient and use 42% less water than global benchmarks;
- recycling or composting 77% of stadium waste, producing 8 million bottles from recycled plastic;
- planting 1 million trees to support climate action and offsetting half of the event emissions through solar energy investments and carbon credits;
- low-carbon transport initiatives, including metro, light rail, 750 electric buses, and over 500 charging stations, reduce the tournament's 119,000 daily car journeys;
- sustainable procurement practices that promoted local contractors, minimized resource use, and protected human rights, covering 90% of high-risk contracts.

These efforts reflect Islamic stewardship and sound public principles, ensuring an enduring environmental legacy for Qatar.

Corporate Social Responsibility Programs and Establishment of Waqf (Generation Amazing Foundation)

In 2010, Qatar's FWC 2022 bid committee launched the Generation Amazing (GA) program, using football to create social change among vulnerable youth worldwide (Ekren & Anagnostopoulos, 2023). This voluntary initiative is not a FIFA requirement, and it continues post-tournament. GA established community clubs, football pitches, and football-for-development programs to develop life skills such as leadership, communication, and organization. As a legacy of the World Cup, GA impacted over one million people across 75 countries. The GA foundation acts by the Islamic Waqf concept, emphasizing justice, fairness, responsibility, and public good, ensuring lasting benefits globally.

Dawa Efforts to Promote Islamic Principles

Qatar used the FIFA World Cup 2022 to introduce Islam to visitors and address misconceptions. Supported by scholars like Dr. Zakir Naik and Nouman Ali Khan, Qatar promoted Islamic teachings through murals, free booklets, and guided tours at key locations, such as Souq Waqif and the Sheikh Abdulla bin Zaid Islamic Cultural Center. Volunteers in Doha's Katara cultural district also offered coffee, dates, and Islamic literature. The state policy aligned with maslahah (public good) promotion and Qatar's commitment to spreading Islamic values.Syrian volunteer Ziad Fateh reported that FWC 2022 is "an opportunity to introduce millions of people to Islam" and change "misconceptions" about a religion that is linked mainly in the West to radicalization (VOA News, 2022). Even though the event's organizers did not directly organize the Dawa activities, they were managed by local actors.

Welcoming the world while opposing the imposition of LGBTQ+ acceptance

FIFA President Gianni Infantino openly supported the LGBTQI+ community during the FIFA World Cup 2022 (CNBC, 2022). However, Qatar faced criticism for its laws criminalizing same-sex activity, which align with the country's constitution and Islamic Sharia law. These laws prohibit same-sex sexual activity under the Penal Code (Law No. 11, 2004).

Nasser Al Khater, CEO of FIFA World Cup Qatar 2022 LLC, emphasized Qatar's welcoming approach despite its conservative stance: "We are open, welcoming, and hospitable. We understand cultural differences and expect people to respect our culture".

Despite criticism from Western media and politicians, Qatar maintained its Islamic values, refusing to adopt Western laws on LGBTQ+ rights. As stated by Energy Minister Saad Sherida Al Kaabi, Qatar would not change its laws or values to meet Western expectations (Doha News, 2022). Moreover, these statements highlighted the consistency of Qatar's leadership on this issue and demonstrated a divergence from FIFA's inclusivity agenda, in line with the principles of maslahah (public good).

Banning alcohol in more expansive public parks and stadiums

Two days before the first match, Qatar decided to ban alcohol for general spectators in stadiums, despite FIFA's long-standing partnership with Budweiser. Alcohol was restricted to VIP and hospitality zones. Interestingly, the ban increased the sales of Budweiser's non-alcoholic beer, 'Bud Zero,' at the event (The Guardian, 2022).

The regulations were based on the principles of maslahah and thus consistent with Islamic values, reflected in Qatar's Penal Code (Law No. 11, 2004, Article 270), which prohibits drinking alcohol in public places. The media reported that this measure helped create a safer and more family-friendly environment for female fans (Reuters, 2022).

Donation of assets after the tournament to earthquake victims in Turkey and Syria

The devastating earthquake in Türkiye and Syria on February 6, 2023, left cities and town centers in ruins and claimed the lives of more than 53,000 people in Türkiye and 5,900 in Syria(Al Jazeera, 2023; Reuters, 2023) . Qatar promptly aided Türkiye and Syria by dispatching portable homes used by fans during the FWC 2022 to earthquake-affected areas (Al Jazeera, 2024). This was a decision taken by the Qatari local authorities and local organizing committee; however, FIFA did not oppose this move. This act reflects Islamic principles of charitable giving, which Awang (2017) identifies as vital for individual and societal welfare. Qatar's 10,000 mobile housing units donation ensures the FWC 2022 legacy supports earthquake-affected regions. Donating assets and infrastructure embodies Islamic values of justice, fairness, responsibility, and public good, aligning with the ummatic concept and the tournament's strategy of aiding needy countries.

Recommendations

This research offers valuable insights from Qatar for Muslim event organizers, NGOs, and governments, guiding them in operationalizing Islamic principles to contemporary events and projects for an enduring legacy.

While organizations may face challenges such as resistance to change, financial constraints, and lack of resources, design thinking can help address these issues by:

(1) Integration of Islamic values: workshops, governance frameworks, and training programs can embed values like Adl, Mizan, Khalifah, Amanah, and Maslahah into organizational policies, procedures, and business models.

(2) Resistance to change: lack of management commitment and a culture supporting sustainability can hinder progress. Design thinking fosters problem-solving and supports adopting sustainable practices by building a culture of commitment.

(3) Financial costs: emphasizing long-term benefits, such as cost savings and regulatory compliance, can offset initial expenses.

(4) Measuring sustainability: combining an Islamic value-based framework with recognized ESG metrics can help monitor and report on environmental and social capital performance.

(5) Environmental and Social Audits: Regular audits and collaboration with suppliers can improve sustainability across the supply chain.

(6) While design thinking offers solutions, it may be time-consuming and costly without focusing on root causes. The study advocates reconnecting with Islamic values to make sustainability culturally relevant and easier to adopt in Muslim-majority nations.

Further research is needed to assess the FIFA World Cup's post-event legacy in Qatar, focusing on human, social, environmental, and economic impacts over the mid (3–5 years) and long-term (5–10 years) periods and their role in Qatar's development. Studies should also evaluate events hosted by other Muslim nations, examining their experiences, sustainability adoption, and integration of Islamic values to identify gaps in this field.

Current literature lacks insights into the opinions and attitudes of non-Muslim fans toward Qatar during the mega-event, compared with Western media narratives. Analyzing shifts in perceptions among fans who visited Qatar and those who watched the event remotely would be valuable.

A limitation of the study is its reliance on Islamic values, which may restrict broader acceptance. A parallel model based on Abrahamic prophetic values, incorporating Islam, Christianity, and Judaism, is recommended to address this. This approach would involve interfaith dialogue partnerships with religious leaders, organizations, and institutions to foster broader understanding and collaboration.

5. CONCLUSION

The study developed a new framework for assessing the legacy of mega-events through the lens of Islamic ethics, using the FIFA World Cup 2022 in Qatar as a case study. The analysis focused on how Islamic principles—Adl (justice), Mizan (balance), Maslahah (public good), Khalifah (stewardship), and Amanah (responsibility)—were reflected in the tournament's planning and execution and how they aligned with FIFA's sustainability agenda. The findings showed that Islamic values were not externally imposed but inherent to Qatari leadership's decision-making culture. These principles shaped choices related to infrastructure, social programs, environmental planning, and cultural positioning, reinforcing Qatar's identity as a conservative Muslim nation.

The research recommends moving beyond leadership-centric applications of Islamic ethics toward institutionalizing Islamic values within event governance systems, particularly when events involve international teams with diverse cultural backgrounds. Therefore, Islamic values are not exceptional but part of a coherent ethical system applicable to modern global events.

The study outlines a conceptual framework based on shared Abrahamic values as a complementary proposition. While not applied in the context of Qatar's FIFA World Cup 2022, this model may facilitate interfaith cooperation across Islam, Christianity, and Judaism and broaden the ethical applicability of sustainability efforts in diverse religious contexts. This approach may enhance inclusivity in sustainability discourse while preserving ethical consistency rooted in religious traditions.

For future application, the study calls on Muslim-majority countries, policymakers, event organizers, and civil society actors to actively incorporate Islamic ethical teachings in sustainability agendas. This requires contextual adaptation of core principles to reflect local conditions while advancing the broader objectives of the UN Sustainable Development Goals (UNSDGs) through culturally resonant strategies.

AUTHOR CONTRIBUTION

Writing – original draft: Deniz Can Ekren.
Conceptualization: Deniz Can Ekren.
Formal analysis and investigation: Deniz Can Ekren.
Funding acquisition and research administration: Deniz Can Ekren.
Development of research methodology: Deniz Can Ekren.
Resources: Deniz Can Ekren.
Software and supervisions: Deniz Can Ekren.
Data collection, analysis and interpretation: Deniz Can Ekren.
Visualization: Deniz Can Ekren.
Writing review and editing research: Deniz Can Ekren.

References

Ahmed, A., (1998). *Discovering Islam* (1st edition). Routledge.

Al Jazeera. (2023). Qatar ships World Cup portable homes to quake-affected Turkey. Retrieved April 6, 2025, from https://www.aljazeera.com/news/2023/3/5/qatar-ships-world-cup-portable-homes-to-quake-affected-turkey

Al Jazeera. (2024, February 6). Anger as Turkey marks anniversary of devastating earthquake. Retrieved April 6, 2025, from https://www.aljazeera.com/news/2024/2/6/anger-as-turkey-marks-anniversary-of-devastating-earthquake

Al-Jayyousi, O., Hasan, W.N.W., Mohamed Saniff, S., Sever, S.D., & Tok, E. (2023) A critical discourse analysis on climate change in a globalized world: The nexus of Islam and sustainable development. *Sustainability, 15*(19), 14515. https://doi.org/10.3390/su151914515

Amos, D. (2022). Conducting research by mixed methods: An autoethnography account of a PhD research in facilities management from a developing country. *Facilities, 40* (13/14), 828-844. https://doi.org/10.1108/F-12-2021-0124

BBC Sport. (2022). Which was the best World Cup this century? [Poll results]. Retrieved April 6, 2025, from https://www.bbc.com/sport/football/64075135

Beesley, L.G., & Chalip, L. (2011). Seeking (and not seeking) to leverage mega-sport events in non-host destinations: The case of Shanghai and the Beijing Olympics. *Journal of Sport & Tourism, 16*(4), 323-344. https://doi.org/10.1080/14775085.2011.635016

Brannagan, P. & Giulianotti, R. (2018). The soft power-soft disempowerment nexus: The case of Qatar. *International Affairs, 94*(5), 1139-1157. https://doi.org/10.1093/ia/iiy125

Bowdin, G., Allen, J., O'Toole, W., Harris, R. & McDonnell, I. (2011). *Events management.* (3rd Edition). Routledge.

Brundtland, G. (1987). Report of the World Commission on Environment and Development: Our Common Future. Retrieved April 6, 2025, from https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf

CNBC. (2022). *Qatar World Cup 2022: Teams ax pro-LGBTQ armbands after FIFA threats*. Retrieved April 6, 2025, from https://www.cnbc.com/2022/11/21/qatar-world-cup-2022-teams-drop-lgbtq-armbands-after-fifa-threats.html

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.

Deery, M. & Jago, L. (2010). Social impacts of events and the role of anti-social behaviour. *International Journal of Event and Festival Management*, *1*(1), 8-28. https://doi.org/10.1108/17852951011029289

Doha News. (2022). *LGBTQ welcome to visit Qatar, but West should not 'dictate' our beliefs, says energy minister*. Retrieved April 6, 2025, from https://dohanews.co/lgbtq-welcome-to-visit-qatar-but-west-should-not-dictate-our-beliefs-says-energy-minister /

Dolles, H. & Söderman, S. (2005). *Globalization of sports - The case of professional football and its international management challenges.* Working paper no. 05/1, German Institute for Japanese Studies, Tokyo.

Elamin, M.O.I., (2023). Countering Islamophobia through Sports: Qatar's Initiatives during the 2022 FIFA World Cup. *International Journal of Membrane Science and Technology, 10*(1), 1568-1578. https://doi.org/10.15379/ijmst.v10i1.2997

Elkington, J.B. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management, 8*, 37-51. https://doi.org/10.1002/TQEM.3310080106

Fredline, L., Jago, L. and Deery, M. (2003). The Development of a Generic Scale to Measure the Social Impacts of Events. *Event Management, 8*, 23-37. https://doi.org/10.3727/152599503108751676

FIFA World Cup Qatar 2022 (2024). Retrieved April 6, 2025, from https://cdnlegacy.azureedge.net/files-en/Qatar_2022_Amazing_Delivered.pdf

FIFA (2024). World Cup Qatar 2022 Sustainability Policy. Retrieved April 6, 2025, from https://digitalhub.fifa.com/m/2797014fe0b78979/original/FIFA-World-Cup-Qatar-2022-Sustainability-Policy.pdf

International Organization for Standardization. (2024). *ISO 20121: Event sustainability management systems – Requirements with guidance for use*. Retrieved April 6, 2025, from https://www.iso.org/standard/54552.html

Lee, B. and Kim, T. (2016). A study on the birth and globalization of sports originated from each continent. *Journal of Exercise Rehabilitation, 12*(1), 2-9. https://doi.org/10.12965/jer.150248

Reuters. (2022, December 6). Female fans feel safe at Qatar World Cup thanks to reduced alcohol consumption. Retrieved from https://www.reuters.com/lifestyle/sports/female-fans-feel-safe-qatar-world-cup-thanks-reduced-alcohol-consumption-2022-12-06/

Reuters. (2023). Qatar ships World Cup fan accommodation to Turkey, Syria earthquake zones. Retrieved April 6, 2025, from https://www.reuters.com/world/middle-east/qatar-ships-world-cup-fan-accommodation-turkey-syria-earthquake-zones-2023-02-13/

Sarkawi, A., Abdullah, A., & Dali, N.M. (2016). The Concept of Sustainability From The Islamic Perspective. *International Journal of Business, Economics and Law, 9*(5), 112–116.

Senturk, R. (2022). *Decolonizing Social Sciences: From Uniplexity to Multiplexity* [Video]. YouTube. https://www.youtube.com/watch?v=zAmX8vYcZeo

Sherwood, P., Jago, L. & Deery, M. (2004). Sustainability reporting: An application for the evaluation of special events. *In C. Cooper et al. (Eds), paper presented at the Annual Conference of the Council for Australian University Tourism and Hospitality Education*. Brisbane: University of Queensland.

Sherwood, P., Jago, L. & Deery, M. (2005). *Unlocking the triple bottom line of special event evaluations: What are the key impacts?* Third International Event Management Research Conference. Sydney: University of Technology.

Shin, H. & Li, B. (2013). Whose games? The costs of being "Olympic citizens" in Beijing. Environment and Urbanization, 25(2), 681-696. https://doi.org/10.1177/0956247813501139

Supreme Committee for Delivery & Legacy. (2022). Qatar 2022: Amazing delivered. Retrieved April 6, 2025, from https://azureedge.net

The Guardian. (2022). *Budweiser to give beer it cannot sell at World Cup to winners*. Retrieved April 6, 2025, from https://www.theguardian.com/football/2022/nov/22/budweiser-to-give-beer-it-cannot-sell-at-world-cup-to-winners

VOA News. (2022, December 4). *World Cup host Qatar seeks to change minds on Islam*. Retrieved April 6, 2025, from https://www.voanews.com/a/world-cup-host-qatar-seeks-to-change-minds-on-islam/6862327.html

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.

AUTHOR BIOGRAPHIES

***Deniz Can Erken** – M. (Sc.), College of Islamic Studies, Hamad Bin Khalifa University, Doha, Qatar. Email: denizcanekren@gmail.com. ORCID ID: https://orcid.org/0000-0003-2697-317X

Received on: 30 March 2025 Revised on: 18 May 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.514

Assessment of Bank Profitability through Structural Indicators: Evidence from Kazakhstan

Nazym K. Zaitenova[1]

Sholpan Abzhalelova[1]*

[1] University of International Business named after K. Sagadiyev, Almaty, Kazakhstan

Corresponding author:
*Sholpan Abzhalelova– PhD, Institute of Economics MSHE RK, Almaty, Kazakhstan.
Email: aselka01@mail.ru

How to cite this article:
Zaitenova, N.K. & Abzhalelova, Sh. (2025). Assessment of Bank Profitability through Structural Indicators: Evidence from Kazakhstan. Eurasian Journal of Economic and Business Studies, 69(2), 79-94.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

Bank profitability remains a central concern in assessing financial sector resilience, especially in systems undergoing institutional and regulatory transformation. This study aims to examine the impact of key internal structural indicators, namely capital adequacy, management efficiency, liquidity, and market-based funding, on the return on equity (hereinafter – ROE) of the banking sector in Kazakhstan. The analysis uses linear regression based on data from 2013 to 2023, incorporating standardized indicators to measure the relationship between structural financial variables and profitability. The model includes adjusted capital adequacy ratio, pre-tax return on assets, ROE, liquidity ratio based on client deposits, and the share of market-based funding in total liabilities. Results demonstrate that management efficiency has a substantial and statistically significant effect on ROE ($\beta = 11.41$, $p < 0.01$), while capital adequacy, liquidity, and market-based funding show weaker or statistically insignificant effects. The high explanatory power of the model ($R^2 = 0.970$) suggests that internal operational factors, rather than the balance sheet, drive profitability in Kazakhstan's banking sector. A comparative analysis of marginal effects further supports the dominant role of internal operational performance over passive balance sheet structure. The study is complemented by a literature-based framework highlighting mixed evidence on the role of liquidity and capitalization under different institutional conditions. Findings indicate that in transitional financial systems, profitability is primarily driven by internal cost and risk management rather than by regulatory capital levels or external funding strategies. Policy implications should prioritize operational efficiency and coordinated prudential regulation according to system-specific constraints.

KEYWORDS: Bank, Banking Performance, Economy, Capital Adequacy, Management Efficiency, Liquidity, Liability Structure, Internal Stability

SCSTI: 06.73.55

JEL Code: G21, G23, G32

FINANCIAL SUPPORT: The study was not sponsored.

1. INTRODUCTION

Following the global financial crisis of 2007–2008, banking system resilience and vulnerability to liquidity shocks became central to the international agenda (Florackis et al., 2014). The disruption of short-term funding and the halt in interbank settlements showed that existing regulatory mechanisms could not cope with liquidity risks. In response, the liquidity coverage ratio (hereinafter – LCR) was established under Basel III (Schmitz, 2013; Hong et al., 2014). Thus, increasing the share of stable funding sources, primarily retail deposits, strengthens the sector's resilience and reduces the risk of contagious instability during financial shocks. At the same time, substituting short-term market instruments for deposits was supposed to reduce liquidity volatility, and the total cost of funding, deposit-based funding, led to rising interest rates, falling margins, and reduced lending volumes.

International organizations are forming a coordinated position on the role of stable funding in strengthening the financial system. The Basel Committee views stable sources as a means of reducing short-term vulnerability and enhancing confidence. The International Monetary Fund assesses liquidity requirements to prevent systemic imbalances, especially in economies with limited access to capital markets (Papadamou et al., 2021). The World Bank emphasizes the importance of adapting regulatory requirements to the specificities of national banking systems to avoid putting pressure on small and regional financial institutions.In some countries, implementing sustainable funding models has had mixed effects. In South Korea, increased liquidity requirements have increased the share of term deposits and reduced dependence on external borrowing while limiting lending volumes. In Brazil, increased requirements for liquid assets have reduced bank profitability and stimulated a redistribution of assets towards government securities. In Turkey, adaptation to new standards occurred in the context of inflationary pressure and currency instability, which has led to higher funding costs and a reduction in the maturity of obligations. The impact of regulation has proven to be dependent on market structure, macroeconomic conditions, and the level of institutional maturity.

In emerging markets, the vulnerability was exacerbated by the predominance of deposits in the liability structure, limited opportunities to raise capital through markets, and weak institutional regulatory frameworks. In several countries, conflicts have been identified between regulatory liquidity and economic performance, universal regulatory models, and national conditions of banking behavior. At the same time, the question remains: how do various sustainability parameters - capitalization, liquidity, funding structure, and management effectiveness - relate to performance in the context of institutional constraints? This study aims to examine the impact of key internal structural indicators, namely capital adequacy, management efficiency, liquidity, and market-based funding, on the ROE of the banking sector in Kazakhstan

2. LITERATURE REVIEW

ROE is considered in the research literature as a complex indicator reflecting the relationship between the internal stability of a bank and external environmental conditions. Athanasoglou et al. (2008) defined bank profitability as the interaction of internal characteristics - capital structure, operating expenses, and asset risk - with industry and macroeconomic conditions. The specific characteristics make the main contribution to the formation of the ROE of banks, while macro factors play a supporting role. Sufian and Habibullah (2009) focused on banks in Bangladesh, where the key source of profitability is recognized as the intensity of lending, and cost management is considered a decisive tool for retaining profits. In contrast to this approach, Heffernan and Fu (2010), studying the Chinese banking system, link

performance not so much to the volume of operations as to the quality of financial management.

Marginal profit and economic added value indicators are brought to the forefront, which reflects the institutional specificity and strategic focus of Chinese banks. Albulescu (2015), analyzing data on emerging market countries, points out the dependence of profitability on the macro level, including inflation, the volume of government spending, and the quality of regulation. In this context, ROE is understood not as an indicator of efficiency but as an indicator of the bank's ability to remain stable in the face of external changes. Al-Homaidi et al. (2018), examining Indian banks, record the influence of assets and management decisions and the multidirectional effects of inflation and economic growth. Concluding, Rumaly (2023) showed that in conditions of institutional instability, return on capital loses predictability and becomes dependent on the short-term macroeconomic environment, including currency and inflation risks. The high climate volatility negates the importance of internal strategies, limiting their effect.

Some studies have considered capital adequacy and solvency of banks as critical stability parameters that affect the return on capital and financial institutions' behavior in macroeconomic instability conditions. Peura and Jokivuolle (2004) proposed a simulation model of stress testing, showing that the required amount of capital should vary depending on the cycle phase. In this case, capital adequacy was interpreted not as a constant value but as a variable buffer regulating the level of vulnerability in conditions of deteriorating asset quality. Drumond (2009) interpreted standards growth in expansion phases as a condition for smoothing out procyclicality and reducing profitability volatility in the downturn phase. This approach complements the interpretation of capital as a limiter on ROE during periods of tightening but a stabilizing factor in overheating conditions. Greenwood et al. (2017), analyzing the institutional structure of regulation, pointed to the fragmentation of requirements as a factor complicating the achievement of stable profitability. At the same time, the idea of unifying the regulatory framework to increase the predictability of capital policy was put forward. In contrast, Gurrea-Martínez and Remolina (2019) found that the universal approach of Basel III in emerging markets led to a restriction of lending activity and a decrease in ROE in the context of structural incomparability of markets. The increase in capital requirements was interpreted as restraining profitability, especially in banking systems with limited access to funding. Oino (2021), studying the largest UK banks, empirically confirmed that a decrease in lending activity accompanies a capital increase but, at the same time, stabilizes overall solvency. Such a two-way relationship showed that capital can simultaneously play a protective role and reduce profitability. In the context of the regression model used in this study, the lack of a significant effect of capital on ROE may be due to the offsetting of the positive impact of sustainability by the negative dynamics of profitability arising in the context of regulatory overload.

Studies on managerial efficiency and internal optimization strategies have considered it a key source of sustainability and profitability in the banking sector. Using nonparametric analysis, Ariff and Luc (2008) documented high cost and profit inefficiencies in Chinese banks, which were explicitly determined by internal management processes. Inefficiencies were interpreted not as deviations from standards but as systemic weaknesses in operational settings unrelated to macro conditions or formal constraints. Abuzayed et al. (2009) linked the market undervaluation of banks to the lack of real managerial mediation between reported profit and sustainable profitability. When comparing market and book value, an inconsistency was revealed, which is explained by hidden inefficiencies in business models. The work of Soyemi et al. (2014), based on Nigerian material, found that risk management practices play a decisive role in shaping financial results.

Insufficient integration of risk assessment into day-to-day management increased sensitivity to operational failures and reduced the ability to maintain profitability. Adem (2022), studying the impact of diversification, showed that product line expansion without synchronized management transformation increases vulnerability, especially in developing systems. The relationship between diversification and resilience was negative when controls for internal coordination were weak. Hoque et al. (2024) analyzed the Vietnamese banking sector and found that digital transformation reduced credit risk but did not improve liquidity. Changes in the liability structure did not accompany the transition to digital platforms in the context of persistent administrative inertia. Hordofa (2024), studying the Ethiopian market, confirmed that digitalization without institutional support is limited in its sustainable effect: a technological shell without a strategic reorientation of management does not reduce long-term risks. Therefore, managerial efficiency was considered a structural condition of profitability, directly impacting return on capital and indirectly impacting funding sustainability and risk profile.

Studies on the liquidity structure and dependence on deposit funding have considered the internal organization of liabilities as a key element of resilience in the face of regulatory and market constraints. Allen et al.(2015) constructed a model in which deposits performed a dual function as a funding source and a factor forming the capital structure. With a high share of deposits, market control was weakened, and sensitivity to depositors' behavioral reactions increased. DeYoung and Jang (2016) analyzed approaches to liquidity management using the example of American banks. Thus, liquidity was regulated through the asset structure and active management of attracted funds. The dependence of behavior on the phase of the credit cycle and regulatory pressure increased the heterogeneity of decisions. Edem (2017), studying Nigerian banks, found that excess liquid assets reduced profitability, and an aggressive placement strategy increased risk. The effectiveness of management was determined not by the level of liquidity as such but by the balance point between profitability and the acceptable level of risk. Mashamba and Magweva (2019), analyzing the effects of the LCR in emerging markets, showed that Basel III requirements shifted the funding structure towards short-term deposits, which increased vulnerability to outflows. Using Indonesian data, Trinugroho et al. (2020) documented differences in the deposit structure depending on the type of ownership: state-owned banks demonstrated increased sensitivity to depositor discipline, while private banks relied on more stable funding channels. Africa and Agustia (2023) found that the effectiveness of liquidity management depended on institutional control: active oversight by the risk committee strengthened the link between operational transparency and financial performance. Liquidity and liability shaped sustainability, influencing profitability and adaptability to regulatory and market changes.

Market funding mechanisms and external vulnerabilities of banks have been considered in the literature as a source of instability, creating a dependence of the financial system on short-term capital and limiting the possibilities of control through traditional regulatory channels. Hanson, Scharfstein, and Sundaram (2015) analyzed reforms of money market funds, showing that even small fluctuations in liquidity can cause significant cascading effects in the market funding system. The mechanism of instability transmission was associated with the concentration of assets in instruments with limited transparency and high sensitivity to market signals. Polzin et al. (2017) considered the resilience of market-oriented systems in energy transition financing. In the context of poorly diversified funding channels, the emphasis shifted to expanding institutional mechanisms to attract stable capital.

Market funding was noted to be highly susceptible to external shocks and information asymmetries. Gabor (2018) described the shift from shadow banking to market-oriented

finance as an institutional transformation that altered the architecture of money circulation. In the context of the disintermediation of banks, there was an increased reliance on structured markets, where the rules were determined not by the regulator but by the logic of asset circulation. Mertzanis (2020) focused on the limitations of decentralized regulation in the context of the growing share of non-bank lending. The lack of coordination between supervisory structures increased fragmentation, reducing the effectiveness of supervision of transactions outside the banks' balance sheets. Bavoso (2020) examined the P2P lending model in the UK, where the promise of access to alternative finance was accompanied by increasing systemic risks, including the absence of protections for borrowers and the lack of institutional backup. The P2P structure was perceived as a private platform, not embedded in a system of public guarantees, which exacerbated external vulnerabilities. According to Knafo (2022), the transition to market-oriented banking is a change in the regulation logic. Thus, attention is shifted to managing risk perception through ratings, liquidity metrics, and signals instead of standards and ratios. Nevertheless, market funding creates structural vulnerability despite its flexibility since it takes risks beyond the scope of banking supervision and transforms resilience into a function of market trust.

The analysis showed that existing works consider individual sustainability parameters, but there is no comparison of their impact in a single analytical structure. The links between the configuration of sustainability parameters and the nature of profitability, considering institutional differences, remained unexamined. The study aims to fill this gap by assessing the impact of management efficiency, capitalization, liquidity, and market funding on the return on capital in the banking sector of Kazakhstan.

3. RESEARCH METHODS

In line with the stated research objective to examine how the banking system's internal structural parameters affect Kazakhstan's ROE, the methodological framework was structured into three main stages. The first stage involved the formulation of working hypotheses grounded in the literature on banking sustainability and performance evaluation. The second stage consisted of selecting relevant financial indicators from official aggregated sources and calculating derived variables based on an adapted version of the KAMEL model. The third stage included statistical testing of the proposed hypotheses through multiple regression analysis and supporting diagnostics.

The selection of variables was based on the availability of consistent data for the period 2013–2023. Table 1 presents the indicators used for constructing the analytical framework.

TABLE 1. Selected indicators and units of measurement

Indicator	Unit of Measurement
Charter capital	billion KZT
Reserve capital	billion KZT
Retained earnings (uncovered loss) of the current year	billion KZT
Total liabilities	billion KZT
Equity capital	billion KZT
Total assets	billion KZT
Net income after tax	billion KZT
Net income before tax	billion KZT
Client deposits	billion KZT
Securities issued	billion KZT
Borrowed funds	billion KZT

Note: compiled by authors

Assessment of banking sector stability factors in Kazakhstan for the period 2013–2023 was carried out using an adapted version of the KAMEL model, which initially includes five key components: (1) Capital Adequacy (K); Asset Quality (A); Management Efficiency (M); Earnings (E); Liquidity (L). In this study, the A component (asset quality) was excluded due to the unavailability of comparable data on non-performing assets. Instead, the model incorporates the Market Funding Ratio (MF) to reflect the sector's dependence on borrowed and external funding sources.

To ensure a consistent and interpretable model, a set of diagnostic and inferential statistical procedures was applied (Figure 1).

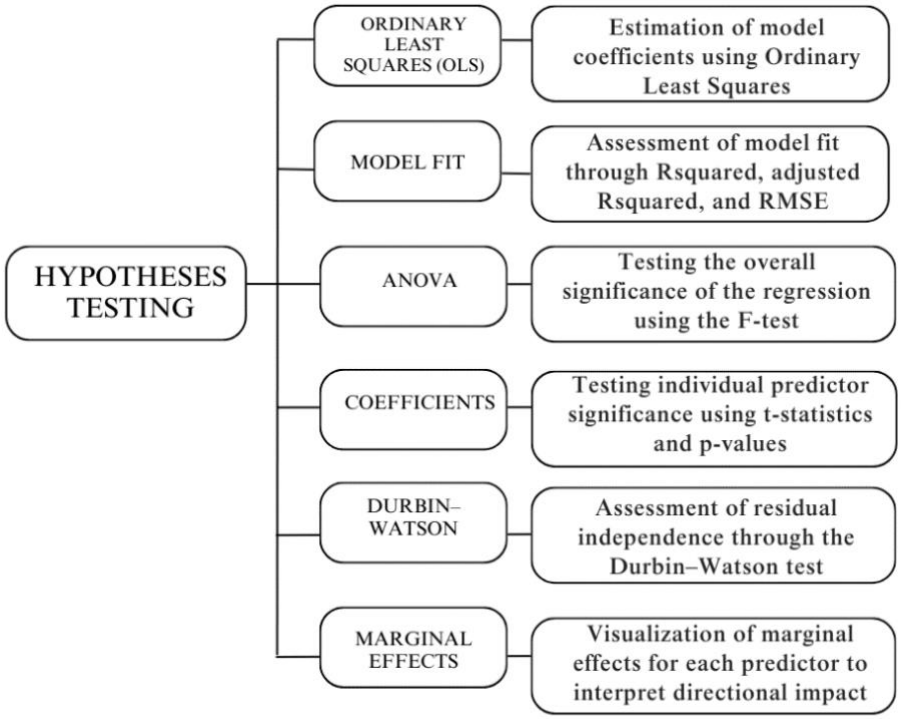

FIGURE 1. The sequence of procedures for hypothesis testing in the regression model

The following hypotheses were developed to capture potential relationships between components of financial stability and capital profitability:

H_1: An increase in the management efficiency ratio positively affects ROE.

H_2: An increase in the capital adequacy ratio is associated with a decrease in ROE.

H_3: A higher liquidity ratio (based on client deposits) leads to an increase in ROE.

H_4: A higher market funding ratio leads to a decrease in ROE.

The dependent variable is the ROE. The following indicators are used as independent variables: (1) Management efficiency, pre-tax profit to total assets (M); Capital adequacy (K); Liquidity ratio, client deposits to total liabilities (L); Market funding ratio, securities issued and borrowed funds to total liabilities (MF).

To assess the impact of internal stability indicators on capital profitability, a multiple linear regression model was applied. The model estimates the marginal influence of each factor, management efficiency, capital adequacy, liquidity, and market funding on ROE across the banking sector of Kazakhstan from 2013 to 2023. The multiple linear regression model is specified as follows:

$$ROE_t = \beta_0 + \beta_1 M_t + \beta_2 K_t + \beta_3 L_t + \beta_4 MF_t + \varepsilon_t \quad (1)$$

where:

ROE_t – return on equity in year *t*;
M_t – management efficiency;
K_t – capital adequacy;
L_t – liquidity;
MF_t – market funding ratio;
β_0 – Intercept;
β_1,β_2,β_3,β_4 — coefficients of the explanatory variables;
ε_t – error term.

The goal of the proposed methodology was to ensure the banking sector's stability based on internal parameters, with subsequent verification of their impact on the return on capital. The calculation formulas ensured the indicators' reproducibility and the model's structure allowed us to exclude duplication of effects and hidden intersections between variables. Regression analysis made it possible to establish a difference between formally influential and significant factors, to record the dominant influence of management efficiency, and to show the limited role of capital, liquidity, and market funding in profit generation. The advantage of the approach is that it allows us to construct reasonable quantitative relationships between internal characteristics and financial results on a limited set of aggregated data. This makes the method applicable in banking systems with a high regulatory burden and limited opportunities for expanding active operations.

4. FINDINGS AND DISCUSSIONS

To quantitatively assess the sustainability of the banking sector, an adapted KAMEL model was used, including five key indicators: capital adequacy ratio (K), management efficiency ratio (M), return on equity (E), liquidity level based on customer deposits (L) and the share of market funding.

The calculations cover 2013–2023 and are based on aggregated data on the banking sector of Kazakhstan. All indicators are presented as a percentage.

TABLE 1. Dynamics of Banking Sector Sustainability Indicators in Kazakhstan under the KAMEL Model for 2013–2023, %

Indicator	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
K – Adjusted Capital Adequacy Ratio	18,845	15,847	8,242	8,219	8,436	9,016	8,935	7,768	7,128	6,251	6,848
M – Management Efficiency Ratio	1,485	0,960	1,144	1,647	0,460	2,629	3,234	2,627	3,364	3,346	4,343
E – Return on Equity (ROE)	6,741	3,534	10,369	16,867	0,566	24,473	29,130	29,012	41,228	45,369	55,563
L – Liquidity Ratio I (Based on Client Deposits)	64,053	62,721	66,074	68,192	69,212	68,159	66,717	68,952	69,411	69,726	67,526
Market Funding Ratio	10,347	11,979	13,032	11,247	9,434	10,072	10,269	9,010	7,184	8,321	8,530

Note: compiled based on author's calculations

Institutional and economic changes occurred in Kazakhstan's banking sector from 2013 to 2023. Three waves of tenge devaluation (in 2014, 2015, and 2022), strengthening of regulatory control by the National Bank, liquidation of problem

financial institutions, and consolidation of the most prominent players were recorded. Funding strategies, capital levels, and profitability indicators changed under the influence of both internal restructuring and external shocks.

The capital adequacy ratio decreased from 18.85% in 2013 to 6.85% in 2023. The minimum value was recorded in 2022 – 6.25%. The sharpest decrease occurred in 2015, when the indicator decreased to 8.24%. The decrease occurred in the context of the rapid growth of liabilities caused by the active expansion of lending operations and the redistribution of resources toward borrowed funds. At the same time, equity capital increased more slowly, which led to an increase in the share of attracted resources in the liability structure and a decrease in the stability buffer against external risks.

The management efficiency indicator, calculated as the profit ratio before tax to assets, increased from 1.49% in 2013 to 4.34% in 2023. Until 2017, the values were below 2%. Since 2018, steady growth has begun against the backdrop of the completion of the withdrawal of insolvent banks from the market and the transition to centralized cost management systems. During the same period, active implementation of digital solutions began, which made it possible to reduce administrative expenses, reduce the share of non-performing assets, and increase the stability of income operations. The increase in the indicator was accompanied by stabilization of profit rates without the need to expand assets.

ROI increased from 6.74% in 2013 to 55.56% in 2023. Steady growth began after 2015: 24.47% in 2018, 41.23% in 2021, and 55.56% in 2023. The main factor is net profit growth with a limited equity increase. This situation leads to a rise in return on each unit of capital but, at the same time, increases sensitivity to potential losses: even a slight decrease in profit with a low capital base can cause a sharp deterioration in the financial situation. An increase in financial stress accompanies high profitability in such conditions. The share of deposits in the liabilities structure varied between 62.72–69.73%. The maximum value was reached in 2022. Throughout the period, deposits remained the primary source of funding. This ensured stable coverage of current liabilities without turning to external markets. The high share of deposits indicates a stable level of trust in the banking system, supported, among other things, by attractive interest rates and the relative availability of services. At the same time, the concentration of funding sources in one channel reduced the level of diversification and increased dependence on the behavior of investors.

The share of market funding, including borrowings and securities issuance, decreased from 10.35% in 2013 to 8.53% in 2023. The fluctuation range was between 7.18% and 13.03%. The decrease in the share of market instruments was accompanied by a gradual displacement of external borrowings by internal resources. Priority was given to less volatile and more predictable funding channels. This strategy made it possible to reduce the risks associated with fluctuations in interest rates, exchange rates, and the availability of credit lines. The main goal is to strengthen control over liquidity and reduce dependence on unstable sources.

A transformation of the banking sector sustainability model was recorded at the end of the decade. The level of capitalization decreased more than twofold while operating efficiency and profitability indicators increased significantly. Funding began to be concentrated within the sector, mainly through deposits, while the role of market instruments gradually weakened. The changes occurred in the context of exchange rate fluctuations, rate changes, and regulatory revisions. The sector's stability was ensured not by capital volumes but by internal adaptation of the cost structure, profitable areas, and sources of liquidity.

Time series were constructed for each component of the KAMEL model to visually represent the structure and directions of changes in the calculated indicators. The graphs allow us to identify the features of the

dynamics, including turning points, stable phases, and differences in the trajectories of individual indicators.

In Figure 2, key trends in the long-term sustainability of the banking sector are presented.

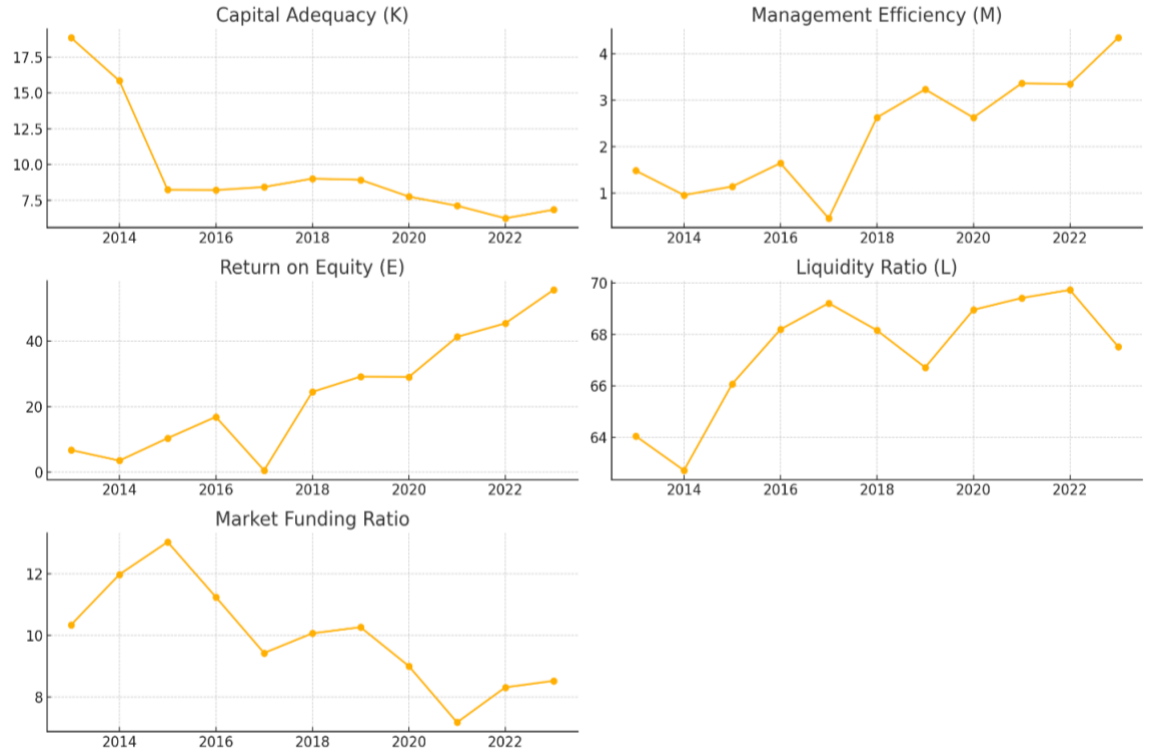

FIGURE 2. KAMEL Indicators in the banking sector of Kazakhstan for 2013-2023, %

The obtained results allowed us to draw the following conclusions.

1. Capital Adequacy Ratio (K) shows a clearly defined downward trend throughout the period. The value fell from 18.85% in 2013 to a minimum of 6.25% in 2022. The sharpest collapse occurred in 2015, possibly due to devaluation and restructuring of liabilities. In 2018–2021, the dynamics stabilized, but without a confident recovery. Only in 2023 was a weak growth of 6.85% recorded, which may indicate the ultimate point of adaptation of the sector to new standards and asset structure. The trajectory is characterized by high inertia of decline and the absence of phases of return to previous levels.

2. Management Efficiency Ratio (M) demonstrates unstable and wave-like dynamics. In 2013–2017, low values were recorded, not exceeding 1.65%, with a local minimum in 2017 (0.46%). Starting in 2018, the curve enters a phase of accelerated growth, reaching 2.63% in 2018 and 4.34% in 2023. The development of the management efficiency ratio since 2018 indicates a change in management practices: the priority has shifted from risk retention and elimination of problem assets to improving operational efficiency. The sequence of changes in the indicator reflects the transition of the banking sector from the rehabilitation stage to the phase of profitability restoration and cost optimization.

3. Return on Equity (E) is characterized by the sharpest and most stable upward trend. The value increased from 6.74% in 2013 to 55.56% in 2023. The period since 2017 has become a turning point: after a short-term drop to 0.57%, rapid growth began — more than 80 times in six years. Such dynamics indicate a significant

gap between profit growth and capital growth rates. The curve represents an exponential development type, forming a potential risk zone when income flows deteriorate. The sustainability of this trend requires further analysis of profit sources and dependence on the interest margin.

4. Liquidity Ratio (L) remains within a narrow corridor: from 62.72% to 69.73%. Since 2015, the values have stabilized above 66%. A weak positive trend is observed, especially in 2019–2022, which may be due to an increase in the share of deposits and a reduction in market borrowings. The absence of sharp fluctuations confirms the deposit funding model's stability and liquidity's predictability. The graph reflects a stable resource base with other changing parameters.

5. The Market Funding Ratio shows a moderately decreasing trend: from 10.35% in 2013 to 8.53% in 2023. The peak value was observed in 2015 (13.03%), followed by a phase of steady decline. The graph records a gradual rejection of external market financing in favor of internal sources. IBanks maintain a cautious policy in borrowing management despite the instability of external markets and periods of temporary availability of market instruments. Individual increases in the share of market funding, including the 2019 value (10.27%), reflect short-term returns to the use of external resources in the context of favorable placement conditions or individual transactions. Such fluctuations were temporary and did not change the overall liability structure towards a permanent increase in market borrowings. Throughout the period, there was a gradual decrease in the share of external financing and an increase in the role of internal sources, primarily deposits.

A multiple linear regression analysis was conducted, where the dependent variable is ROE, to assess the impact of sustainability indicators on the final profitability (Table 2).

TABLE 2. Regression results: the impact of sustainability indicators on ROE (2013–2023).

Model	R	R^2	R^2	RMSE	R^2 Change	df1	df2	p	Durbin-Watson		
									Autocor-relation	Statis-tic	p
M_0	0.000	0.000	0.000	18.176	0.000	0	10		0.618	0.372	< .001
M_1	0.985	0.970	0.970	4.036	0.970	4	6	< .001	0.373	1.201	0.037
M_1 includes M – management efficiency ratio, K – adjusted capital adequacy ratio, L – liquidity ratio I (based on client deposits), market funding ratio											

Note: compiled based on author's calculations

The M_1 regression model demonstrates a high level of explained variance (R^2 = 0,970). The value of the determination coefficient indicates that 97% of fluctuations in ROE in the banking sector of Kazakhstan in 2013–2023 are associated with changes in management efficiency, capital adequacy, liquidity, and market funding volumes. This value reflects a direct dependence of profitability on internal stability parameters. Thus, institutional characteristics strongly impact the context of a controlled and structurally closed financial space. Increased sensitivity of profit to internal factors is typical for systems under the influence of administrative restrictions, with limited external market impact. A significant improvement in the model compared to zero ($p < 0.001$) means the statistical validity of including management, capital, liquidity, and funding components in explaining profitability. The economic interpretation is that the behavior of the banking sector profit is not subject to random processes and can be represented as a function of controlled financial indicators. The stability of the model is confirmed by the correspondence of the actual values to the predicted ones when including the specified predictors.

The value of the Durbin-Watson statistics (1.201) does not indicate the presence of autocorrelation of the residuals. That is, the sequence of errors does not form systematic deviations. Such behavior of the residuals suggests the absence of omitted time factors in

the model, which ensures the independence of predictions from chronological structures. The lack of autocorrelation allows us to consider the model suitable for analyzing time data in stable or slowly changing economic regimes.

Among the included variables, only the management efficiency coefficient was statistically significant ($p = 0.001$). The main contribution to the formation of profitability is provided by the indicator reflecting the profit ratio before tax to assets. The high significance of this variable confirms the decisive role of the internal organization of processes, cost control, digitalization of operations, and optimization of product lines. During the specified period, the management of flows and structures, rather than the scale or sources of assets, formed the basis for increasing profits. Such a dependence is typical for restructuring completion and the transition to a performance policy.

The remaining predictors - capital adequacy, liquidity level, and the share of market funding - are statistically insignificant in this model. This does not mean the absence of economic influence but indicates that within the observed time window, these parameters remained relatively stable or mutually neutralized their effects. Insignificance may be because the permissible limits for these indicators were observed by all market participants, resulting in variations within the sector that did not lead to significant differences in profits. Financial stability was ensured not so much by structural relationships in the balance sheet as by the nature of operating activities.

A high R^2 value with one significant coefficient reflects a high concentration of explanatory influence. Such a model structure indicates the management component's dominance in forming profitability with the relative homogeneity of other factors. The results suggest that the banking sector's profitability in 2013–2023 was formed mainly due to internal management decisions implemented under strict regulatory control, limited access to external sources of financing, and a predictable macroeconomic environment. This model means that profits were maintained by redistributing internal resources and cost optimization rather than through operations or external activity growth. As a result, the main burden of ensuring stability was transferred to the internal reserves of banks and, indirectly, to customers - through tariffs, interest rates, and the narrowing of the product line.

ANOVA was used to assess the statistical significance of the linear regression model. The method helps to establish whether the set of selected predictors explains the variation in ROE better than a simple constant. Table 3, presents results for ANOVA analysis.

TABLE 3. Statistical significance of ROE dependence on stability parameters

Model		Sum of Squares	df	Mean Square	F	p
M_1	Regression	3206.032	4	801.508	49.204	< .001
	Residual	97.736	6	16.289		
	Total	3303.769	10	-		
M_1 includes M – management efficiency ratio, K – adjusted capital adequacy ratio, L – liquidity ratio I (Based on Client Deposits), market funding ratio						
The intercept model is omitted, as no meaningful information can be shown						

Note: compiled based on author's calculations

The obtained value of the F-criterion (49.204) at $p<0.001$ confirms that the included variables — management efficiency, capital, liquidity, and market funding — together provide a significant explanation for changes in profitability. The high value of the sum of squares for the regression part (3206.032 out of 3303.769) reflects that almost the entire spread of ROE values is associated with variations in the selected stability parameters. The remaining share (97.736) is attributed to the residual variation, which indicates a minimal

influence of unaccounted factors. The statistical significance of the model allows us to state that the behavior of profit in the banking sector can be analytically explained through institutional parameters and is not due to random external fluctuations.

Multiple linear regression coefficients were calculated to determine each factor's contribution to the change in ROI. The assessment is carried out based on the t-statistics value and the significance level (p), considering both standardized and non-standardized coefficients.

Table 4, presents results for coefficients analysis.

TABLE 4. Coefficients of the regression model for the impact of sustainability parameters on ROE for 2013–2023

Model		UnSTND	STND Err	STND	t	p
M_0	(Intercept)	23.896	5.480	-	4.360	0.001
M_1	(Intercept)	130.672	159.192	-	0.821	0.443
	M – Management Efficiency Ratio	11.410	2.001	0.771	5.703	0.001
	K – Adjusted Capital Adequacy Ratio	-1.433	0.965	-0.314	-1.484	0.188
	L – Liquidity Ratio I (Based on Client Deposits)	-1.488	1.958	-0.186	-0.760	0.476
	Market Funding Ratio	-1.910	1.832	-0.179	-1.043	0.337

Note: compiled based on author's calculations

The management efficiency ratio exerts the most significant impact on ROE. Each additional point for this indicator is associated with an increase in ROE by 11.41 percentage points at a significance level of p = 0.001. This variable's contribution is not only statistically significant but also economically justified: an increase in profitability before tax per unit of asset is accompanied by a direct increase in ROE. The remaining parameters - capitalization, liquidity, and market funding - did not show statistical significance at the selected confidence level. Negative values of the coefficients for capital (-1.433), liquidity (-1.488), and market funding (-1.910) indicate an inverse relationship. Still, the p-levels (0.188, 0.476, and 0.337, respectively) do not allow us to confirm the presence of a stable influence. Such a picture may reflect compensating effects between the variables or the absence of pronounced changes over the period. The model emphasizes that profitability in 2013–2023 was formed primarily through internal management mechanisms, while structural parameters remained relatively stable.

Figure 3, presents marginal effects plots for analyzed variables.

The marginal effects graphs reflect the nature of the impact of each of the four model predictors on ROE, given fixed values of the other variables. Based on the results of the analysis, hypotheses about the direction and significance of these dependencies were tested. Hypothesis H_1 about the positive impact of the management efficiency coefficient (M) on ROE was confirmed. With an increase in the value of the M indicator from low to high, a steady increase in ROE is observed, which is recorded by a clear upward slope of the effect line and a narrowing of the confidence interval. This dependence indicates that the banking sector of Kazakhstan in 2013–2023 ensured profitability growth primarily due to internal management decisions. The digitalization of services accompanied increased efficiency, decreased administrative costs, restructuring of unprofitable operations, and asset optimization. With the dominance of operational mechanisms, profit was generated under a fixed capital and funding structure without large-scale expansion of activities. This dependence forms a model in which an increase in profitability does not require an increase in the resource base but is associated with an increase in internal productivity and management adaptability.

Hypothesis H_2 about a decrease in ROE

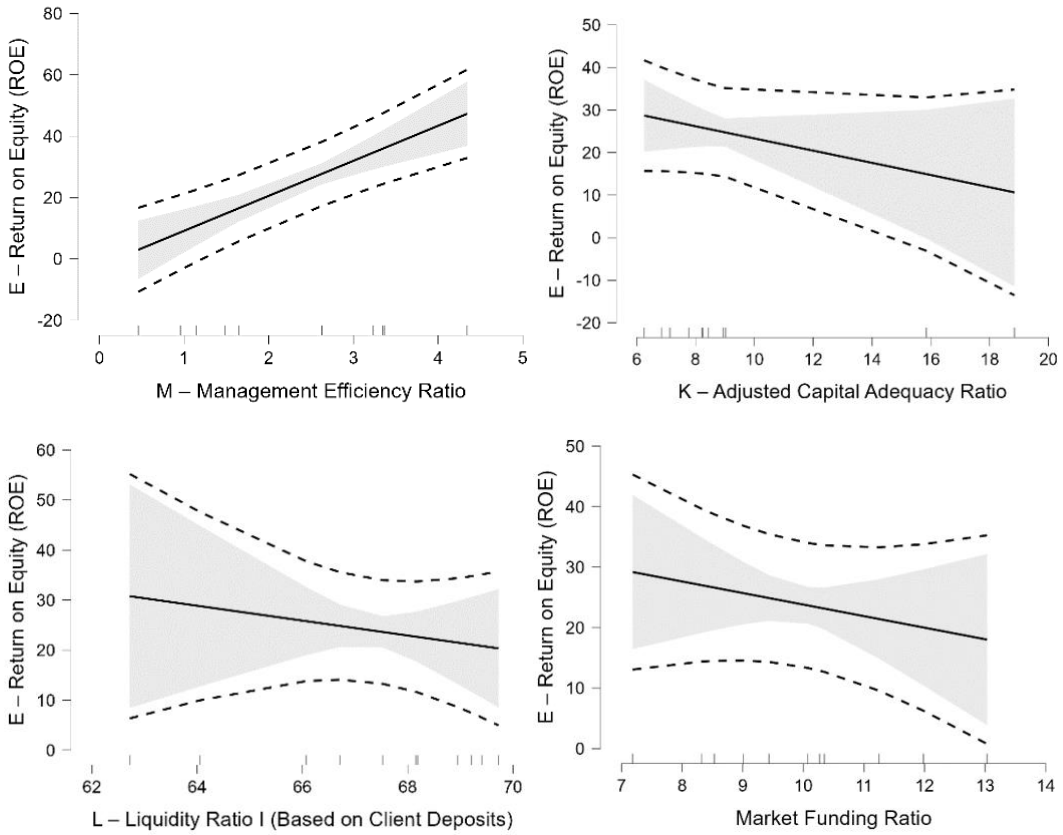

FIGURE 3. Marginal Effects Plots

with an increase in the capital adequacy ratio (K) was partially confirmed. A negative slope of the regression line is observed, but a wide confidence interval reduces the conclusion's reliability level. The inverse dependence may be because an increase in the volume of capital is not accompanied by a corresponding rise in profitable assets, resulting in a decrease in the turnover of resources. Maintaining high capital adequacy ratios in Kazakhstan places a significant share of funds in low-yield or non-market instruments. The lack of synchronization between capital growth and opportunities for active income-generating activities restrains the overall profitability of the banking sector, especially with weak investment demand in the real economy.

Hypothesis H_3 about a positive relationship between the level of liquidity and ROE was not confirmed. The graph of the marginal effect for the liquidity indicator based on customer deposits demonstrates a virtually horizontal trajectory; the confidence interval is wide. This structure indicates the absence of a clear relationship between liquidity and profitability in the period under study. The probable cause is the stability and homogeneity of the deposit base, formed mainly by funds from the population and businesses. The lack of sensitivity of ROE to changes in the share of deposits means that access to resources did not limit active operations but did not create an additional source of income. The macroeconomic conditions of Kazakhstan reflect the saturation of the passive base and indicate the need for further development of alternative funding models to increase the flexibility and diversification of the resource base.

Hypothesis H_4 about a decreased profitability with increased market funding was not confirmed. The regression line has a

negative slope, but the confidence interval is wide, and the concentration of observations does not support a stable relationship. An increase in the share of borrowings and placed debt instruments did not significantly impact profitability.

In summary, the banks' funding structure for the analyzed period was primarily supported by client deposits, while market sources were used in limited volumes. Thus, the funding model of banks in Kazakhstan ensured stability against external fluctuations but could limit opportunities for financing large projects and participating in investment initiatives. With the increasing need for long-term financing, the insufficient role of market instruments could become a factor restraining growth.

5. CONCLUSION

The study examined the determinants of ROE in Kazakhstan's banking sector during the post-crisis period. The results showed that, profitability was driven by management efficiency and capital adequacy, liquidity, and funding structure did not significantly affect ROE. Under conditions of limited growth and low asset turnover, stability was maintained through internal decisions. The profit structure was based on operational optimization, digitalization of processes, cost redistribution, and increased productivity of current balance sheets. Expansion of the resource base did not lead to an increase in profitability. The balance between regulatory sustainability and commercial performance shifted towards maintaining formal requirements. Funding was based primarily on deposit sources. The use of market instruments remained episodic, which limited strategic flexibility.

Institutional changes are required to increase profitability. Capital must be redistributed to active areas, internal management contours strengthened, and funding mechanisms revised. Lack of market flexibility reduces the banking system's potential to serve long-term investment objectives. The prevalence of operational efficiency over structural scalability excludes expansion unless growth sources are updated.

In the current configuration, Kazakhstan's banking sector ensures stability but does not perform capital redistribution in the economy. The lack of connection between profitability and liquidity or market funding means a decrease in transmission potential. Maintaining stability requires not an increase in volumes but an increase in their efficiency.

Limiting banks' role as mechanisms of economic growth is becoming a strategic risk. If the closed model is maintained, the sector maintains its current position but is unable to expand support for structural transformations. Unlocking the potential is possible only with the integration of market funding sources, the transition to active profitability management, and the formation of an institutional environment for the sustainable involvement of capital in economic development.

AUTHOR CONTRIBUTION

Writing – original draft: Nazym K. Zaitenova, Sholpan Abzhalelova.
Conceptualization: Nazym K. Zaitenova, Sholpan Abzhalelova.
Formal analysis and investigation: Nazym K. Zaitenova, Sholpan Abzhalelova.
Funding acquisition and research administration: Nazym K. Zaitenova, Sholpan Abzhalelova.
Development of research methodology: Nazym K. Zaitenova, Sholpan Abzhalelova.
Resources: Nazym K. Zaitenova, Sholpan Abzhalelova.
Software and supervisions: Nazym K. Zaitenova, Sholpan Abzhalelova.
Data collection, analysis and interpretation: Nazym K. Zaitenova, Sholpan Abzhalelova.
Visualization: Nazym K. Zaitenova, Sholpan Abzhalelova.
Writing review and editing research: Nazym K. Zaitenova, Sholpan Abzhalelova.

References

Abuzayed, B., Molyneux, P., & Al-Fayoumi, N. (2009). Market value, book value and earnings: is bank efficiency a missing link? *Managerial Finance, 35*(2), 156-179. https://doi.org/10.1108/03074350910923491

Adem, M. (2022). Impact of diversification on bank stability: evidence from emerging and developing countries. *Discrete Dynamics in Nature and Society, 2022(1*), 7200725. https://doi.org/10.1155/2022/7200725

Africa, L. A., & Agustia, D. (2023). The Moderating Role of Risk Monitoring Committee on the Effect of Risk Disclosure on Financial Performance in Islamic Banks. *Australasian Accounting, Business and Finance Journal*, *17*(4). https://doi.org/10.14453/aabfj.v17i4.11

Al-Homaidi, E. A., Tabash, M. I., Farhan, N. H., & Almaqtari, F. A. (2018). Bank-specific and macro-economic determinants of profitability of Indian commercial banks: A panel data approach. *Cogent Economics & Finance*, *6*(1), 1548072. https://doi.org/10.1080/23322039.2018.1548072

Albulescu, C. T. (2015). Banks' profitability and financial soundness indicators: A macro-level investigation in emerging countries. *Procedia economics and finance*, *23*, 203-209. https://doi.org/10.1016/S2212-5671(15)00551-1

Allen, F., Carletti, E., & Marquez, R. (2015). Deposits and bank capital structure. *Journal of Financial Economics*, *118*(3), 601-619. https://doi.org/10.1016/j.jfineco.2014.11.003

Ariff, M., & Luc, C. (2008). Cost and profit efficiency of Chinese banks: A non-parametric analysis. *China economic review, 19*(2), 260-273. https://doi.org/10.1016/j.chieco.2007.04.001

Athanasoglou, P. P., Brissimis, S. N., & Delis, M. D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of international financial Markets, Institutions and Money*, *18*(2), 121-136. https://doi.org/10.1016/j.intfin.2006.07.001

Bavoso, V. (2020). The promise and perils of alternative market-based finance: the case of P2P lending in the UK. *Journal of Banking Regulation*, *21*, 395-409. https://doi.org/10.1057/s41261-019-00118-9

DeYoung, R., & Jang, K. Y. (2016). Do banks actively manage their liquidity? *Journal of Banking & Finance*, *66*, 143-161. https://doi.org/10.1016/j.jbankfin.2015.11.013

Drumond, I. (2009). Bank capital requirements, business cycle fluctuations and the Basel accords: A synthesis. *Journal of Economic Surveys*, *23*(5), 798-830. https://doi.org/10.1111/j.1467-6419.2009.00605.x

Edem, D. B. (2017). Liquidity management and performance of deposit money banks in Nigeria (1986–2011): An investigation. *International Journal of Economics, Finance and Management Sciences*, *5*(3), 146-161. https://doi.org/10.11648/j.ijefm.20170503.13

Florackis, C., Kontonikas, A., & Kostakis, A. (2014). Stock market liquidity and macro-liquidity shocks: Evidence from the 2007–2009 financial crisis. *Journal of International Money and Finance, 44*, 97-117. https://doi.org/10.1016/j.jimonfin.2014.02.002

Gabor, D. (2018). Goodbye (Chinese) shadow banking, hello market-based finance. *Development and change*, *49*(2), 394-419. https://doi.org/10.1111/dech.12387

Greenwood, R., Stein, J. C., Hanson, S. G., & Sunderam, A. (2017). Strengthening and streamlining bank capital regulation. *Brookings Papers on Economic Activity*, *2017*(2), 479-565. https://doi.org/10.1353/eca.2017.0020

Gurrea-Martínez, A., & Remolina, N. (2019). The dark side of implementing basel capital requirements: theory, evidence, and policy. *Journal of international economic law*, *22*(1), 125-152. https://doi.org/10.1093/jiel/jgz002

Hanson, S. G., Scharfstein, D. S., & Sunderam, A. (2015). An evaluation of money market fund reform proposals. *IMF Economic Review*, *63*, 984-1023. https://doi.org/10.1057/imfer.2015.14

Heffernan, S. A., & Fu, X. (2010). Determinants of financial performance in Chinese banking. *Applied Financial Economics*, *20*(20), 1585-1600. https://doi.org/10.1080/09603107.2010.505553

Hong, H., Huang, J. Z., & Wu, D. (2014). The information content of Basel III liquidity risk measures. *Journal of Financial Stability, 15*, 91-111. https://doi.org/10.1016/j.jfs.2014.09.003

Hoque, A., Le, D. T., & Le, T. (2024). Does digital transformation reduce bank's risk-taking? evidence from vietnamese commercial banks. *Journal of Open Innovation: Technology, Market, and Complexity, 10*(2), 100260. https://doi.org/10.1016/j.joitmc.2024.100260

Hordofa, D. F. (2024). Impact of digital transformation on financial stability in emerging markets: evidence from Ethiopia. *Discover Sustainability, 5*, 309. https://doi.org/10.1007/s43621-024-00540-8

Knafo, S. (2022). The power of finance in the age of market based banking. *New political economy*, *27*(1), 33-46. https://doi.org/10.1080/13563467.2021.1910646

Mashamba, T., & Magweva, R. (2019). Basel III LCR Requirement and Banks' Deposit Funding: Empirical Evidence from Emerging Markets. *Journal of Central Banking Theory and Practice*, *8*(2), 101-128. https://doi.org/10.2478/jcbtp-2019-0016

Mertzanis, C. (2020). Financial supervision structure, decentralized decision-making and financing constraints. *Journal of Economic Behavior & Organization*, *174*, 13-37. https://doi.org/10.1016/j.jebo.2020.03.004

Oino, I. (2021). Bank solvency: The role of credit and liquidity risks, regulatory capital and economic stability. *Banks and Bank Systems*, *16*(4), 84-100. https://doi.org/10.21511/bbs.16(4).2021.08

Papadamou, S., Sogiakas, D., Sogiakas, V., & Toudas, K. (2021). The prudential role of Basel III liquidity provisions towards financial stability. *Journal of Forecasting, 40*(7), 1133-1153. https://doi.org/10.1002/for.2766

Peura, S., & Jokivuolle, E. (2004). Simulation based stress tests of banks' regulatory capital adequacy. *Journal of Banking & Finance*, *28*(8), 1801-1824. https://doi.org/10.1016/j.jbankfin.2003.05.005

Polzin, F., Sanders, M., & Täube, F. (2017). A diverse and resilient financial system for investments in the energy transition. *Current Opinion in Environmental Sustainability*, *28*, 24-32. https://doi.org/10.1016/j.cosust.2017.07.004

Rumaly, N. (2023). Unlocking profitability: Exploring the impact of bank-specific and macroeconomic determinants on return on equity in commercial banking sector of Bangladesh. *International Journal of Economics and Financial Issues*, *13*(6), 107-115. https://doi.org/10.32479/ijefi.15274

Schmitz, S. W. (2013). The impact of the liquidity coverage ratio (LCR) on the implementation of monetary policy. *Economic Notes: Review of Banking, Finance and Monetary Economics, 42*(2), 135-170. https://doi.org/10.1111/j.1468-0300.2013.12006.x

Soyemi, K. A., Ogunleye, J. O., & Ashogbon, F. O. (2014). Risk management practices and financial performance: evidence from the Nigerian deposit money banks (DMBs). *The Business and Management Review, 4*(4), 345-354.

Sufian, F., & Habibullah, M. S. (2009). Determinants of bank profitability in a developing economy: Empirical evidence from Bangladesh. *Journal of business economics and management*, *10*(3), 207-217. https://doi.org/10.3846/1611-1699.2009.10.207-217

Trinugroho, I., Pamungkas, P., Ariefianto, M. D., & Tarazi, A. (2020). Deposit structure, market discipline, and ownership type: Evidence from Indonesia. *Economic systems*, *44*(2), 100758. https://doi.org/10.1016/j.ecosys.2020.100758

AUTHOR BIOGRAPHIES

Nazym K. Zaitenova – PhD, Associate Professor, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: nazym_beisebaeva@mail.ru, ORCID ID: https://orcid.org/0000-0001-9971-2240

***Sholpan Abzhalelova** – PhD student, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: abzhalelova2021@mail.ru , ORCID ID: https://orcid.org/0000-0002-2188-6280

Received on: 12 February 2025 Revised on: 15 March 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.507

An Assessment of Financial Stability of Artificial Intelligence-based Monitoring Project in Kazakhstan

Timur Narbaev[1] | **Bauyrzhan Aitkhozha**[1] | **Andrey Samoilov**[1,2*] | **Gabriel Castelblanco**[3]

[1] Kazakh-British Technical University, Almaty, Kazakhstan

[2] Institute of Advanced Research and Sustainable Development, Almaty, Kazakhstan

[3] University of Florida, USA

Corresponding author:
*Andrey Samoilov – PhD candidate, Institute of Advanced Research and Sustainable Development, Almaty, Kazakhstan.
Email: an_samoilov@kbtu.kz

How to cite this article:
Narbaev, T., Aitkhozha B., Samoilov, A. & Castelblanco, G. (2025). An Assessment of Financial Stability of Artificial Intelligence-based Monitoring Project in Kazakhstan. Eurasian Journal of Economic and Business Studies, 69(2), 95-108.

Conflict of interest:
author(s) declare that there is no conflict of interest

ABSTRACT

Today, public-private partnership (hereinafter – PPP) projects, which apply digital technologies and artificial intelligence (hereinafter – AI), are becoming essential for improving infrastructure delivery and transparency. This study aims to assess the financial stability and risks of the Sergek project, an AI-based traffic video monitoring system in Almaty implemented under the PPP model with fixed government payments. The study examines the macroeconomic and operational risks of the project using system dynamics (SD) modeling. The data inputs for the SD model were collected from project documentation, national economic statistics, and expert interviews. In the baseline scenario, with a stable exchange rate (0.1% growth per year) and timely government payments, the internal rate of return (hereinafter – IRR) increases from -1.0% in 2021 to 0.37% by 2026. In an alternative scenario with an annual devaluation of 20%, the IRR only reaches 0.3%, and the break-even point is delayed by one year. However, the return significantly declined under scenarios simulating currency depreciation, underscoring the AI project's sensitivity to external economic risks. This study provides methodological and practical contributions to the field, specifically within the contracts of availability-payment mechanisms in emerging economies like Kazakhstan. The proposed simulation model is an adaptable tool for stakeholders to forecast investment outcomes and enhance project monitoring and control based on AI applications in PPPs.

KEYWORDS: Artificial Intelligence, Public-Private Partnerships, Digital Business, Sergek, Financial Stability, Project Financing, Investment Risk

SCSTI: 06.81.12, 06.81.23

JEL Code: G32, H54, H57

FINANCIAL SUPPORT: This research was funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan (grant No. AP23488488).

1. INTRODUCTION

The long-term partnership of the government with private businesses reduces the burden of the public budget, successfully implements socially significant projects, and improves the efficiency of infrastructure development. As governments in developing countries struggle with budget deficits, a private-sector partnership will be essential in bridging infrastructure gaps. Due to the investments and knowledge of the private sector, the public-private partnership (hereinafter – PPP) provides another way of funding alongside the traditional one (Chileshe et al., 2022).

PPPs were established in Kazakhstan to attract private investment into public infrastructure development and to develop management skills in the field (Narbaev & Charman, 2017). The Law 'On Concessions' of 2006 was the first attempt to formalize PPP arrangements, later supplemented by the Law 'On Public Private Partnerships' of 2015, which broadened the scope of private sector participation and introduced availability-based contracts. As of December 2024, Kazakhstan had 1,333 PPP projects valued at 2 292,6 billion KZT. With 14 projects at the republican level, amounting to 1,309.7 billion KZT, and 1,057 projects at the local level, valued at 982.9 billion KZT. Most (87.9%) of these projects are concentrated in the social sector, covering education, healthcare, housing, and utilities. According to the Kazakhstan PPP Center (2025), 37% of total investments implementing the PPP mechanism fall on large-scale transport and road infrastructure facilities.

Furthermore, the Kazakhstan Ministry of National Economy has already taken focused measures to get the PPP mechanism to work more effectively, such as the Comprehensive Plan for the Development of PPP in the Social Sphere for 2024-2028. As a result, the Government outlines a strategic pathway of action to modernize economic infrastructure by establishing onshore development with competence centers to enhance the spectrum of localized industrial production. Moreover, Kazakhstan's long-term development strategy "Kazakhstan-2050" highlights the development of PPPs to strengthen entrepreneurship and create sustainable development (Akorda, 2012).

This study evaluates the financial sustainability and risk dynamics of the availability-based PPP project in Kazakhstan. Specifically, the study analyzes artificial intelligence (hereinafter – AI) based on the Sergek video monitoring system project in Almaty. The Sergek's main objective is to monitor traffic safety on roads. AI's applications in monitoring and controlling PPP projects have proliferated in recent years. Availability-based PPPs focus on fixed payments from the government to the operational partners, as opposed to directly charging end-users to create revenue streams; this means that the PPPs with hard-toll payment mechanisms are more susceptible to challenges such as delayed payments, inflation over the lifespan of the project, operating cost overruns, and currency exchange risks (Samoilov et al., 2024b).

PPPs usually have a term of 25–30 years to recoup the investments (Mangano et al., 2025; Narbaev et al., 2025), so the five-year Sergek term brings up essential issues as to its financial viability. Accordingly, this study specifies goals of assessing Sergek's economic viability, determining major risk factors, employing SD modeling to quantify risk factors, and defining and analyzing Internal Rate of Return (hereinafter – IRR) results under various scenarios. The study addresses these challenges by examining key aspects related to the financial and operational uncertainties inherent in PPPs with availability payment mechanism, the impact of fixed government payments on financial performance, the relevance of SD modeling to capture the changing risks, and the effectiveness of IRR calculations for assessing project success.

The paper begins with a literature review, placing this paper within the context of essential works on PPPs, including attention to risk management and financial sustainability. Next, the following methodology section

describes the SD modeling technique, the empirical data sources, and the structure of the analytical framework. The findings and discussion section analyzes the Sergek project, presents the financial consequences of the revealed risks, and compares the results according to various scenarios. Finally, the conclusion synthesizes key findings, PPP policymaking implications, and future research directions.

2. LITERATURE REVIEW

An interest in applying a PPP mechanism as an alternative to a traditional public procurement scheme continues growing in developed and developing countries. In the past decade, the PPP literature witnessed tremendous growth in academic and industry publications. To enhance our knowledge of the field, a brief literature review is provided, and the novelty of the current study is formulated.

Existing literature on PPPs has dramatically helped to investigate risk management (Bing et al., 2005; Osei-Kyei et al., 2023), financial sustainability, concession period (Mangano et al., 2025), and governance structures, particularly within developed and developing economies (Narbaev, 2022). It is worth noting that modern technologies have been recently gaining popularity in project management, including the implementation of AI applications (Kozhakhmetova et al., 2024), which effectively addresses sound decision-making based on big data analysis, including traffic analytics and safety management in urban spaces (Assaf & Assaad, 2024). Thus, Levine et al. (1993) investigated the travel time in Houston area and found that PPP approach is an effective mechanism in traffic management using modern intelligent systems. Traffic monitoring is becoming more and more important over time given the rapid development of technology, e.g., Turner (1995) examined the studies on traffic monitoring and revealed a rapid growth in techniques for analyzing travel time. Meanwhile, reviewing recent research on AI and digitalization, we can note the intensive development of Smart City concept in big cities of Kazakhstan, which also includes traffic management and road safety using AI-based technologies (Mendybayev, 2022; Nurbatsin et al., 2023).

Most studies on transport PPPs analyzed the success of projects based on economic metrics, concession period and return on investment for the private partner, which are reflected in the relevant risks that need to be appropriately allocated between partners (Bing et al., 2005). Also notable is the focus of most studies on the user-fee payment mechanism, where the private partner bears the demand risk, from which the complete financial model of the project is built (Castelblanco et al., 2005; Mangano et al., 2025). But there have been few studies on project models with the availability-payment mechanism, where the government transfers the payments to the private partner for project operation, which consequently assumes no demand risk for the private partner.

According to research, the theoretical frameworks in this context include transaction cost economics and SD theory to assess financial risk, governance, and project feasibility. However, these studies are limited mainly in integrating multiple theoretical perspectives, where risks and sustainability are commonly seen in isolation rather than as interconnected (Castelblanco et al., 2025). Thus, SD modeling, which became popular for its ability to model complex interactions between risk factors and cash flows over time, remains, for the most part, empirically unconsolidated against empirical project data (Khallaf et al., 2024). Additionally, variations in risk stratification methods between studies impede comparability (Biziorek et al., 2023). The IRR has consistently received attention as an essential financial performance measure for availability-based PPPs with fixed government payments (Xu et al., 2012). However, many studies do not comprehensively evaluate long-term financial sustainability, especially on contract renegotiations and external economic shocks, thus limiting the robustness of these assessments.

Other limitations relate to qualitative methods predominating the field, which,

although rich in context and detail, lead to subjectivity bias and limited statistical power (Mouraviev & Kakabadse, 2017). In addition, the PPP literature primarily focuses on individual project-level analysis, overlooking systemic risks from multiple concurrent projects (De Marco & Narbaev, 2021; Biziorek et al., 2023).

Among the studies on PPP projects in Kazakhstan using SD modeling, it is worth highlighting the research of Castelblanco et al. (2024), where authors analyzed the PPP project pipeline in Kazakhstan, noting weaknesses and suggesting how the PPP program could be improved. Samoilov et al. (2024a), using SD, modeled the BAKAD project. They analyzed the critical risks that could arise if the BAKAD project had a "hard toll" payment mechanism, meaning that the managing consortium would collect tolls from highway users.

A lack of research on PPPs in the field of road monitoring in Kazakhstan has been identified in the existing literature. Unlike previous studies conducted in the field, the current research investigates the financial sustainability of the AI-based road monitoring project based on the PPP mechanism. To address this research gap, this study utilizes empirical validation on SD modeling for availability-based PPPs, integrates a dynamic scenario-oriented risk assessment process, and applies a portfolio perspective. These contributions will lead to more robust risk assessment tools and further knowledge regarding the financial sustainability of PPP infrastructure investments.

3. RESEARCH METHODS

This study uses a case-based modeling framework using the SD approach to simulate the financial and operational risks of availability-based PPPs. SD modeling was established by Jay Forrester at the Massachusetts Institute of Technology in the 1960s and is centered around analyzing system complexity that evolves. SD researchers may simulate different nonlinear system interdependencies, feedback structures (Sterman, 2000), and delays over certain time bounds to forecast the impacts/of interconnected variables (Haraldsson & Ab, 2004).

The primary dependent variable is IRR, which is used as a key output to determine whether the availability-based PPP model yields a sustainable and attractive return for private partners under given financial conditions. While Net Present Value is commonly used in project finance, this study prioritizes IRR due to its effectiveness in evaluating the timing and adequacy of investment return under dynamic financial and operational risk factors. IRR is a more practical indicator of financial success in project management in PPP projects based on an availability-payment mechanism, where the revenue stream is guaranteed through fixed government-backed payments. IRR reflects the financial capacity to generate returns relative to its initial investments, allowing decision-makers to assess the project's long-term financial success and viability. It determines whether the net cash flows from the project are sufficient to recover initial investment and provide acceptable returns to private investors. IRR is widely used in PPP investment to indicate project attractiveness over time (Wibowo, 2024). It is especially relevant in modeling long-term financial outcomes through forecasting, e.g., using SD (Castelblanco et al., 2024).

The structure of the methodological framework includes six stages: case selection, risk identification, SD inputs, model validation, and sensitivity analysis (Figure 1).

The Sergek video monitoring system project was chosen as a case study to evaluate financial sustainability and risk dynamics in availability-based PPPs using SD modeling. Unlike concession-based PPPs, which generate revenues commonly from tariffs, Sergek operates under a fixed-payment model, where the government provides fixed payments to private partners. The project is developed using AI applications to monitor and control road

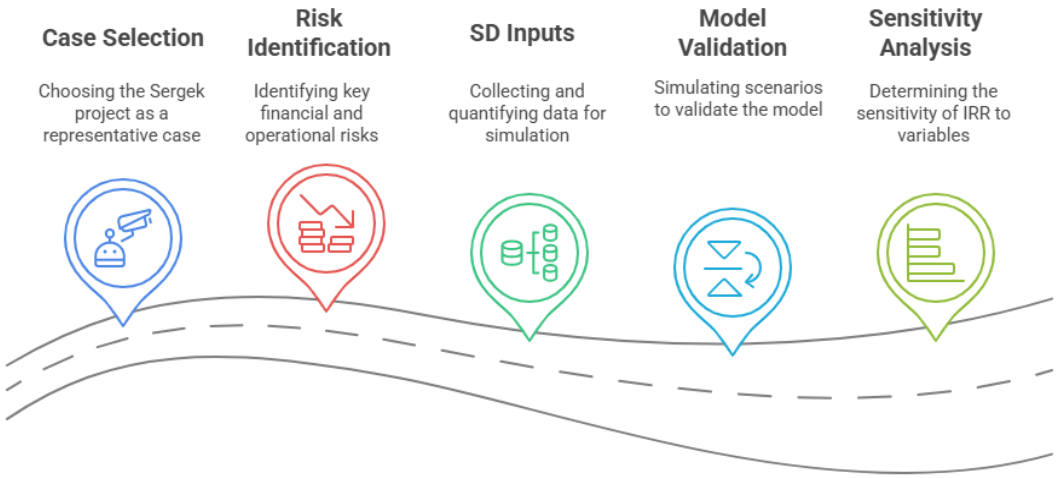

FIGURE 1. Stages of the SD-based analytical framework for PPP evaluation

traffic. LLP "Korkem Telecom" is the private partner responsible for financing, deploying, operating, and maintaining monitoring systems. At the same time, the Department of Urban Mobility of Almaty and the Department of Police of Almaty oversee regulatory compliance and disburse contractual payments. The project integrates AI-driven traffic monitoring systems across Almaty to improve road safety and manage urban mobility.

Sergek is used in Almaty, Astana, and other regional cities in Kazakhstan, and its practice development as a PPP has not been sufficiently studied, which calls for this research. Based on a real-world case, this research promotes methodological approaches within the framework of PPP used. It helps the stakeholders better assess the financial feasibility of availability-based PPPs in Kazakhstan.

The identified risks are taken from project documentation and expert assessments. The findings confirm that government payment stability, financial risks, and macroeconomic conditions play the most critical roles in the financial sustainability of availability-based PPPs like the Sergek project. These risks directly impact the ability of the project to maintain operational continuity, financial stability, and long-term feasibility. The structured risk ranking outlined in Table 1 serves as the basis for scenario analysis in the SD model. The classification reflects financial risk factors (such as government payment delays, inflation, and exchange rate fluctuations) and operational risks (including operational cost overruns, technical issues, and political uncertainties), providing a comprehensive overview of potential challenges in the Sergek PPP project.

Based on the revealed risk factors, the most significant ones were chosen based on experts' assessment for further modeling in SD, simulation running, and sensitivity analysis (Table 1).

TABLE 1. Key risk factors identified for the Sergek project

Risk rank	Risk name	Justification	Unit of measurement
1	Government Payment Risks (Policy and Budget Fluctuations)	Delays or reductions in government payments can cause liquidity shortages, directly affecting project financial stability.	% of CAPEX
2	Commercial Risk	Cost overruns from rising material, transportation, equipment prices, and video	% of CAPEX

		monitoring equipment damage or loss risks can increase financial strain.	
3	Exchange Rate Fluctuation Risk	The cost of video monitoring equipment components depends on imported technology; currency depreciation increases procurement costs.	% of video monitoring equipment
4	Key Interest Rate Risk	Higher interest rates increase the cost of borrowed funds, raising debt servicing expenses and reducing financial predictability.	% of borrowed funds
5	Inflation Rate Risk	Rising inflation increases operating costs, procurement expenses, and financial burdens, making the project more expensive.	% of the cost of services
6	Political Risk	Changes in legislation, contract terms, or political instability (e.g., coups, revolutions, strikes) can worsen project conditions.	% of CAPEX
7	Technical Risk	Poor installation work or equipment failure can lead to system malfunctions, increased maintenance costs, and operational disruptions.	% of installation work costs

Note: compiled by authors using expert evaluations

Scenario Construction

The primary inputs to the SD model include initial CAPEX, OPEX adjusted according to the annual inflation rate, bank loan rate, and scheduled government payments complemented by a final asset handover at project completion. Two clearly defined SD models (the Basic Scenario and the Currency Risk Scenario) were created, providing distinct conditions to explore the impact of specific risks on project sustainability. The Basic Scenario (Table 2) represents favorable economic conditions, assuming scheduled government payments, stable inflation, and minimal currency exchange rate growth.

TABLE 2. Basic scenario inputs for the SD model

Data Type	Value	Description
CAPEX	4.5 billion KZT	Initial investment and setup costs
OPEX	2.1 billion KZT/year, adjusted for inflation	Annual operating costs adjusted for inflation
Loan Amount	1.12 billion KZT	Borrowed funds from financial institutions
Government Payment	4.5 billion KZT	Scheduled fixed government-backed payments
State Handover of video monitoring equipment	7.6 billion KZT	Final payment upon asset transfer to the public sector
Inflation Rate	7% annually	Annual percentage increase in operational costs
Loan Repayment	Fixed five-year term	Scheduled loan repayment duration
Currency Rate Growth	1.001 1/year	Annual incremental currency fluctuation rate

Note: based on the analysis of the Sergek case study using project documentation and interview data

This scenario establishes a baseline against which the project's financial performance can be measured, highlighting the expected financial viability and return on investments under perfect economic conditions. The Currency Risk Scenario (Table 3) explicitly introduces the risk of currency fluctuations by integrating a fixed annual currency fluctuation factor. This scenario evaluates how sustained currency depreciation impacts the project's capital expenditures, particularly imported equipment costs. By comparing this scenario against the baseline, stakeholders can understand the project's sensitivity to external economic risks and devise effective financial risk management strategies.

TABLE 3. Currency risk scenario inputs for the SD model

Data Type	Value	Description
CAPEX	4.5 billion KZT	Initial investment and setup costs
OPEX	2.1 billion KZT/year, adjusted for inflation	Annual operating costs adjusted for inflation
Loan Amount	1.12 billion KZT	Borrowed funds from financial institutions
Government Payment	4.5 billion KZT	Scheduled fixed government-backed payments
State Handover of video monitoring equipment	7.6 billion KZT	Final payment upon asset transfer to the public sector
Inflation Rate	7% annually	Annual percentage increase in operational costs
Loan Repayment	Fixed five-year term	Scheduled loan repayment duration
Currency Rate Growth	1.2 1/year	Annual incremental currency fluctuation rate

Note: based on the analysis of the Sergek case study using project documentation and interview data

Model Validation and Sensitivity Testing

Given that the developed SD model is a simplified representation of a complex real-world PPP mechanism, comprehensive validation techniques were applied to ensure model reliability and analytical soundness. The validation process included behavior reproduction tests, which assessed the model's capacity to replicate logical trends in financial sustainability, such as the transition of IRR from negative to positive over time in both the Basic and Currency Risk Scenarios. Sensitivity analysis was conducted to observe how variations in key parameters such as government payments, equity levels, inflation rate, and currency exchange rate fluctuations affected IRR outcomes, reinforcing IRR as the core metric of project financial performance in this study.

Extreme condition testing was applied to examine the model's behavior under minimum and maximum plausible values for key variables, including inflation rate, government payment schedule, and CAPEX levels. Structural assessment ensured internal consistency of causal relationships and feedback loops identified during Stock and Flow Diagram modeling. Finally, dimensional consistency was confirmed by verifying the correct use of measurement units across all related variables.

The model structure incorporates key variables and feedback loops relevant to the project's financial performance. Stocks in this scenario include "Equity to Return," "Loans to Return," "CAPEX," "OPEX," and "NPV" (Net Present Value), each of which accumulates or decreases over time depending on associated inflows and outflows. For instance, CAPEX reflects the capital expenditures needed during the initial implementation period, while OPEX increases annually based on inflation. Equity and loan contributions are spread over five years, while loan repayments are distributed equally over the same period.

Flows such as "Project Financing", "Investment Return", "Principal Repayments", and "Inflation" dynamically affect the stocks and provide a temporal structure for cash flow. The model assumes that government payments are disbursed as performance-based monthly tariffs and are aligned with service levels agreed upon in the PPP contract. The SD sketch modeled in Vensim PLE shows all Sergek project elements interacting with each other (Figure 2).

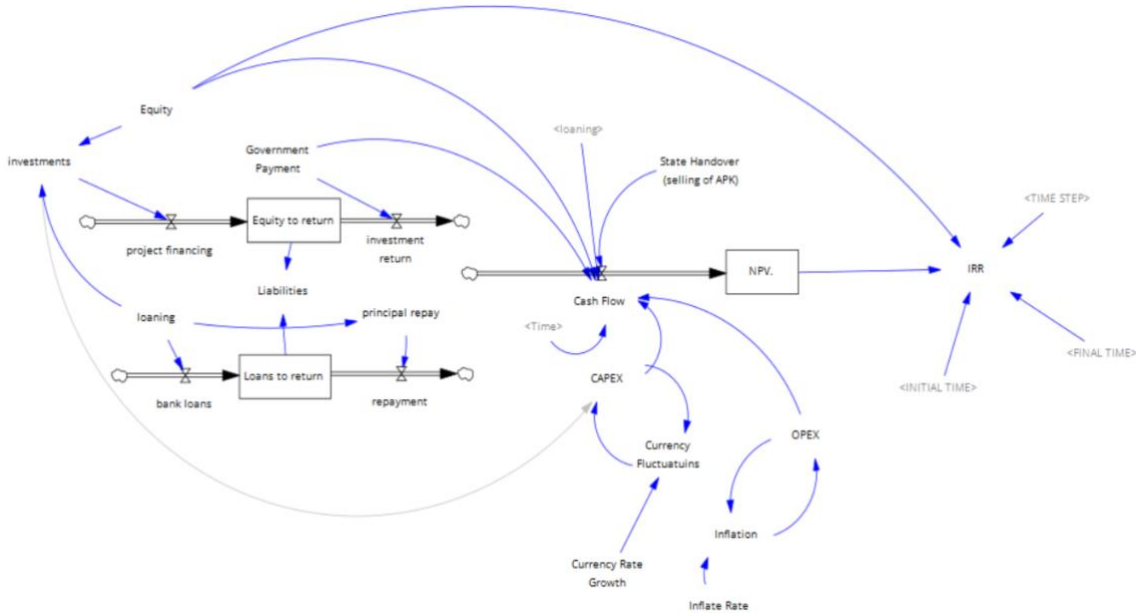

FIGURE 2. SD model structure for the Sergek PPP project

The primary project metric in this model is the IRR variable, which is impacted more or less by all system variables. SD model illustrates a system-dynamic model developed to analyze the financial stability of the Sergek project in the context of PPP mechanisms with fixed government payments. The model reflects the key relationships between investment flows, transaction costs, macroeconomic parameters, and financial performance indicators.

This study also includes sensitivity analysis, a well-known method in SD modeling that evaluates how changes in the values of variable inputs affect the dependent variable (Saltelli et al., 2004). Sensitivity analysis in the context of PPP projects facilitates researchers in determining variables such as inflation rate, equity size, and payment delays, which can significantly affect financial performance indicators (Barlas, 1994).

Sensitivity analysis is a helpful tool for addressing uncertainty in project management because it allows us to identify how sensitive model results can be to changes in initial inputs. It also helps to prioritize issues in risk management, which variables posing the most significant financial risk should be given more attention. Thus, the use of sensitivity analysis directly corresponds to the purpose of the study - to test how external risks affect the success of PPP projects with availability payment mechanisms.

Sensitivity analysis was performed for both the Basic Scenario and the Currency Risk Scenario to assess how variations in key parameters affect the IRR. As the primary metric in this study, IRR evaluates the financial viability and success of Sergek by changing the values of impacting variable inputs by – and + 10% to see to which variable the IRR is most sensitive. This allowed for a clearer understanding of which financial parameters are most critical to project viability under differing assumptions.

4. FINDINGS AND DISCUSSIONS

This section presents the key findings of a study examining economic and environmental factors impact on adopting responsible manufacturing standards (ISO 14001) across various countries. The first part presents a cross-country comparative analysis that examines the differences in regulatory frameworks, the level of ISO 14001 implementation, and the specifics of

responsible manufacturing in the United States, Japan, China, Germany, and Sweden. The second part presents the results of a quantitative analysis based on a panel regression model that assesses the impact of GDP per capita, the share of renewable energy, and CO_2 emissions on the number of ISO 14001 certifications. This approach helps identify patterns and determine the key factors contributing to responsible manufacturing standards' global adoption.

This section presents simulation modeling results based on an SD approach aimed at assessing the financial stability of the AI-based "Sergek" monitoring PPP project with fixed government payments. The analysis covers two scenarios: a basic one characterized by stable macroeconomic conditions and an alternative one considering currency risks. The results demonstrate the dynamics of the IRR depending on the parameters of the model set and the sensitivity of this indicator to changes in key variables.

Figure 3 compares IRR trajectories under both scenarios.

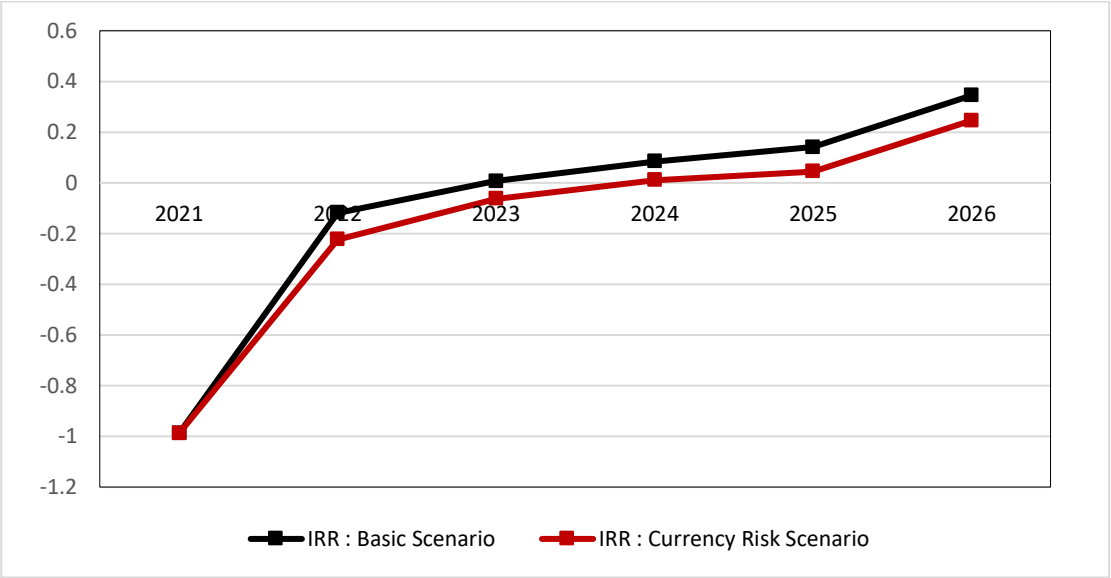

FIGURE 3. IRR of basic and currency risk scenarios

It illustrates the divergence in financial performance caused by currency fluctuation. The Basic Scenario line shows IRR rising steadily from 2022 onward, while the Currency Risk Scenario line reflects delayed and weaker growth. In the Basic Scenario, IRR improved from -1.0 in 2021 to -0.13 in 2022, reached 0.03 in 2023, and steadily increased to approximately 0.37 by 2026, confirming that the availability-based model can be financially sustainable if the contractual assumptions hold.

In contrast, the Currency Risk Scenario demonstrated how external macroeconomic risks, particularly currency depreciation, directly affect capital expenditures and reduce project profitability. With a currency fluctuation constant of 1.2, the IRR in this case improved from -1.0 in 2021 to -0.22 in 2022, reaching 0.01 in 2024 and ending at a lower 0.30 by 2026 compared to the basic case. The delay in achieving a positive IRR, combined with overall declining returns, emphasizes the weakness of short-term PPPs with fixed payments to factors beyond the control of project stakeholders.

Scenario Analysis Results

In the Basic Scenario, IRR becomes positive by the third operational year and continues to grow steadily, suggesting a financially sustainable project under stable conditions. In contrast, the Currency Risk Scenario demonstrates how currency

depreciation reduces IRR and delays investment recovery, highlighting the project's sensitivity to external financial risks. These findings offer a structured understanding of how risk exposure alters project outcomes in availability-based PPPs and support evaluating whether contractual and policy adjustments are necessary to improve fiscal reliability and investment security.

The Basic Scenario represents an ideal condition where macroeconomic factors such as inflation and currency remain stable, and government payments follow the contractual schedule without delays. This scenario reflects the core assumptions under which the Sergek PPP project was planned and approved.

Figure 4 displays the IRR curve for both scenarios.

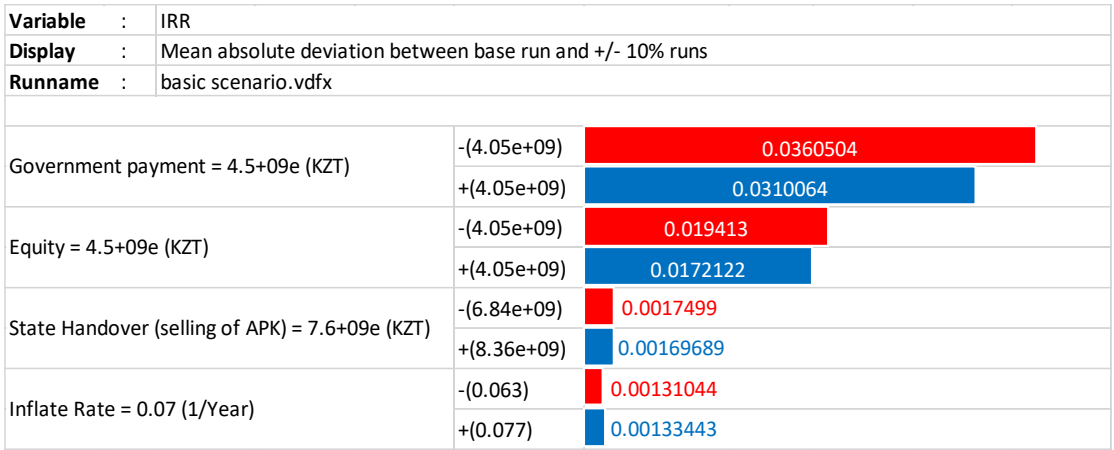

FIGURE 4. Sensitivity analysis of the basic scenario

The IRR begins below zero due to high initial capital outflows but turns positive by the third year of operations, indicating the onset of investment recovery. By the final year, the IRR stabilizes at a financially viable level, reinforcing the notion that the Sergek model is sustainable under stable economic conditions. The government's timely disbursement of fixed payments and the containment of operational costs play a decisive role in achieving these outcomes.

The Currency Risk Scenario builds on the structure of the Basic Scenario but introduces the financial impact of currency depreciation. In this version of the model, a fixed currency fluctuation factor is applied to capital expenditures, reflecting the increased cost of imported components. This change directly influences the CAPEX variable, increasing overall investment requirements and reducing the efficiency of financial recovery.

The model structure retains the same core stocks. It flows used in the Basic Scenario: "Equity to Return", "Loans to Return", "CAPEX", "OPEX", and "NPV", along with flows such as "Project Financing", "Investment Return" and "Repayments". However, the key difference lies in recalculating "CAPEX" using a constant value for currency fluctuation instead of a gradual growth rate. The model applied a fixed currency fluctuation factor of 1.2 1/year to simulate the effect of sustained depreciation on the cost of imported technology, directly increasing the initial capital requirements and impacting cash flow projections. This adjustment leads to higher capital expenditures during the operating phase, negatively affecting cash flow and postpones the transition to a positive IRR.

The IRR growth remains negative for a more extended period than the Basic Scenario, becoming positive only at the later stages of the project. The final IRR value is also lower, reflecting reduced returns on investment due to increased capital costs. These results demonstrate how exchange rate fluctuations can diminish the financial viability of availability-based PPP.

This simulation run highlights the project's sensitivity to macroeconomic changes beyond the control of the project stakeholders. Without financial risk-sharing arrangements, it is assumed that partners in such uncertain economic conditions typical for developing economies may face the challenge of generating the desired return on investment if currency risk is accepted. The scenario also emphasizes properly allocating currency risk during PPP contracts' planning and negotiation phases.

Sensitivity Analysis Outcomes

The sensitivity analysis covered both the Basic Scenario and the Currency Risk Scenario, focusing on the most significant impacting variables: government payment consistency, equity investment levels, inflation rate, and currency fluctuation rate. Figure 4 presents the sensitivity tornado diagram for the Basic Scenario, showing positive and negative changes in IRR across stable values of government payments, equity size, final state handover, and inflation rate.

The IRR was most sensitive to government payment and equity variations in the Basic Scenario. Reducing government payments by 10% led to the IRR declining by 3.6%; in contrast, increasing them by 10% will cause the IRR to grow by 3.1%. The equity input change by -10% will decline the IRR by 1.9%; in contrast, changing this variable input by +10% will increase the IRR by 1.7%. Variables "State Handover" and "Inflation Rate" adjustments revealed less pronounced effects.

Figure 5 presents the sensitivity chart for the Currency Risk Scenario, illustrating how changes in currency fluctuation, equity, and government support affect IRR.

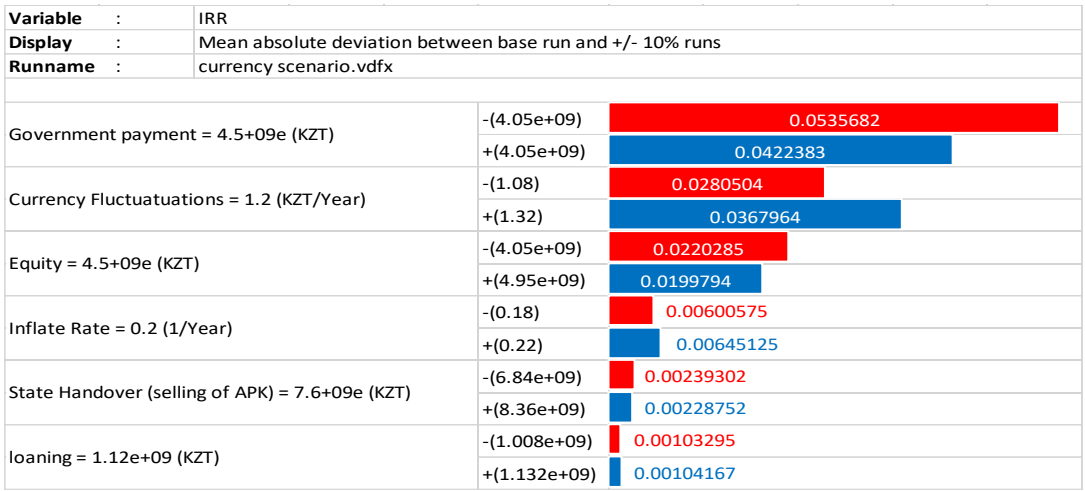

FIGURE 5. Sensitivity analysis of the currency risk scenario

In the Currency Risk Scenario, the model was susceptible to changes in the following variables "Government payment", "Currency Fluctuations", and "Equity". Thus, the -/+10% change in the variable "Government payment" will impact the IRR by -5.4% and +4.2, respectively. The fall of currency fluctuations by -10% will cause an IRR growth of 3.7%; in contrast, the growth of currency fluctuations will decline the IRR by 2.8%. Finally, the change in the variable "Equity" of -/+10% will affect the IRR by -2.2% and +2.0 respectively. The change in the inputs of other variables will not affect the IRR.

Overall, the sensitivity analysis supports the model's validity by showing logical and interpretable shifts in IRR in response to changes in risk variables. It highlights the necessity for proper risk management, careful planning, contracting, and policy consideration in mitigating financial uncertainty in availability-based PPPs like Sergek.

5. CONCLUSIONS

This paper assessed the financial sustainability, risk allocation, and effectiveness of the Sergek project in Almaty delivered under the availability-based payment PPP mechanism. Using SD modeling, the study presented a simulation-based analysis of vital financial and operating elements, which specifically related to the research questions and objectives of the study.

The IRR was used as the primary criterion for project success. Confirmed through simulation, the following findings conclude that the overall IRR of the Sergek project can be positive if the macroeconomic environment remains stable; however, the project is threatened by some financial risks, especially by delayed payments from the government as well as fluctuations in the exchange rate, and equity share.

The study found that PPP contracts with an availability-payment mechanism, where the public partner provides regular fixed annual transfers to the private partner for its services, are extremely sensitive to government payment delays, equity size, and currency exchange rate increases.

The study also has limitations like estimated financial data and assumptions around macroeconomic indicators. Political, legal, and institutional risks were not explicitly modeled. Future researchers might include assessments of political economy factors into the discussion of enforceability in law to give a more complete picture of PPP sustainability. Furthermore, aggregating this framework to other availability-based PPP projects in different PPP areas like infrastructure, healthcare, transport, education, and energy in Kazakhstan or other countries would provide valuable insights into its cross-sectoral applicability and validation.

AUTHOR CONTRIBUTION

Writing – original draft: Timur Narbaev, Bauyrzhan Aitkhozha, Andrey Samoilov.
Conceptualization: Timur Narbaev, Bauyrzhan Aitkhozha, Andrey Samoilov.
Formal analysis and investigation: Timur Narbaev, Andrey Samoilov.
Development of research methodology: Gabriel Castelblanco, Andrey Samoilov.
Resources: Timur Narbaev, Andrey Samoilov.
Software and supervisions: Timur Narbaev, Andrey Samoilov.
Data collection, analysis and interpretation: Bauyrzhan Aitkhozha, Andrey Samoilov.
Visualization: Bauyrzhan Aitkhozha, Andrey Samoilov.
Writing review and editing research: Gabriel Castelblanco, Andrey Samoilov.

REFERENCES

Benito, J., & Gonzalez-Benito, O. (2005). An analysis of the relationship between environmental motivations and ISO 14001 certification. *British Journal of Management*, *16(2)*, 133-148. https://doi.org/10.1111/j.1467-8551.2005.00436.x

Akorda. (2012). Address by the President of the Republic of Kazakhstan, Leader of the Nation N. Nazarbayev – Strategy Kazakhstan 2050: New political course of the established state. Official Website of the President of the Republic of Kazakhstan. Retrieved March 10, 2025 from https://adilet.zan.kz/rus/docs/K1200002050

Assaf, G., & Assaad, R. H. (2024). A Data-Driven Decision-Support Tool for Selecting the Optimal Project Delivery Method for Bundled Projects: Integrating Machine Learning and Expert Domain Knowledge. *Journal of Construction Engineering and Management*, 150(12). https://doi.org/10.1061/JCEMD4.COENG-15116

Barlas, Y. (1994). Formal aspects of model validity and validation in system dynamics. *System dynamics review*, Autumn (Fall). https://doi.org/10.1002/(SICI)1099-1727(199623)12:3%3C183::AID-SDR103%3E3.0.CO;2-4

Bing, L., Akintoye, A., Edwards, P. J., & Hardcastle, C. (2005). The allocation of risk in PPP/PFI construction projects in the UK. *International Journal of project management*, *23*(1), 25-35. https://doi.org/10.1016/j.ijproman.2004.04.006

Biziorek, S., De Marco, A., Guevara, J., & Castelblanco, G. (2023). Enhancing the Public Investment in Public-Private Partnerships Using System Dynamics Modeling. *Proceedings - Winter Simulation Conference*, 2777–2788. https://doi.org/10.1109/WSC60868.2023.10407708

Castelblanco, G., Narbaev, T., Mamyrbayev, A., Samoilov, A., & Guevara, J. (2024). Improving public investment in Kazakh PPPs from a portfolio perspective: A system dynamics approach. *Proceedings of the 44th Eurasia Business and Economics Society Conference, Istanbul 2023* (253-265). Cham: Springer Nature Switzerland. Retrieved March 10, 2025 from https://link.springer.com/chapter/10.1007/978-3-031-69237-6_14

Castelblanco, G., Mangano, G., Zenezini, G., & De Marco, A. (2025). Once concessioned, twice shy? Asymmetries of "reconcession" in national PPP programs. *Construction Management and Economics*, *43*(6), 405-427. https://doi.org/10.1080/01446193.2024.2448975

Chileshe, N., Njau, C. W., Kibichii, B. K., Macharia, L. N., & Kavishe, N. (2022). Critical success factors for Public-Private Partnership (PPP) infrastructure and housing projects in Kenya. *International Journal of Construction Management*, *22*(9), 1606–1617. https://doi.org/10.1080/15623599.2020.1736835

De Marco, A., & Narbaev, T. (2021). Factors of Schedule and Cost Performance of Tunnel Construction Megaprojects. *The Open Civil Engineering Journal*, 15(1), 38-49. https://doi.org/10.2174/1874149502115010038

Haraldsson, H. V, & Ab, M. (2004). Introduction to System Thinking and Causal Loop Diagrams. Retrieved March 10, 2025 from www.planteco.lu.se

Kazakhstan Public-Private Partnership Center. (2025). Project database. Retrieved March 10, 2025 from https://kzppp.kz/en/development-of-ppp-in-kazakhstan/

Khallaf, R., Guevara, J., Mendez-Gonzalez, P., & Castelblanco, G. (2024). A System Dynamics Model for a National PPP Program: The Egyptian Project Portfolio. *Construction Research Congress 2024,* CRC 2024, 3, 507–516. https://doi.org/10.1061/9780784485286.051

Kozhakhmetova, A., Mamyrbayev, A., Zhidebekkyzy, A., & Bilan, S. (2024). Assessing the impact of artificial intelligence on project efficiency enhancement. *Knowledge and Performance Management*, 8(2), 109–126. https://doi.org/10.21511/kpm.08(2).2024.09

Levine, S., McCasland, W., & Smalley, D. (1993). Development of a freeway traffic management project through a public-private partnership. 26–31. Retrieved March 10, 2025 from http://onlinepubs.trb.org/Onlinepubs/trr/1993/1394/1394-004.pdf

Mangano, G., Castelblanco, G., De Marco, A., & Ottaviani, F. M. (2025). Exploring the drivers of concession period in transport public–private partnerships. *Built Environment Project and Asset Management*, *15*(2), 193-210. https://doi.org/10.1108/bepam-04-2024-0095

Mendybayev, B. (2022). Imbalances in Kazakhstan's Smart Cities Development. *Environment and Urbanization ASIA*, 13(1), 144–152. https://doi.org/10.1177/09754253221083198

Mouraviev, N., & Kakabadse, N.K. (2017). Public-private partnerships. Policy and Governance. Challenges Facing Kazakhstan and Russia. *Corporate Governance: the International Journal of Business in Society, 14*(5), 653 – 669. https://doi.org/10.1108/CG-03-2014-0037

Narbaev T., Karimov O., Samoilov A., Ottaviani F. (2025). Success analysis of public-private partnership infrastructure project in Kazakhstan: a case of the big Almaty ring road (BAKAD). *Herald of the Kazakh-British technical university*, *22*(1), 380-391. https://doi.org/10.55452/1998-6688-2025-22-1-380-391

Narbaev, T. (2022). A meta-analysis of the public-private partnership literature reviews: Exploring the identity of the field. *International Journal of Strategic Property Management*, *26*(4), 318-331. https://doi.org/10.3846/ijspm.2022.17860

Narbaev, T., & Charman, K. (2017). The formation and management of Public-Private Partnerships in Kazakhstan. Retrieved March 10, 2025 from https://www.researchgate.net/publication/337136999

Nurbatsin, A., Kireyeva, A., Gamidullaeva, L., & Abdykadyr, T. (2023). Spatial analysis and technological influences on smart city development in Kazakhstan. *Journal of Infrastructure, Policy and Development*, 8(2). https://doi.org/10.24294/jipd.v8i2.3012

Osei-Kyei, R., Jin, X., Nnaji, C., Akomea-Frimpong, I., & Wuni, I. Y. (2023). Review of risk management studies in public-private partnerships: A scientometric analysis. *International Journal of Construction Management*, *23*(14), 2419-2430. https://doi.org/10.1080/15623599.2022.2063013

Saltelli, A., Tarantola, S., Campolongo, F., & Ratto, M. (2004). Sensitivity Analysis in Practice: A Guide to Assessing Scientific Models. John Wiley & Sons. http://dx.doi.org/10.1002/0470870958

Samoilov, A., Narbaev, T., Castelblanco, G., & Mukashev, Y. (2024a). Evaluating Public-Private Partnership Dynamics: the Kazakhstan Toll Road Case. *Eurasian Journal of Economic and Business Studies, 68*(1), 131–142. https://doi.org/10.47703/ejebs.v68i1.374

Samoilov, A., Osei-Kyei, R., Kussaiyn, M., Mamyrbayev, A., & Mukashev, Y. (2024b). Cross-Country Comparison of Risk Factors in Public–Private Partnerships in Infrastructure Development: Evidence from Colombia, Kazakhstan, and Ghana. *Sustainability (Switzerland)*, *16*(13), 5712. https://doi.org/10.3390/su16135712

Sterman, J. (2000). *Business Dynamics: System Thinking and Modeling for a Complex World*. McGraw-Hill Europe. Retrieved March 10, 2025 from https://industri.fatek.unpatti.ac.id/wp-content/uploads/2019/03/007-Business-Dynamics-Systems-Thinking-and-Modeling-for-a-Complex-World-John-D.-Sterman-Edisi-1-2000.pdf

Turner, S. M. (1995). Advanced techniques for travel time data collection. Pacific Rim TransTech Conference. *1995 Vehicle Navigation and Information Systems Conference Proceedings. 6th International VNIS. A Ride into the Future*, 40–47. https://doi.org/10.1109/VNIS.1995.518816

Wibowo, A. (2024). Ex ante required rates of return and related factors in Indonesian PPP infrastructure projects. *Built Environment Project and Asset Management*, *14*(2), 228-243. https://doi.org/10.1108/BEPAM-06-2023-0113

Xu, Y., Sun, C., Skibniewski, M. J., Chan, A. P. C., Yeung, J. F. Y., & Cheng, H. (2012). System Dynamics (SD)-based concession pricing model for PPP highway projects. *International Journal of Project Management*, *30*(2), 240–251. https://doi.org/10.1016/j.ijproman.2011.06.001

AUTHOR BIOGRAPHIES

Timur Narbaev – PhD, Kazakh-British Technical University, Almaty, Kazakhstan. Email: timur.narbaev@gmail.com, ORCID ID: https://orcid.org/0000-0002-6401-2700

Bauyrzhan Aitkhozha – MS, Kazakh-British Technical University, Almaty, Kazakhstan. Email: b_aitkhozha@kbtu.kz, ORCID ID: https://orcid.org/0009-0002-7495-9006

***Andrey Samoilov** – PhD candidate, Institute of Advanced Research and Sustainable Development, Almaty, Kazakhstan. Email: an_samoilov@kbtu.kz, ORCID ID: https://orcid.org/0009-0006-0548-4982

Gabriel Castelblanco – PhD, University of Florida, Gainesville, USA. Email: gabriel.castelbl@ufl.edu, ORCID ID: https://orcid.org/0000-0001-6820-6644

Received on: 21 March 2025 Revised on: 01 June 2025 Published: 30 Jube 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.516

Human Resource Management Configurations and Their Impact on Macroeconomic Indicators in Kazakhstan

Meruyert A. Kanabekova[1] | **Gaukhar A. Taspenova**[2] | **Galiya O. Mazhiyeva**[2]* | **Sharbat A. Igenbayeva**[3] | **Kuralai Zh. Demeuova**[3]

[1] Kazakh National Pedagogical University named after Abai, Almaty, Kazakhstan

[2] Narxoz University, Almaty, Kazakhstan

[3] ALT University named after Mukhamedzhan Tynyshpayev, Almaty, Kazakhstan

Corresponding author:
*Galiya O. Mazhiyeva – PhD student, Narxoz University, Almaty, Kazakhstan.
Email: gmazhieva@mail.ru

How to cite this article:
Kanabekova, M.A., Taspenova, G.A., Mazhiyeva, G.O., Igenbayeva, Sh.A. & Demeuova, K.Zh. (2025). Human Resource Management Configurations and Their Impact on Macroeconomic Indicators in Kazakhstan. Eurasian Journal of Economic and Business Studies, 69(2), 109-125.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

Human resource management (hereinafter – HRM) has become a key factor in the adaptability of organisations in the context of instability. The purpose of this study is to investigate the relationship between the types of organisational configurations in HRM and macroeconomic indicators in a hybrid institutional environment in Kazakhstan. The research methods employed include categorical coding of organisational characteristics, multivariate analysis of variance (MANOVA), univariate analysis (ANOVA), and linear regression to assess the relationship between HRM configurations and GDP and employment indicators. The initial data covered the period from 2010 to 2024, including organisational characteristics of 26 small and medium-sized enterprises in Kazakhstan, as well as official industry statistics on GDP and employment, aggregated by four types of HRM configurations. The following key results were obtained: the HRM model in education and science demonstrated the most excellent effectiveness, having a significant impact on both GDP ($F = 2369.3$, $p < 0.001$); the agricultural model showed a high correlation with employment ($F = 116.99$, $p < 0.001$); the digital-creative model was significant only in terms of GDP ($F = 109.4$, $p < 0.001$); the industrial hierarchical model showed the least impact on both indicators. These findings confirm that HRM models embedded in flexible, multifunctional structures with a development focus produce greater institutional and economic resilience. The study contributes to developing HRM typologies in transitional settings and offers evidence-based guidance for redesigning organisational systems aligned with sectoral performance and labor market priorities.

KEYWORDS: Economy, Economic Efficiency, Economic Growth, Employment, Management, Institutional Environment, Business Process

SCSTI: 06.81.65

JEL Code: J21, M12, O15

FINANCIAL SUPPORT: This study was not sponsored.

1. INTRODUCTION

Human resource management (hereinafter – HRM) in contemporary organizations develops in institutional layering, structural diversification, and increasing demands for the internal coherence of managerial systems. The interdependence between organizational architecture and HRM strategies has become a critical area of inquiry, particularly in structural mismatches and fragmented coordination. Inconsistent integration of management structure, functional logic, and personnel practices undermines adaptability, limits performance, and reduces the sustainability of institutional routines. The analytical focus in international research has shifted from standardised instruments toward configurational approaches, which emphasize structural fit and contextual sensitivity.

HRM systems are structured differently in different countries because the specific features of national institutions influence them, namely the formal and informal rules that operate within society. Anglo-Saxon models prioritize individual contracts, performance metrics, and operational flexibility, often downplaying collective procedures. In contrast, continental European systems rely on legal integration and normative coordination through social partnership. Asian and post-industrial systems emphasize hierarchical coherence, loyalty, and procedural stability. Across institutional contexts, architectural consistency, defined by the distribution of authority, functional composition, and sectoral embeddedness, acts as the foundation for HRM implementation.

Human resource management influences the employment-to-unemployment ratio, income distribution, and production indicators, serving as one of the key factors in the establishment of macroeconomic equilibrium (Saha et al., 2025). Its importance is enhanced in conditions where the rate of economic growth depends on the qualitative composition of the labor force. The level of education, professional training, and labor force participation have a direct impact on the efficiency of industries and the dynamics of production expansion (Sarwar et al., 2021). When the institutional environment changes, the sustainability of economic processes largely depends on the quality of the labor force. Embedding management practices in the economic planning system ensures the link between changes in employment and structural restructuring. HRM models developed with consideration for the national economy's specificities form the personnel basis for modernization processes and increased development efficiency (Vîrjan et al., 2023).

The effectiveness of HRM is determined not by a set of universal practices but by the configuration in which they are implemented, taking into account the specifics of the institutional environment, the governance model, and the organization's scale (White et al., 2021). In conditions where market and administrative logic intersect, parameters such as the level of formalization, the degree of autonomy, and the nature of accountability become significant. In small structures deprived of standardized solutions, HRM is built situationally, and the sustainability of such configurations depends on the ability to adapt management procedures to limited resources and external pressures (Kroon & Paauwe, 2022). In semi-autonomous institutions, such as government agencies, HRM is influenced not only by internal organizational goals but also by the requirements of political regulation, normative accountability, and personnel constraints, which necessitate adjusting management approaches to a specific context (Blom et al., 2021).

Kazakhstan is an institutional hybrid where post-Soviet administrative legacies intersect with selectively localized international practices. Organizations, particularly in the SME segment, navigate high regulatory uncertainty, structural inconsistency, and weak normative anchoring of HRM functions. Informal norms, uncoordinated departmental roles, and the absence of standardized HR configurations hinder organizational resilience and limit the internalization of personnel strategies. Addressing these challenges

requires identifying core organizational variables, structure type, departmental design, and sectoral logic—to construct coherent HR models tailored to institutional realities.

This study assesses the relationship between organizational HRM configurations and macro-level outcomes within Kazakhstan's economy. The analysis focuses on the relationship between management style, structural design, and sectoral specialization. The research aims to determine whether distinct HRM models correspond to differences in economic performance and employment distribution across sectors.

2. LITERATURE REVIEW

The conceptual evolution of HRM reflects a shift from administrative and operational models to strategically embedded systems. This transformation redefined HRM as a core element of strategic planning, talent development, and institutional control. Legge (1989) characterized HRM as a tool for aligning personnel practices with organizational goals. Storey (1996) expanded this logic by framing HRM as a mechanism of managerial culture formation and normative reinforcement. Mueller (1996) introduced a resource-based perspective, viewing human capital as an asset capable of generating internal continuity and competitive advantage through accumulated knowledge and motivation.

Subsequent theoretical developments emphasized the architectural alignment of HR functions within the broader organizational structure. Kamoche (1996) conceptualized HRM as an adaptive mechanism for stabilizing internal behavioral systems, placing value on the coherence of HR tools across organizational units. Hiltrop (1996) empirically demonstrated the link between participatory practices and performance outcomes, introducing a configuration-based model of HRM effectiveness.

Dalton and Druker (2012) introduced the focus on cross-contextual transferability and examined HR practices in transnational firms. Institutional adaptability, the capacity to adjust HR mechanisms to external legal and cultural norms, emerged as a critical determinant of organizational resilience. The role of HRM expanded from an efficiency-oriented subsystem to a mediator of institutional identity. Oyler and Golden Pryor (2009), revisiting Drucker's ideas, highlighted the integrative role of HRM in managing cultural diversity and shaping organizational values. This institutional interpretation was reinforced by Armstrong (2009), who framed HRM as a discipline of structural transformation and motivational governance. Dessler et al. (2015) further detailed the operational infrastructure of HR systems, emphasizing the rise of data-driven and behaviorally modelled approaches. Most recently, Diani et al. (2024) defined HRM as a determinant of adaptability, innovation, and systemic sustainability, positioning it as a central mechanism in the evolution of institutions.

The diversity of human resource management (HRM) systems across national and cultural environments is shaped by institutional structures, labor market configurations, and prevailing value systems. Hofstede's (1984) typology of cultural dimensions, power distance, individualism versus collectivism, and uncertainty avoidance, provided a foundation for quantifying behavioral divergence across societies. Later work (Hofstede, 1993) emphasized the limitations of universalist management models that neglect context-specific cultural dynamics. Through a bibliometric analysis, Ferreira et al. (2014) confirmed the enduring influence of cultural variables in international HRM research, particularly in areas such as strategic decision-making, participation structures, and behavioral norms within multinational firms.

A comparative institutional lens, showed a structural divergence between Anglo-Saxon and continental European HRM systems (Sparrow et al. (1994); Brewster (2007). Thus, performance efficiency is the focus of attention, as well as flexible employment arrangements and individualized responsibility, which defines the Anglo-Saxon

model. In contrast, the continental model is embedded in formal institutions and collective agreements. In Asian contexts, there prevail hierarchical coordination, internal career stability, and high organizational loyalty. Asian countries' model is affected by cultural codes and institutional designs, which determine the distribution of authority, decision-making procedures, and HRM integration mechanisms. Differences in coordination mechanisms, interpretative approaches, and institutional expectations determine the diversity of HRM models. According to the conceptual model of Gooderham et al. (2019), normative and cultural foundations shape stable human resource (HR) configurations. High regulatory saturation leads to the centralization and formalization of practices, while institutional flexibility promotes decentralization and coordinated decision-making.

Strauss (2001) identified a divergence between American and British HRM logic within the comparative tradition. The American model regards internal rationalization and operational efficiency. On the contrary, the British model prioritizes collective participation, negotiated compromise, and coordination mechanisms. Cregan et al. (2021) compared calculative and collaborative HR models in post-crisis recovery. It was found that rigid, formalized configurations undermine trust and worsen performance, while collaborative models promote institutional resilience, interpretive predictability, and behavioral consistency. Thus, the structure, distribution of tasks, industry context, and management styles form a configuration that determines the institutionalization of HR practices. This affects organizational effectiveness and macro-level parameters, such as sector profitability and employment levels.

From a micro-structural perspective, Blake and Mouton's managerial grid model (1981) introduced a dual-axis framework balancing task orientation and relational engagement, with the 9.9 position identified as optimal for integrating productivity and team stability. Hersey and Blanchard (1982) criticized universal management models, arguing that management effectiveness depends on the ability to adapt behavior to a specific situation and the employees' readiness level. Therefore, personnel management is a flexible system that must adapt to the changing context of the organization. In this case, HRM acts as an adaptation mechanism built into the structure and dynamics of the management environment.

The type of organizational structure directly influences the degree of involvement, formalization, and adaptability within HRM systems. Comparative analysis by Avdelidou-Fischer (2006) demonstrated higher performance levels in decentralized and matrix configurations compared to hierarchical-administrative models. Lunenburg (2012), following Mintzberg's typology, classified coordination mechanisms—direct control, process standardization, qualification standardization, result standardization, and mutual adjustment, each corresponding to a specific HR function. Departmental architecture defines the extent of strategic participation. In Galbraith's (2012) framework, organizational structure is presented as a set of interrelated decisions on coordination, task allocation, motivation, and resource circulation. Ben-Ner and Ren (2013) linked HRM logic to ownership form: private organizations tend toward formalized and contractual models, while non-profit and public institutions prioritize value identification and flexible inclusion.

Lunenburg's (2017) model introduced strategic and behavioral dimensions to the coordination architecture, identifying leadership roles and internal control as factors that shape HRM's integrative function. Englmaier et al. (2018) conceptualized organizational design as an aggregative mechanism that combines labor division with coordination intensity, determining productivity differences and the depth of institutional resilience. HRM operates as a transmission mechanism between operational capacities and macro-level outcomes within this configuration. Structural logic influences internal organisational performance and

broader sectoral effects, including profitability and employment—parameters empirically examined in the present study.

Self-organizing management models redefine HRM as a regulatory infrastructure in decentralized environments. According to Martela (2019), key organizational functions include task allocation, incentive system, limiting opportunism, strategic direction, and coordination. Their implementation varies: bureaucratic structures rely on hierarchy, adhocracies on flexibility, and self-organization on horizontal connections and autonomy. Industry specificity also influences HRM: in the construction industry, authoritarian practices reduce adaptability, while project-based and client-oriented formats increase flexibility and involvement (Górecki et al., 2022).

The national specifics of human resource management in Kazakhstan are formed under institutional transformations and external adaptation constraints. In the higher education system, structural limitations in the development of human resources and the absence of strategic planning mechanisms are recorded, which indicates the immaturity of the internal HR architecture (Seitova, 2016). Similar limitations are observed in the public sector, where administrative logic, hierarchy, and regulated procedures persist, reducing functional flexibility and adaptability (Nurbekova, 2020). In the private sector, conflict dynamics have been identified between local management norms and attempts to introduce universalized HR practices. A study of Kazakhstani companies showed partial integration of global standards while maintaining elements of informal management and institutional inertia (Latukha & Malko, 2019). In divisions of international companies, the coexistence of corporate standards with locally adapted practices has been observed, confirming the configurational nature of HR systems (Masyhuri, 2022). Shakharova et al. (2025) show that the efficiency of national labor force utilization is determined by the degree of alignment of the personnel structure with industry productivity and employment parameters.

The review revealed gaps in the institutional alignment of HRM models with economic performance, which informs the direction of this study. The purpose of this study is to investigate the relationship between the types of organisational configurations in HRM and macroeconomic indicators in a hybrid institutional environment in Kazakhstan. The following hypotheses are developed:

Hypothesis 1 (H1). There is a statistically significant difference in total GDP values across sectors corresponding to different HR management models.

Hypothesis 2 (H2). There is a statistically significant difference in the number of employed persons across sectors classified by HR management models.

3. METHODOLOGY

The methodological design is based on identifying structural correspondences between organizational characteristics and personnel management styles. This corresponds to the direction of applied research in organizational sociology and strategic management (Mintzberg, 1979; Child, 2005; Burton et al., 2015). The empirical study covered 26 organizations representing small and medium-sized enterprises in Kazakhstan, selected to reflect sectoral diversity and differing internal governance architectures. Organizations were included based on the availability of open data, structural transparency, and relevance to HRM transformation models. The sample size was constrained by access to detailed internal configurations, but it was sufficient for typological comparison.

The study is based on the principles of contingent analysis, which posits that a set of internal organisational parameters determines management practices. The unit of analysis was considered an organization as an integral system in which the structure, functional blocks, and management style form an interdependent model. The analysis was conducted in successive stages using a consistent set of analytical procedures (Figure 1).

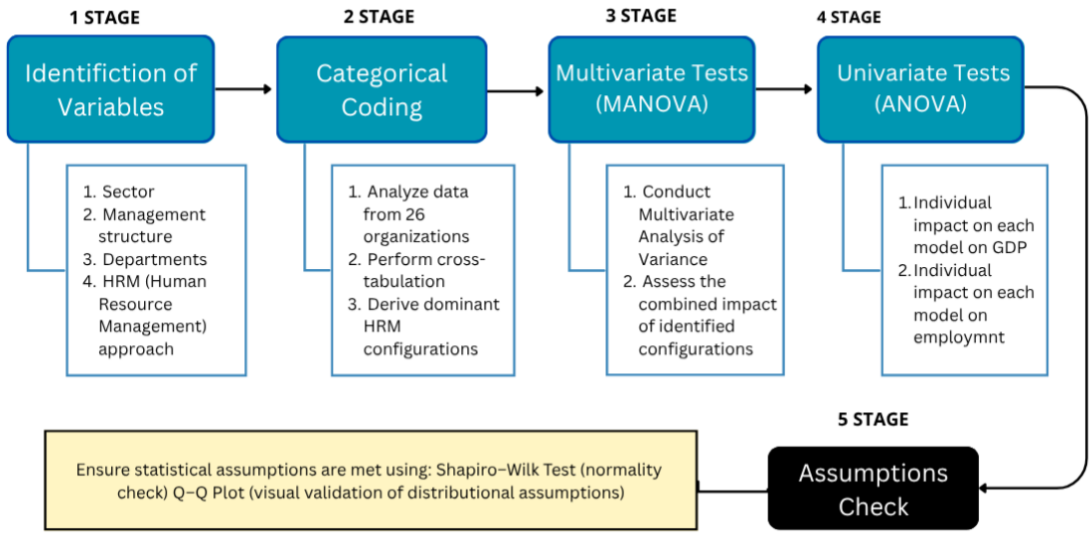

FIGURE 1. Main stages of the analysis

The empirical base comprised 26 organisations from the small and medium sectors. The categorical coding method was employed to ensure comparability, allowing for the unification of qualitative descriptions into analytical variables.

Representativeness within the typological analysis. The number of 26 organizations provided sufficient variability of internal management configurations (by structure, functional blocks, and HR approaches) necessary for constructing a generalized typology. The goal of the study did not imply statistical representativeness at the level of the entire set of enterprises, but to identify recurring management models characteristic of key sectors.

Selection criteria and data quality. The sample included only those organizations for which verified information on their structure, functions, and personnel management style was available. Although, the sample size was limited the analytical reliability and comparability of cases was high. The selection was conducted based on open sources, expert interviews, and internal documentation.

Methodological relevance for the contingent approach. In contingent studies aimed at comparing organizational configurations, the key value is not the sample size but the diversity and completeness of the presented management types. In the presence of structural diversity, even a limited sample allows us to identify stable dependencies between parameters and build an analytical model that is valid in the applied context.

The main variables adopted for the assessment are presented in the table below (Table 1).

The coding reflects the internal architecture of organizations and covers managerial and functional parameters. The variables were selected based on relevance to organizational behavior, the possibility of observation in open sources, and applicability to transformation strategies in the education system.

The choice of the four variables (A–D) is explained by the need to capture the following dimensions: (1) A – sector of activity, which reflects the institutional context in which the HR system functions; (2) B - organizational structure, which determines the degree of centralization and the distribution of authority; (3) C - functional architecture, which sets the managerial focus; (4) D - management approach is interpreted as the behavioral outcome of interactions among the other three dimensions.

TABLE 1. Categorical coding scheme for organizational analysis

Group	Variable	Code and description
A	Sector of Activity	A1 – Services and Consulting; A2 – Production and Distribution; A3 – Trade and Retail; A4 – Construction and Infrastructure; A5 – Resource Extraction
B	Management Structure	B1 – Hierarchical; B2 – Line-Functional; B3 – Functional; B4 – Functional-Project; B5 – Horizontal; B6 – Alternative
C	Key Departments (Functional Focus)	C1 – Marketing/Sales; C2 – Finance/Accounting; C3 – HR/Admin; C4 – IT/Technical; C5 – Production/Logistics; C6 – Legal; C7 – Multifunctional
D	Employee Management Approach	D1 – KPI and Specialization; D2 – Project Teams; D3 – Regulated Hierarchy; D4 – Collective Decisions; D5 – Client Orientation; D6 – Innovation and HR Dev; D7 – Safety and Compliance; D8 – Flexibility

Note: compiled by authors

This approach is based on the conceptual frameworks developed by Storey (1996), Galbraith (2012), and Martela (2019), where HRM is treated as a mechanism of internal alignment contingent upon organizational architecture and contextual constraints.

To ensure further analytical comparability with sectoral performance and employment dynamics, the typology of organizational configurations was extended through the identification of management models recurrently observed in the dataset. These models were not constructed hypothetically but derived from empirical combinations of structures, departments, and HR approaches recorded across the analyzed organizations. Based on these internal configurations, the following sectors were identified as functionally linked to specific managerial models (Table 2).

TABLE 2. Unified sector coding by HR model (for GDP and Employment)

HR Model	Sector Name (OKED)	GDP (KZT)	Employment (people)
Model 1	Education	M1_EDU_GDP	M1_EDU_EMP
	Professional, Scientific and Technical	M1_PST_GDP	M1_PST_EMP
Model 2	Agriculture, Forestry and Fishing	M2_AGR_GDP	M2_AGR_EMP
Model 3	Information and Communication	M3_INF_GDP	M3_INF_EMP
	Arts, Entertainment and Recreation	M3_ART_GDP	M3_ART_EMP
Model 4	Manufacturing	M4_MAN_GDP	M4_MAN_EMP
	Construction	M4_CON_GDP	M4_CON_EMP

Note: compiled by authors

To interpret the empirical data and integrate them with macroeconomic indicators, four typical models of personnel management were identified, corresponding to different sectors of the economy. Each model represents a stable configuration of the organizational structure, functional architecture, and management approach.

Model 1 – Education and Science

Structure: functional-project (B4); departments: multifunctional (C7); approach: D6 (innovation and HR development), partly D2 (project teams). This model exhibits high internal coordination density and a focus on intangible resources, making it particularly relevant for universities and research institutions.

Model 2 – Agriculture and Food Processing

Structure: line-functional (B2); departments: logistics and production (C5); approach: D1 (KPI and specialization), partly D7 (safety and compliance). Characterized by process formalization and internal orientation,

reflecting the operational logic of agro-industrial systems.

Model 3 – Services and Creative Industries

Structure: horizontal or alternative (B5–B6); departments: marketing, IT, design (C1, C4, C6); approach: D5 (client-oriented), partly D8 (flexibility). Marked by decentralization, responsiveness to the external environment, and task fluidity, corresponding to consultancies, media, and digital companies.

Model 4 – Industry and Construction

Structure: hierarchical (B1); departments: production and finance (C2, C5); approach: D3 (regulated hierarchy), partly D7. Characterized by vertical control mechanisms and compliance-driven routines, typical for capital-intensive and infrastructure-heavy sectors.

These models form the foundation for subsequent integration with macroeconomic indicators such as employment volume and sectoral contribution to GDP, enabling comparative evaluation of HR management effectiveness within and across sectors in Kazakhstan. The objective of the analysis is to evaluate whether distinct HRM configurations are statistically associated with macro-level outcomes, specifically, sectoral variation in GDP and employment. The empirical testing stage included multivariate and univariate statistical procedures (MANOVA, ANOVA, linear regression), supported by normality diagnostics.

4. FINDINGS AND DISCUSSION

Recording differences in the distribution of sectors, management structures, functional units, and personnel approaches allows for the identification of institutional features of internal organizational configurations. Each category reflects not only the specifics of the formal organization but also the principles of responsibility distribution, strategic priorities, and the degree of focus on adaptation. Visualization of these parameters demonstrates the characteristic profiles of dominant models and their relationship in the sample (Figure 2).

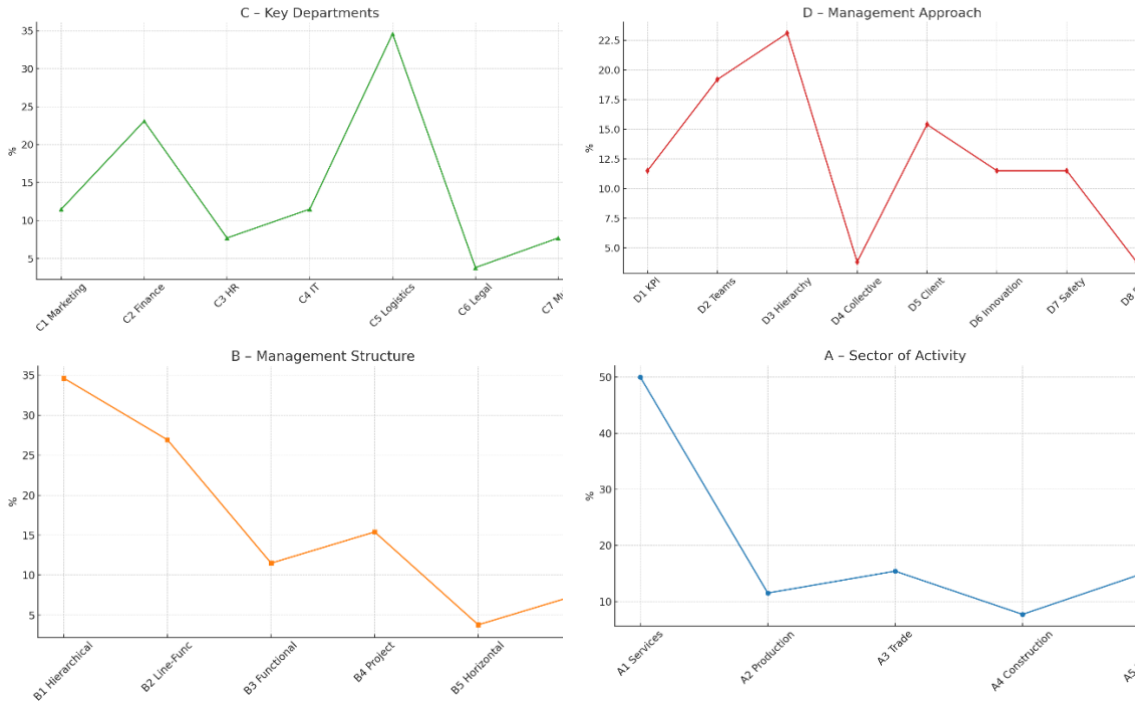

FIGURE 2. Empirical Distribution of HRM Practices Based on Typological Coding

Note: compiled by the authors based on calculations

The distribution by sector (A) reflects the concentration in the services and consulting sector (50.0%), where personnel management is built into flexible, external demand-oriented organizational forms. The manufacturing, trade, and raw materials sectors are more evenly distributed, to identify stable differences in institutional constraints and management practices.

In the distribution of organisational structures (B), the largest share is occupied by hierarchical models (34.6%) and linear-functional configurations (26.9%), reflecting the predominance of centralised management systems. The presence of functional-project structures (15.4%) and alternative solutions (7.7%) indicates the presence of decentralised elements, albeit on a limited scale. Therefore, there is a quantitative predominance of vertical structures with the partial inclusion of hybrid mechanisms that do not form a stable tendency to change the management logic.

Figure 2 shows the distributions by four key variables (A–D), comparing the frequency structure of management practices and assess the degree of their concentration in various institutional environments (Appendix 1).

The functional composition of departments (C) is determined by the predominance of logistics and production blocks (34.6%), ensuring technological and operational continuity. Financial (23.1%) and marketing (11.5%) contours demonstrate a shift in emphasis towards integrating resource and image management.

According to the HR management styles (D), the prevalence of regulated models (23.1%) and project schemes (19.2%) was recorded, reflecting differences in the logic of subordination and distribution of responsibility. Management practices based on a client focus (15.4%) and innovative development (11.5%) form a behavioral strategy in which HR decisions are built into the overall configuration of organizational response.

Table 3 presented cross-dimensional distribution of management approaches.

TABLE 3. Cross-dimensional distribution of management approaches by organizational characteristics (%)

Management approach	Sector of activity (A)	Management structure (B)	Key departments (C)
D1 – KPI and Specialization	11.5 %	11.5 %	11.5 %
D2 – Project Teams	15.4 %	11.5 %	11.5 %
D3 – Regulated Hierarchy	19.2 %	15.4 %	23.1 %
D4 – Collective Decisions	3.8 %	3.8 %	0 %
D5 – Client Orientation	15.4 %	11.5 %	7.7 %
D6 – Innovation and HR Development	7.7 %	7.7 %	11.5 %
D7 – Safety and Compliance	11.5 %	11.5 %	15.4 %
D8 – Flexibility	3.8 %	3.8 %	7.7 %

Note: compiled by the authors based on calculations

A comparison of management approaches with the parameters of the organizational environment reveals differences in coordination methods depending on the sector, type of structure, and functional profile of the units. The stable prevalence of the regulated hierarchy (D3) in all three dimensions indicates the dominance of vertical management mechanisms. At the level of functional blocks, the share of this approach reaches 23.1%, which coincides with the prevalence of logistics and production units in the overall sample. The linkage of hierarchical management to operationally oriented structures forms a closed configuration in which control is strengthened at each level. The presence of project teams (D2) in 15.4% of organizations by sector and 11.5% by structure and unit indicates a partial diversification of management practices. The distribution is close to uniform, indicating adaptation to the hybrid coordination logic without destroying the

vertical core. The emergence of the KPI and specialization model (D1) is recorded mainly in functionally oriented structures and service sectors, where a high standardization of processes is observed.

Forms oriented towards innovation and personnel development (D6), as well as safety and compliance with regulations (D7), are more often tied to the internal architecture of departments. The functional core's influence on the management style is manifested in a higher share of D6 and D7 in block C compared to the sectoral or structural binding. This distribution reflects the dependence of personnel decisions on the depth of specialization and resource provision of specific areas.

Horizontal forms of coordination, including collective decision-making (D4) and flexibility (D8), occupy minimal shares and do not form a stable configuration. Low values at the intersection of all three axes indicate weak institutionalization of decentralized practices. The distribution structure emphasizes the preservation of a rigid coordination logic with limited space for behavioral autonomy.

The analysis of associations between personnel management styles and organizational environment parameters is based on calculations of the χ^2 criterion and Cramer's V correlation coefficient. The statistical test covers three areas: sector of activity, type of management structure, and functional composition of key divisions. The results are presented in Table 4, where the χ^2 values, degree of freedom, significance level, strength of correlation, and sample size (n = 26 organizations) are recorded.

TABLE 4. Chi-Square Test and cramer's v for associations between management approach and organizational characteristics

Association	Chi-Square	df	p-value	Cramer's V
Management Approach ~ Sector	38.894	28	0.08264	0.612
Management Approach ~ Structure	48.858	35	0.05997	0.613
Management Approach ~ Departments	59.126	42	0.04159	0.616

Note: compiled by the authors based on calculations

The relationship between management styles and the sector of activity turned out to be moderately strong (Cramer's V = 0.612) at p = 0.08264. The value does not reach the standard level of statistical significance. However, it approaches the threshold, which indicates a possible influence of the industry context on the choice of management practices when expanding the sample.

A similar picture is observed for the variable "structure type": coefficient V = 0.613, p = 0.05997. The statistical boundary is at the level of the assumption that the structural configuration can influence the distribution of management approaches, especially in the context of maintaining vertical management and introducing project elements.

The only direction with confirmed statistical significance is the relationship between the management style and the functional focus of the divisions (p = 0.04159, V = 0.616). The internal structure of the divisions has a more direct impact on the coordination style and personnel policy than external institutional binding or formal structure. The choice of management approach is mediated by the function that the division performs within the overall system, including the degree of specialization, resource autonomy, and technological load.

A compatibility matrix was created to assess the consistency between the types of organizational structures and HR management styles. This procedure enables us to determine how various management approaches align with the architecture of role distribution, coordination mechanisms, and levels of responsibility. The assessment was based on the frequency of coincidences in a sample of 26 organisations, followed by verbal

categorisation from high to low compatibility. Table 5 reflects which combinations of structural models and HR approaches form stable configurations and which do not appear in the observed array.

TABLE 5. Compatibility Matrix between Organizational Structures and Management Approaches

Structure I am running a few minutes late; my previous meeting is running over. Approach	**D1 – KPI**	**D2 – Project Teams**	**D3 – Regulated Hierarchy**	**D4 – Collective**	**D5 – Client-Oriented**	**D6 – Innovation**	**D7 – Safety**	**D8 – Flexibility**
LCB1 – Hierarchical	NC	NC	HC	NC	LC	MC	NC	NC
B2 – Line-Functional	NC	NC	MC	NC	MC	NC	MC	LC
NCB3 – Functional	NC	HC	NC	NC	NC	NC	HC	NC
B4 – Functional-Project	HC	MC	NC	NC	MC	NC	NC	NC
NCB5 – Horizontal	NC	HC	NC	NC	NC	NC	NC	NC
*Verbal Scale, High compatibility – HC; Moderate compatibility – MC; Low compatibility – LC; No compatibility – NC								

Note: compiled by the authors based on calculations

The compatibility matrix allows us to identify stable dependencies between the management architecture and HR practices. The high compatibility of the KPI approach (D1) with functional-project structures (B4), as well as the high stability of the hierarchical approach (D3) in classical verticals (B1), confirm the presence of fixed interaction models that are reproduced regardless of the specific context. At the same time, the lack of compatibility between project teams (D2) and innovation-oriented practices (D6) with horizontal and alternative structures (B5, B6) may indicate that flexible forms of organisation are underestimated in the sample or have not yet received institutional consolidation. The transition to the following analysis stage involves expanding the interpretation beyond the internal configuration.

The typology, built on the basis of the compatibility of structures and management approaches, allows us to identify several stable models. Each of them is characterised by a repeatable combination of organisational architecture and personnel decisions, which provides grounds to associate it with a particular employment sector reflected in Kazakhstan's socio-economic structure.

A multivariate analysis was conducted to test the proposed hypotheses regarding the association between HR management models and economic output and employment size. This approach made it possible to assess the joint influence of selected sectoral variables, each representing a specific HR configuration—on two dependent variables: total GDP and total employment.

Table 6 presents the results of the multivariate tests (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Root) for each predictor variable included in the model.

The multivariate statistics demonstrate statistically significant effects for several sectors. In particular, M1_EDU_GDP, M2_AGR_GDP, and M3_ART_GDP show highly significant multivariate effects ($p < 0.001$), indicating that HR configurations

TABLE 6. Multivariate Tests

Variable	Test	value	F	df1	df2	p
M1_EDU_ GDP	Pillai's Trace	0.998	1168.68	2	5	<.001
	Wilks' Lambda	0.00213	1168.68	2	5	<.001
	Hotelling's Trace	467.472	1168.68	2	5	<.001
	Roy's Largest Root	467.472	1168.68	2	5	<.001
M2_AGR_ GDP	Pillai's Trace	0.932	34.53	2	5	0.001
	Wilks' Lambda	0.06751	34.53	2	5	0.001
	Hotelling's Trace	13.812	34.53	2	5	0.001
	Roy's Largest Root	13.812	34.53	2	5	0.001
M3_ART_ GDP	Pillai's Trace	0.948	45.60	2	5	<.001
	Wilks' Lambda	0.05198	45.60	2	5	<.001
	Hotelling's Trace	18.238	45.60	2	5	<.001
	Roy's Largest Root	18.238	45.60	2	5	<.001
M4_CON_ GDP	Pillai's Trace	0.321	1.18	2	5	0.381
	Wilks' Lambda	0.67943	1.18	2	5	0.381
	Hotelling's Trace	0.472	1.18	2	5	0.381
	Roy's Largest Root	0.472	1.18	2	5	0.381
M1_EDU_ EMP	Pillai's Trace	0.437	1.94	2	5	0.238
	Wilks' Lambda	0.56308	1.94	2	5	0.238
	Hotelling's Trace	0.776	1.94	2	5	0.238
	Roy's Largest Root	0.776	1.94	2	5	0.238
M2_AGR_ EMP	Pillai's Trace	0.959	59.20	2	5	<.001
	Wilks' Lambda	0.04052	59.20	2	5	<.001
	Hotelling's Trace	23.682	59.20	2	5	<.001
	Roy's Largest Root	23.682	59.20	2	5	<.001
M3_ART_ EMP	Pillai's Trace	0.572	3.34	2	5	0.120
	Wilks' Lambda	0.42841	3.34	2	5	0.120
	Hotelling's Trace	1.334	3.34	2	5	0.120
	Roy's Largest Root	1.334	3.34	2	5	0.120
M4_CON_ EMP	Pillai's Trace	0.738	7.02	2	5	0.035
	Wilks' Lambda	0.26247	7.02	2	5	0.035
	Hotelling's Trace	2.810	7.02	2	5	0.035
	Roy's Largest Root	2.810	7.02	2	5	0.035

Note: compiled by the authors based on calculations

represented in these sectors are strongly associated with variations in both GDP and employment. In contrast, M4_CON_GDP and M1_EDU_EMP did not produce significant results, suggesting weaker or more context-dependent associations.

The findings confirm that selected HR management models are not only structurally distinct but also differentially embedded in their respective sectors' economic and employment architecture. The strong multivariate effects for the education, agricultural, and creative sectors point to the relevance of institutional and functional HR characteristics in explaining variations in macroeconomic performance and labor distribution. To complement the multivariate results, univariate tests were conducted to evaluate the individual contribution of each HR-related sectoral indicator to GDP and employment separately.

Table 7 displays the results of these tests for both dependent variables across all predictor variables.

TABLE 7. Univariate Tests

Independent variable	Dependent variable	Sum of squares	df	Mean Square	F	p
M1_EDU_GDP	GDP_TOTAL	1.52e+16	1	1.52e+16	2369.311	<.001
	EMPLOYED_TOTAL	1.06e0+6	1	1.06e0+6	1794.201	<.001
M2_AGR_GDP	GDP_TOTAL	5.29e+14	1	5.29e+14	82.461	<.001
	EMPLOYED_TOTAL	9358	1	9358	15.789	0.007
M3_ART_GDP	GDP_TOTAL	7.02e+14	1	7.02e+14	109.419	<.001
	EMPLOYED_TOTAL	15566	1	15566	26.264	0.002
M4_CON_GDP	GDP_TOTAL	5.29e+12	1	5.29e+12	0.826	0.399
	EMPLOYED_TOTAL	355	1	355	0.600	0.468
M1_EDU_EMP	GDP_TOTAL	7.65e+12	1	7.65e+12	1.194	0.317
	EMPLOYED_TOTAL	676	1	676	1.141	0.326
M2_AGR_EMP	GDP_TOTAL	7.06e+12	1	7.06e+12	1.101	0.334
	EMPLOYED_TOTAL	69338	1	69338	116.990	<.001
M3_ART_EMP	GDP_TOTAL	6.25e+12	1	6.25e+12	0.974	0.362
	EMPLOYED_TOTAL	4616	1	4616	7.788	0.032
M4_CON_EMP	GDP_TOTAL	7.94e+11	1	7.94e+11	0.124	0.737
	EMPLOYED_TOTAL	6735	1	6735	11.363	0.015
Residuals	GDP_TOTAL	3.85e+13	6	6.41e+12		
	EMPLOYED_TOTAL	3556	6	593		

Note: compiled by the authors based on calculations

The univariate results confirm that M1_EDU_GDP, M2_AGR_GDP, and M3_ART_GDP exert a statistically significant effect on GDP ($p < 0.001$), while M4_CON_GDP does not show significance ($p = 0.399$). A similar pattern is observed for employment: M1_EDU_GDP, M2_AGR_EMP, M3_ART_EMP, and M4_CON_EMP all demonstrate significant effects on employment size ($p < 0.05$), with M2_AGR_EMP being especially influential ($p < 0.001$).

These results indicate that HR models associated with the education, agricultural, and creative sectors influence macroeconomic outcomes and labor distribution. In contrast, the construction sector exhibits weaker associations with GDP and employment, suggesting a lower strategic alignment between its HR practices and performance outcomes.

The results of the Shapiro–Wilk test showed a non-normal data distribution ($W = 0.822$, $p = 0.007$). Given the small sample size, this result is typical and does not reduce the reliability of the core effects. Significant results in both multivariate and univariate tests confirmed the analytical consistency of the findings, though the scope of their application remains limited.

This method allows for a visual interpretation of the degree of deviation of the empirical distribution from the theoretical model underlying the parametric tests and multivariate models.

A Q-Q plot was constructed based on the Mahalanobis distances and χ^2 distribution quantiles to assess the data compliance with the assumption of multivariate normality (Figure 3).

A visual analysis of the plot confirms a satisfactory approximation of the observed values to the diagonal, indicating an acceptable level of compliance with multivariate normality. The trend line covers most points, allowing the assumption of normality to be met at a level sufficient for interpreting the results of the multivariate tests and linear regression models used in this study.

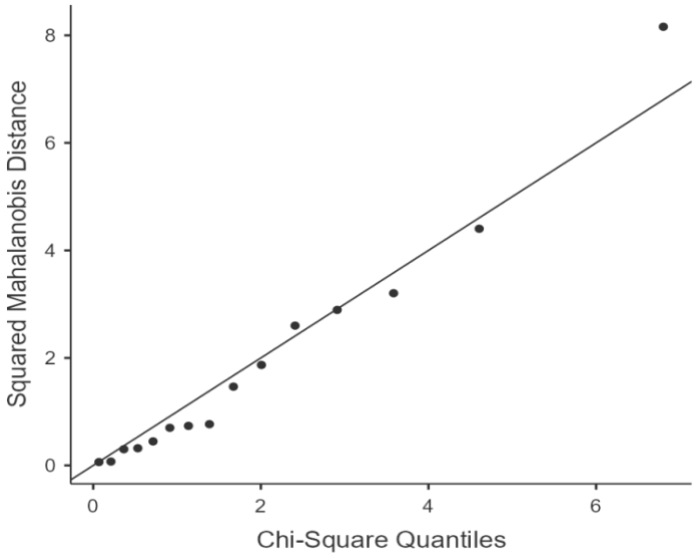

FIGURE 3. Q-Q Plot assessing multivariate normality

5. DISCUSSION

The results showed a statistically significant relationship between the management models and two key indicators - employment and gross value added. All four configurations demonstrated significant effects for at least one of the parameters. Still, the most excellent stability and severity of the relationship were recorded in the model related to the education sector (M1). The significance both for GDP ($p < .001$) and employment ($p < .001$) allows us to consider this configuration as the least vulnerable to institutional and behavioral constraints. Seitova (2016) emphasizes that staff sustainability in higher education is impossible without the strategic institutionalization of HRM and the transition from administrative functions to holistic staff development models. Masyhuri (2022) shows that an internal focus on learning and project-based approaches shape the ability to adapt in the face of transnational pressure. Shakharova et al. (2025) reveal a relationship between the coherence of HR configurations and macro-level outcomes: sectors with a developed HR architecture demonstrate a higher contribution to employment and gross value added. These studies confirm that the M1 model, based on a functional project structure, multifunctional units, and a focus on personnel development, ensures high performance in both organizational and economic dimensions.

The other three models - agricultural (M2), digital-creative (M3), and industrial-hierarchical (M4) - demonstrated partial significance. Model M2 showed a stable relationship with the employment level ($p = 0.007$) but a weak one with GDP ($p = 0.128$), indicating its labor-intensive but low-productivity nature. This relationship is confirmed by the findings of Shakharova et al. (2025), who focus on the imbalance of labor resources in agricultural sectors. Model M3 was significant for gross value added ($p < .001$) but not for employment ($p = .120$), indicating limited HR engagement with a high share of intangible assets, an effect confirmed by Latukha and Malko (2019), which found weak institutional integration of flexible HR practices. In contrast, Model M4 was significant for employment ($p = .015$) but not for GDP ($p = .399$), which may indicate a high administrative burden with limited productive output. These results are consistent with Nurbekova's (2020) observations on the institutional rigidity of government structures and with Górecki et al.'s (2022) findings on the

negative impact of vertical management models on innovative adaptation. Thus, models M3 and M4, which showed significance only for one of the parameters, can be classified as configurations with limited integration potential. At the same time, model M2 is a resource-dependent structure with high personnel involvement but limited economic efficiency.

6. CONCLUSIONS

The analysis confirmed a stable relationship between the types of management configurations and two key macroeconomic indicators - gross value added and employment. All four models showed significant relationships, but the greatest expression and stability of results were recorded in the configuration focused on personnel development in education. This model demonstrated high efficiency in both economic and social directions, which allows us to consider it a systemic example of institutionally coordinated human resource management.

The remaining models – agrarian, digital-creative, and industrial-hierarchical showed effectiveness in only one of the parameters. The agricultural sector model demonstrated a strong connection with employment with limited profitability, while the digital-creative model ensured an economic contribution with weak personnel participation. The hierarchical-industrial configuration was limited in both indicators, indicating institutional inertia and weak adaptability in the context of transformation. The differences confirmed that the structure of departments, the degree of functional integration, and the type of management logic determine the internal efficiency and the macroeconomic return of HR systems. The transition from vertical models to hybrid functional-project configurations is significant, especially in sectors with a high potential for intangible capital. The methodological substantiation of the analysis through a comparison of models made it possible to record the uneven influence of various HR architectures on socioeconomic indicators. The results of the study can be used to develop recommendations in the field of institutional modernization of HR policy, primarily in the higher education system and sectors with high social involvement. The findings make it possible to formulate structural guidelines for the transition to effective, adaptive, and sustainable models of human resource management in the context of the national economy.

AUTHOR CONTRIBUTION

Writing – original draft: Galiya M. Mazhieva.
Conceptualization: Meruyert A. Kanabekova, Gaukhar A. Taspenova, Galiya M. Mazhieva.
Formal analysis and investigation: Meruyert A. Kanabekova.Galiya M. Mazhieva.
Funding acquisition and research administration: Meruyert A. Kanabekova.Galiya M. Mazhieva.
Development of research methodology: Meruyert A. Kanabekova, Gaukhar A. Taspenova.
Resources: Gaukhar A. Taspenova, Sharbat A. Igenbayeva, Kuralai Zh. Demeuova.
Software and supervisions: Galiya M. Mazhieva.
Data collection, analysis and interpretation: Sharbat A. Igenbayeva, Kuralai Zh. Demeuova.
Visualization: Galiya M. Mazhieva, Sharbat A. Igenbayeva, Kuralai Zh. Demeuova.
Writing review and editing research: Meruyert A. Kanabekova, Gaukhar A. Taspenova, Galiya M. Mazhieva.

References

Armstrong, M. (2009). *Armstrong's handbook of human resource management practice* (11th ed.). Kogan Page. Retrieved from https://e-uczelnia.uek.krakow.pl

Avdelidou-Fischer, N. (2006). The relationship between organizational structures and performance: the case of the fortune 500. In Value Creation in Multinational Enterprise, International Finance Review, 7, 169-206. Emerald Group Publishing Limited. https://doi.org/10.1016/S1569-3767(06)07008-7

Ben-Ner, A., & Ren, T. (2013). Comparing workplace organization design based on form of ownership: Nonprofit, for-profit, and local government. *Nonprofit and Voluntary Sector Quarterly, 44*(2), 340-359. https://doi.org/10.1177/0899764013512422

Blake, R. R., & Mouton, J. S. (1981). Management by Grid® principles or situationalism: Which? Group & Organization Studies, 6(4), 439-455. https://doi.org/10.1177/105960118100600404

Blom, R., Kruyen, P. M., Van Thiel, S., & Van der Heijden, B. I. (2021). HRM philosophies and policies in semi-autonomous agencies: Identification of important contextual factors. The International Journal of Human Resource Management, 32(18), 3862-3887. https://doi.org/10.1080/09585192.2019.1640768

Brewster, C. (2017). Human resource practices in multinational companies. The Blackwell Handbook of Cross-Cultural Management, 126-141. https://doi.org/10.1002/9781405164030.ch7

Burton, R. M., Obel, B., & Håkonsson, D. D. (2015). Organizational Design: A Step-by-Step Approach (2nd ed.). *Cambridge University Press*. Retrieved from https://assets.cambridge.org/97805216/17338/copyright/9780521617338_copyright.pdf

Child, J. (2005). Organization: Contemporary Principles and Practice. Wiley.

Cregan, C., Kulik, C. T., Johnston, S., & Bartram, T. (2021). The influence of calculative ("hard") and collaborative ("soft") HRM on the layoff-performance relationship in high performance workplaces. *Human Resource Management Journal, 31*(1), 202-224. https://doi.org/10.1111/1748-8583.12291

Cuypers, I. R., Ertug, G., Cantwell, J., Zaheer, A., & Kilduff, M. (2020). Making connections: Social networks in international business. *Journal of international business studies, 51*, 714-736. https://doi.org/10.1057/s41267-020-00319-9

Daft, R. L. (2012). *Organization Theory and Design* (11th ed.). Cengage Learning.

Dalton, K., & Druker, J. (2012). Transferring HR concepts and practices within multi-national corporations in Romania: The management experience. European Management Journal, 30(6), 588-602. https://doi.org/10.1016/j.emj.2011.12.003

Dessler, G., Cole, N. D., & Chhinzer, N. (2015). *Management of human resources: The essentials* (4th ed.). Pearson Education Canada.

Diani, R. D., Hamida, H., & Sudiarditha, I. K. R. (2024). The Role of Human Resources in Human Capital Management. *Siber Journal of Advanced Multidisciplinary, 2*(1), 145-160. https://doi.org/10.38035/sjam.v2i1.145

Donaldson, L. (2001). The Contingency Theory of Organizations. Sage Publications. https://doi.org/10.4135/9781452229249

Englmaier, F., Foss, N. J., Knudsen, T., & Kretschmer, T. (2018). Organization design and firm heterogeneity: Towards an integrated research agenda for strategy. *Organization design,* 229-252. https://doi.org/10.1108/S0742-332220180000040008

Ferreira, M. P., Serra, F. A. R., & Pinto, C. S. F. (2014). Culture and Hofstede (1980) in international business studies: A bibliometric study in top management journals. REGE-Revista de Gestão, 21(3), 379-399. https://doi.org/10.5700/rege536

Galbraith, J. R. (2012). The evolution of enterprise organization designs. Journal of Organization Design, 1(2), 1-13. Retrieved from https://ssrn.com/abstract=2181930

Gooderham, P. N., Mayrhofer, W., & Brewster, C. (2019). A framework for comparative institutional research on HRM. *The international journal of human resource management, 30*(1), 5-30. https://doi.org/10.1504/EJIM.2007.014696

Górecki, J., Núñez-Cacho, P., & Rutkowska, M. (2022). Study on circular economy implementation propensity of construction companies in context of prevailing management styles. *Applied Sciences, 12*(8), 3991. https://doi.org/10.3390/app12083991

Hersey, P., & Blanchard, K. H. (1982). Grid® principles and situationalism: Both! A response to Blake and Mouton. *Group & Organization Studies, 7*(2), 207-210. https://doi.org/10.1177/105960118200700207

Hiltrop, J. M. (1996). The impact of human resource management on organisational performance: Theory and research. *European management journal, 14*(6), 628-637. https://doi.org/10.1016/S0263-2373(96)00059-X

Hofstede, G. (1984). Cultural dimensions in management and planning. *Asia Pacific journal of management, 1,* 81-99. https://doi.org/10.1007/BF01733682
Hofstede, G. (1993). Cultural constraints in management theories. *Academy of Management Perspectives, 7*(1), 81-94. https://doi.org/10.5465/ame.1993.9409142061
Robbins, S. P., & Judge, T. A. (2019). *Organizational Behavior* (18th ed.). Pearson.
Kamoche, K. (1996). Strategic human resource management within a resource-capability view of the firm. *Journal of Management studies, 33*(2), 213-233. https://doi.org/10.1111/j.1467-6486.1996.tb00158.x
Oyler, J. D., & Golden Pryor, M. (2009). Workplace diversity in the United States: the perspective of Peter Drucker. *Journal of Management History, 15*(4), 420-451. https://doi.org/10.1108/17511340910987338
Saha, A., Ali, A. I., Tasrif, A. A., & Khan, N. A. (2025). The Impact of Human Capital on Labor Productivity and Income: An Analytical Study of Education, Skills, and Workforce Attributes. Pacific Journal of Business Innovation and Strategy, 2(1), 34-38. https://doi.org/10.70818/pjbis.2025.v02i01.026
Sarwar, A., Khan, M. A., Sarwar, Z., & Khan, W. (2021). Financial development, human capital and its impact on economic growth of emerging countries. *Asian Journal of Economics and Banking, 5*(1), 86-100. https://doi.org/10.1108/AJEB-06-2020-0015
Seitova, D. (2016). Perspectives on the Present State and Future of Higher Education Faculty Development in Kazakhstan: Implications for National Human Resource Development. *International Journal of Environmental and Science Education, 11*(18), 11081-11096. Retrieved from https://eric.ed.gov/?id=EJ1120637
Shakharova A., Bashu, Z., Ybyraiym, N., & Kanapina, A. (2025). Evaluation of the effectiveness of utilizing national human resources of the republic of Kazakhstan in the context of socio-economic development. *Statistics, Accounting and Audit, 1*(96), 19–31. https://doi.org/10.51579/1563-2415.2025.-1.02
Sheehan, M., & Sparrow, P. (2012). Introduction: Global human resource management and economic change: A multiple level of analysis research agenda. *The International Journal of Human Resource Management, 23*(12), 2393-2403. https://doi.org/10.1080/09585192.2012.668382
Sparrow, P., Schuler, R. S., & Jackson, S. E. (1994). Convergence or divergence: human resource practices and policies for competitive advantage worldwide. *International Journal of Human Resource Management, 5*(2), 267-299. https://doi.org/10.1080/09585199400000019
Storey, J. (1996). From personnel management to HRM: The implications for teaching. *ASIA Pacific journal of human resources, 33*(3), 4-14. https://doi.org/10.1177/103841119603300302
Strauss, G. (2001). HRM in the USA: correcting some British impressions. *International Journal of Human resource management, 12*(6), 873-897. https://doi.org/10.1080/09585190122941
Kroon, B., & Paauwe, J. (2022). HRM in 21st century small organizations: a midrange typology to describe, contrast and contextualize the phenomenon. *The International Journal of Human Resource Management, 33*(16), 3224-3251. https://doi.org/10.1080/09585192.2021.1915359
Latukha, M., & Malko, K. (2019). Westernization or localization of human resource management practices in CIS countries? Evidence from Kazakh firms. *International Journal of Emerging Markets, 14*(3), 385-409. https://doi.org/10.1108/IJOEM-05-2016-0122
Legge, K. (1989). Information technology: personnel management's lost opportunity? *Personnel Review, 18*(5), 2-61. https://doi.org/10.1108/EUM0000000000774
Lunenburg, F. C. (2012). Organizational structure: Mintzberg's framework. *International journal of scholarly, academic, intellectual diversity, 14*(1), 1-8. Retrieved from http://www.nationalforum.com/Electronic%20Journal%20Volumes/Lunenburg,%20Fred%20C.%20Organizational%20Structure%20%20Mintzberg%20Framework%20IJSAID%20V14%20N1%202012.pdf
Lunenburg, F. C. (2017). Organizational Structure and Design. *Journal of Educational Leadership and Policy Studies, 1*(1), 21-43. Retrieved from https://eric.ed.gov/?id=EJ1226963
Martela, F. (2019). What makes self-managing organizations novel? Comparing how Weberian bureaucracy, Mintzberg's adhocracy, and self-organizing solve six fundamental problems of organizing. *Journal of Organization Design, 8*(1), 1-23. https://doi.org/10.1186/s41469-019-0062-9

Masyhuri, M. (2022). HRM comparative performance and practices within MNCs' subsidiaries in Kazakhstan. *Eurasian Journal of Economic and Business Studies, 63*(1), 31-61. https://doi.org/10.47703/ejebs.v1i63.71

Medlin, C. J. (2012). Peter Drucker's ontology: understanding business relationships and networks. *Journal of Business & Industrial Marketing, 27*(7), 513-520. https://doi.org/10.1108/08858621211257275

Mintzberg, H. (1979). The Structuring of Organizations: A Synthesis of the Research. Prentice-Hall. Retrieved from https://www.nrc.gov/docs/ML0907/ML090710600.pdf

Mueller, F. (1996). Human resources as strategic assets: an evolutionary resource-based theory. *Journal of Management studies, 33*(6), 757-785. https://doi.org/10.1111/j.1467-6486.1996.tb00171.x

Nurbekova, R. (2020). HRM in public sector in Kazakhstan. BULLETIN of Ablai Khan KazUIRandWL *Series "International Relations and Regional Studies", 42*(4). https://doi.org/10.48371/ISMO.2020.%2042.4.007

Vîrjan, D., Manole, A. M., Stanef-Puică, M. R., Chenic, A. S., Papuc, C. M., Huru, D., & Bănacu, C. S. (2023). Competitiveness—the engine that boosts economic growth and revives the economy. *Frontiers in Environmental Science, 11*, 1130173. https://doi.org/10.3389/fenvs.2023.1130173

White, L., Lockett, A., Currie, G., & Hayton, J. (2021). Hybrid context, management practices and organizational performance: A configurational approach. *Journal of Management Studies, 58*(3), 718-748. https://doi.org/10.1111/joms.12609

AUTHOR BIOGRAPHIES

Meruyert A. Kanabekova – Cand. Sc. (Econ.), Associate Professor, Kazakh National Pedagogical University named after Abai, Sorbonne Institute-Kazakhstan, Almaty, Kazakhstan. Email: kma.2372@mail.ru, ORCID ID: https://orcid.org/0000-0003-2392-0136

Gaukhar A. Taspenova – Cand. Sc. (Econ.), Professor, Narxoz University, Almaty, Kazakhstan. Email: Gaukhar.taspenova@narxoz.kz, ORCID ID: https://orcid.org/0000-0002-6853-0142

***Galiya M. Mazhieva** – PhD student, NARXOZ University, Almaty, Kazakhstan. Email: gmazhieva@mail.ru, ORCID ID: https://orcid.org/0009-0006-9595-043X

Sharbat A. Igenbayeva – M. Sc. (Econ.), Assistant Teacher, ALT University named after Mukhamedzhan Tynyshpayev, Almaty, Kazakhstan. Email: Sharbat89@mail.ru, ORCID ID: https://orcid.org/0009-0007-8182-7753

Kuralai Zh. Demeuova – M. Sc. (Econ.), Senior Lecturer, ALT University named after Mukhamedzhan Tynyshpayev, Almaty Region, Kazakhstan. Email: k.d.zh@mail.ru, ORCID ID: https://orcid.org/0000-0002-7114-7574

Appendix 1

Frequencies by organizational characteristics (%)

Code	Variable	%
A1	Services and Consulting	50.0
A2	Production and Distribution	11.5
A3	Trade and Retail	15.4
A4	Construction and Infrastructure	7.7
A5	Resource Extraction	15.4
B1	Hierarchical Structure	34.6
B2	Line-Functional Structure	26.9
B3	Functional Structure	11.5
B4	Functional-Project Structure	15.4
B5	Horizontal Structure	3.8
B6	Alternative Structure	7.7
C1	Marketing/Sales	11.5
C2	Finance/Accounting	23.1
C3	HR/Admin	7.7
C4	IT/Technical	11.5
C5	Production/Logistics	34.6
C6	Legal	3.8
C7	Multifunctional	7.7
D1	KPI and Specialization	11.5
D2	Project Teams	19.2
D3	Regulated Hierarchy	23.1
D4	Collective Decisions	3.8
D5	Client Orientation	15.4
D6	Innovation and HR Dev	11.5
D7	Safety and Compliance	11.5
D8	Flexibility	3.8

Received on: 01 February 2025 Revised on: 22 March 2025 Published: 30 March 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.503

Economics of Water Supply and Household Behavior: the Transition from Self-Supply to Centralized Systems

Askar A. Adamov[1] | **Aybota M. Rakhmetova**[2] | **Ainur Zh. Sugurova**[3]* | **Gulnara B. Tuleshova**[4] | **Raushan B. Azbergenova**[5]

[1] Karaganda University of Kazpotrebsoyuz, Karaganda, Kazakhstan
[2] Center for Research, Analysis and Evaluation of Effectiveness, Astana, Kazakhstan
[3] ALT University named after Mukhamedzhan Tynyshpayev, Almaty, Kazakhstan
[4] Zhetysu University named after I.Zhansugurov, Taldykorgan, Kazakhstan
[5] Kazakh National Pedagogical University named after Abay, Almaty, Kazakhstan

Corresponding author:
*Ainur Zh. Sugurova – Cand. Sc. (Econ.), Assistant Professor. ALT University named after Mukhamedzhan Tynyshpayev, Almaty, Kazakhstan.
Email: a.sugurova@mail.ru

How to cite this article:
Adamov, A.A., Rakhmetova, A.M., Sugurova, A.Zh., Tuleshova, G.B. & Azbergenova, R.B. (2025). Economics of Water Supply and Household Behavior: the Transition from Self-Supply to Centralized Systems. Eurasian Journal of Economic and Business Studies, 69(1), 128-140.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

Access to clean and safe water remains a critical determinant of public health, quality of life, and socio-economic resilience, particularly in emerging economies with unequal infrastructure development. This study aims to identify the key factors that determine consumer behaviour in the water supply sector, taking into account water quality and the level of infrastructure coverage from 2013 to 2023. The research integrates behavioral, infrastructural, and environmental dimensions to understand how access to water infrastructure and source quality influence consumption patterns. Using a mixed-method design, the study combines streamgraph visualization, correlation matrix analysis, and multiple linear regression modeling based on five indicators: quality of centralized water (DW_C), groundwater (DW_G), population connected to centralized systems (AC_P), per capita consumption (WC_PC), and the self-supply population (SA_NP). The results reveal a strong positive correlation between access to centralized systems and per capita water consumption ($r = 0.901$, $p < 0.001$). At the same time, higher groundwater contamination is associated with greater reliance on self-supply ($r = –0.824$, $p = 0.002$). The regression model confirms the significant influence of centralized water quality ($\beta = –0.2679$, $p = 0.023$) and consumption behavior ($\beta = –0.1506$, $p = 0.087$) on reducing the prevalence of self-supply. Visual analysis via Arc Diagrams reveals structural links between infrastructural expansion and behavioral change, suggesting that improved access and sanitary standards influence household preferences. The results highlighted the importance of targeted investments and effective governance mechanisms in reducing dependence on unsafe self-supply, particularly in Kazakhstan's regional disparities, especially in rural areas.

KEYWORDS: Water Supply Systems, Water Quality, Water Management, Consumer Behavior, Economic Efficiency, Economic Development

SCSTI: 06.71.59

JEL Code: Q25; Q35; O13

FINANCIAL SUPPORT: This study was not sponsored.

1. INTRODUCTION

Access to clean and safe water is the basis for sustainable development, public health, and social justice. Against the backdrop of climate change, population growth, and rapid urbanization, the water supply issue has become a priority for many countries. According to the Food and Agriculture Organization of the United Nations, more than two billion people live in regions with high levels of water stress, and the shortage of drinking water is one of the most pressing global challenges (FAO, 2006). Solving this problem requires a comprehensive approach that includes assessing the availability, quality, reliability, and affordability of water resources.

In global practice, two main types of water supply have emerged: centralized and decentralized. State or municipal structures typically manage centralized systems and include extensive infrastructure facilities, such as treatment plants, main pipelines, and reservoirs. Such systems function most effectively in conditions of high population density and provide a stable water supply in cities (Sapkota et al., 2014). In contrast, decentralized solutions rely on individual sources, including boreholes, rainwater collection, and household filtration systems. These models are typically used in rural and remote areas where the construction of centralized networks is limited by financial or geographical factors (Arora et al., 2015).

In countries with heterogeneous infrastructure and uneven development of territories, such as Kazakhstan, the issue of rational water resource distribution becomes particularly relevant. An arid climate characterizes a significant part of the country's territory, and its water resources are unevenly distributed. In rural areas, many people still rely on private water sources, including untreated boreholes and open water bodies. The lack of quality control in such conditions increases sanitary risks and reduces the overall sustainability of the water supply. At the same time, active urban growth increases the pressure on existing infrastructure and requires new approaches to water system management.

Household water use behavior in Kazakhstan is influenced by physical access to the centralized network and perceptions of the reliability and quality of services provided. The transition from individual water supply to connection to centralized systems depends on several factors, including the sanitary condition of water, the level of infrastructure coverage, and the volumes of actual consumption. In the context of territorial heterogeneity and institutional constraints, a more in-depth assessment of water-use structure and the factors influencing the population's choice of water source is necessary.

This study aims to investigate the impact of sanitary water quality, the level of connection to centralized systems, and individual consumption volumes on the degree of household dependence on self-sufficiency in water in Kazakhstan. The analysis aims to investigate the interaction between infrastructure capabilities, environmental characteristics, and the everyday practices of the population, enabling more informed and balanced management decisions that consider regional differences.

2. LITERATURE REVIEW

Several studies have highlighted the negative impacts of water scarcity, particularly in water-stressed countries. In particular, it has been demonstrated that a lack of access to safe water has a profound impact on health, human development, and socioeconomic status. Improved water supply and sanitation are recognized as crucial to reducing mortality and enhancing health, particularly among children (Tarrass & Benjelloun, 2011; Zhang, 2012). Hutton and Chase (2016) note that investments in water infrastructure can significantly improve public health, reduce health care costs, and increase economic well-being. Access to safe water and improved sanitation are thus integral to achieving the Sustainable Development Goals, including reducing poverty and improving quality of life.

Additionally, water supply improvements impact labor productivity and economic growth, particularly in agriculture (Meeks, 2017). Continuous monitoring of drinking water quality is crucial for enhancing public health and necessitates the development of effective health protection strategies, particularly in countries vulnerable to frequent natural disasters (Li & Wu, 2019). Water disasters such as floods and droughts increase epidemiological risks, with poor and marginalized populations being the most vulnerable (Lee et al., 2020). Zhang et al. (2020) emphasize that water scarcity and poor water management can hinder the development of countries, resulting in economic and social consequences, particularly in the absence of innovative solutions and improved water management. Water crises can lead to social and economic problems, including poverty, migration, and deterioration of living conditions (Israilova et al., 2023). In this regard, water management should consider not only economic but also social factors to minimize negative impacts and increase resilience to water crises.

Some studies focus on water management strategies, including infrastructure planning, policy measures, legal barriers, and innovative approaches to water supply and sanitation. Kayser et al. (2013) proposed a system of indicators for assessing water services across different countries and concluded that the lack of an integrated approach to evaluating water supply can lead to an underestimation of problems and inefficient resource allocation. Thus, a system of indicators reflecting all aspects of water supply helps to effectively plan and manage water resources, improving access to safe water and reducing health risks. Socioeconomic aspects, including living standards and social inclusion of the population, as well as effective policy and governance, are crucial for successful water supply planning. Asefa et al. (2014) emphasized that to ensure a sustainable water supply, it is necessary to consider a complex set of factors, including the social and economic needs of the population, as well as to develop effective political and management strategies. Increasing the water supply can stimulate economic growth, but it is also necessary to consider environmental impacts, such as deterioration of water quality. Therefore, for balanced growth, it is necessary to apply a strategic approach that takes into account not only economic but also environmental aspects (Ke et al., 2016). Fletcher et al. (2017) emphasized that for water supply sustainability, it is essential to develop flexible infrastructure that can adapt to future changes in water system design, thereby reducing capital costs and enhancing resilience to unpredictable fluctuations in water resources. Cipolletta et al. (2021) emphasized the significance of small-scale water supply systems as local, decentralized infrastructure that provides water supply and sanitation on a smaller scale, most often in rural or remote areas. However, small-scale water supply systems, despite significant potential to address water scarcity issues, face legislative barriers. On the contrary, Makanda et al. (2022) emphasized the conservation of natural resources and the importance of protecting aquatic ecosystems, including groundwater and surface water, for sustainable water management. More attention should be paid to the protection of aquatic ecosystems and the prevention of pollution, which implies a more traditional and centralized approach to managing water resources. Zhang and Oki (2023) recommend revising water pricing policies as an essential part of sustainable water resources management. Current water prices do not accurately reflect the actual cost of water resources and fail to create sufficient incentives for efficient water use, particularly in water-intensive sectors like agriculture. Revising water prices can be a crucial tool for improving water efficiency, reducing the inefficient use of water resources, and encouraging the adoption of technologies that reduce water consumption. Thus, the introduction of economic instruments to ensure the sustainability of water resources, especially in agricultural areas where water is the primary resource for production, is significant. Thus, countries with large

territories and high water needs can focus on economic instruments, such as water pricing, to encourage the rational use of water resources. In contrast, countries with smaller volumes of water resources and more controlled systems can focus on environmental and innovative solutions that are more adapted to the specifics of the water supply and ecosystem.

Different approaches to water resource management influence risk perception and decision-making about water supply. The culture of water supply management in different regions has a significant impact on the choice of water sources, particularly in areas with insufficient centralized water supply. Koehler et al. (2018) identified that effective water resource management requires considering the cultural characteristics of local communities, as well as developing governance models that account for the risks and values associated with water resources. Since water is not only a physical resource but also a social one, access to it depends on the country's political and economic situation. Gunda et al. (2019) emphasized that water security requires the integration of environmental, economic, and social factors. Therefore, an integrated approach to water resource management is crucial, which should consider not only the physical availability of water but also the ability of society to manage this resource effectively. In rural and remote areas, where centralized water supplies are either absent or underdeveloped, self-sufficiency in water is paramount. However, legal and institutional recognition of self-sufficiency as a crucial component of water supply is necessary. However, Grönwall and Danert (2020) noted that such systems face risks related to water quality, pollution, and inadequate monitoring. Successful community water systems depend on local ownership, funding, and technical expertise. This means that the long-term sustainability of such systems requires active participation of residents and continuous external support, including training and financial resources (Machado et al., 2022). Despite the availability of centralized water supply, many households continue to use private water sources, such as wells and groundwater, due to concerns about the quality of centralized water and the system's unreliability. Genter et al. (2022) note that to ensure the sustainability of urban water supply, both centralized and decentralized systems need to be considered, supporting their complementarity.

The issue of access to drinking water in rural areas of Kazakhstan has been accompanied by institutional and infrastructural imbalances over the past decades. Tussupova et al. (2016) recorded a high level of willingness of rural households to connect to the centralized system. Low coverage and inadequate sanitation infrastructure made such connections ineffective. As a result, the physical presence of the network does not ensure its daily use. Following this, Karatayev et al. (2017) drew attention to the strategic priorities of water policy, in which technical expansion prevailed over institutional flexibility, which limited the adaptation of systems to the behavioral practices of the population. Thus, weak institutional coherence became a barrier between project goals and real conditions. This gap was further confirmed by Zhupankhan et al. (2018), who noted a misalignment between basin-level governance and existing regulatory mechanisms, especially in the limited participation of local users. The study by Issanova et al. (2018) introduced spatial differentiation, revealing that water resources and the degree of anthropogenic transformation of water basins were extremely uneven, which exacerbated differences in access between regions and undermined the universality of technical solutions. Against this background, Omarova et al. (2019) demonstrated that even with the formal availability of centralized water supply, a significant proportion of households continued to use alternative sources, which was explained not by habit but by doubts about water quality, supply instability, and high costs.

The institutional, regional, and behavioral contradictions identified in the literature indicate the need for a multidimensional approach to analyzing water use in Kazakhstan.

Despite the presence of centralized systems, the use remains selective, and self-sufficiency continues to play a significant role in households.

Existing studies have demonstrated a gap between technical water availability and actual consumption patterns; however, they have not integrated behavioral, sanitary, and infrastructural determinants of water source choice in a single empirical study. This study aims to fill this gap. The hypothesis is formulated: the level of water self-sufficiency is determined not only by the coverage of centralized water supply but also by the perceived water quality, system stability, and economic behavior of households, including the level of registered consumption.

3. METHODOLOGY

The study employed a combination of statistical analyses and visual assessments to investigate the relationship between access to water infrastructure, water source quality, and household consumption patterns in Kazakhstan. Data were collected from the Bureau of National Statistics of the Republic of Kazakhstan, covering the period from 2013 to 2023. The assessment followed a step-by-step structure, progressing from a graphical representation of variable linkages to a quantitative evaluation of interdependence, thereby ensuring internal consistency in testing the stated hypothesis.

At the first stage, descriptive trends were examined using a streamgraph visualization. This allowed for a comprehensive overview of five key indicators across eleven years. This dynamic assessment formed the empirical foundation for developing a hypothesis regarding the determinants of water consumption behavior. Specifically, it was posited that the volume of water consumed per capita (WC_PC) is not an isolated indicator, but is shaped by several interrelated factors: the extent of access to centralized water supply systems (AC_P), the proportion of the population relying on self-supply (SA_NP), and the quality of available water sources, including both groundwater (DW_G) and centralized supplies (DW_C). The observed temporal trends in these indicators suggested meaningful interdependencies that warranted further statistical validation.

The variables included in the analysis are presented in Table 1.

TABLE 1. Variables used in the analysis

No.	Indicator description	Code	Unit of measurement
1	Share of non-standard samples in centralized water	DW_C	% of tested water samples
2	Share of non-standard samples in groundwater	DW_G	% of tested water samples
3	The population is connected to a centralized supply	AC_P	Share of total population (%)
4	Water consumption per capita	WC_PC	Cubic meters per person/year
5	The population relying on self-supply	SA_NP	Million persons

Note: compiled by authors based on the Bureau of National Statistics (2024)

In particular, the consistent growth of WC_PC alongside increases in AC_P, and the simultaneous decline in SA_NP, indicated a potentially structured dynamic in the evolution of water access and use. The following specific hypotheses were proposed:

H1: Water consumption per capita (WC_PC) increases with a higher share of the population connected to a centralized water supply (AC_P).

H2: The prevalence of self-supply practices (SA_NP) decreases as AC_P increases and WC_PC rises.

H3: The use of self-supply is positively associated with the deterioration of groundwater quality (DW_G).

H4: The quality of centralized water (DW_C) has an inverse effect on reliance on self-supply (SA_NP).

H5: The sanitary quality of water sources (DW_C and DW_G) influences overall consumption behavior and the perceived reliability of supply systems.

All data were sourced from open-access publications of the Bureau of National Statistics of the Republic of Kazakhstan. The dataset was checked for completeness, and no missing values were detected during the observation period. Since all variables were expressed in compatible units and scales, no normalization or transformation procedures (e.g., logarithmization) were applied. The sample consisted of eleven annual observations (N = 11), which imposes certain limitations on generalizability and statistical power. Nonetheless, the dataset was deemed sufficient for identifying directional patterns and testing bivariate associations using correlation and regression techniques.

To formally test the proposed hypotheses, statistical procedures were conducted using IBM SPSS Statistics. Pearson correlation analysis was applied to assess the direction and strength of linear relationships between variables, followed by the estimation of a multiple linear regression model. In this specification, per capita water consumption (WC_PC) was treated as the dependent variable. In contrast, the share of population connected to centralized supply (AC_P), the size of the self-supplying population (SA_NP), groundwater quality (DW_G), and centralized water quality (DW_C) served as independent variables. Statistical significance was assessed at thresholds of $p < 0.05$ (statistically significant) and $p < 0.10$ (marginally significant). The regression model demonstrated strong explanatory power, with a coefficient of determination (R^2) of 0.894, indicating that approximately 89.4% of the variation in WC_PC was explained by the combined influence of the selected variables. Among them, the quality of centralized water (DW_C) demonstrated a statistically significant inverse relationship with the level of self-supply ($p = 0.023$). At the same time, the volume of consumption per capita (WC_PC) showed a marginal effect ($p = 0.087$). Other predictors did not reach the defined significance thresholds.

The analysis was based on an annual time series of eleven observations (N = 11), which imposes limitations on statistical inference. Adjusted R^2, residual diagnostics, and tests for outliers were not conducted due to the limited degrees of freedom. These methodological constraints should be taken into account when interpreting the results.

To enhance the interpretive depth of the analysis and capture relational patterns that may not be evident through numerical methods alone, the statistical procedures were supplemented with a visual structural component. Specifically, a structural visualization was constructed in the form of an Arc Diagram, which allowed for the mapping of aggregated connections between the selected indicators over the entire observation period. This technique offered insight into the relative intensity and configuration of inter-variable linkages, reflecting underlying behavioral or infrastructural dependencies. For example, the visualization revealed powerful associations between AC_P and WC_PC, suggesting that infrastructural expansion is systematically associated with shifts in consumption patterns. At the same time, the proximity between DW_G and SA_NP in the diagram highlighted the role of environmental quality in shaping reliance on self-supplied water sources.

Taken together, the integrated methodological design, combining statistical validation with relational visualization, facilitated the construction of a logically coherent and analytically layered framework for hypothesis testing. This approach enabled the detection of not only direct statistical associations but also latent structural dynamics, thereby facilitating a more comprehensive understanding of how water accessibility, quality, and usage intersect within the broader context of public well-being and infrastructure-driven development.

4. RESULTS AND DISCUSSION

Water supply and drinking water quality issues play a key role in ensuring sustainable development and public well-being. Assessing the relationships between the quality characteristics of water sources, consumption levels, and infrastructure availability allows us to identify hidden dependencies that require consideration in water resources policy. This section presents the results of a visual analysis that reflects both the dynamics of changes and the structure of internal relationships between the leading water indicators in Kazakhstan for the period 2013–2023.

Figure 1 presents a Streamgraph visualization showing the dynamics of five key indicators: centralized water quality (DW_C), groundwater (DW_G), proportion of population with access to public water supply (AC_P), per capita water consumption (WC_PC), and self-sufficiency (SA_NP).

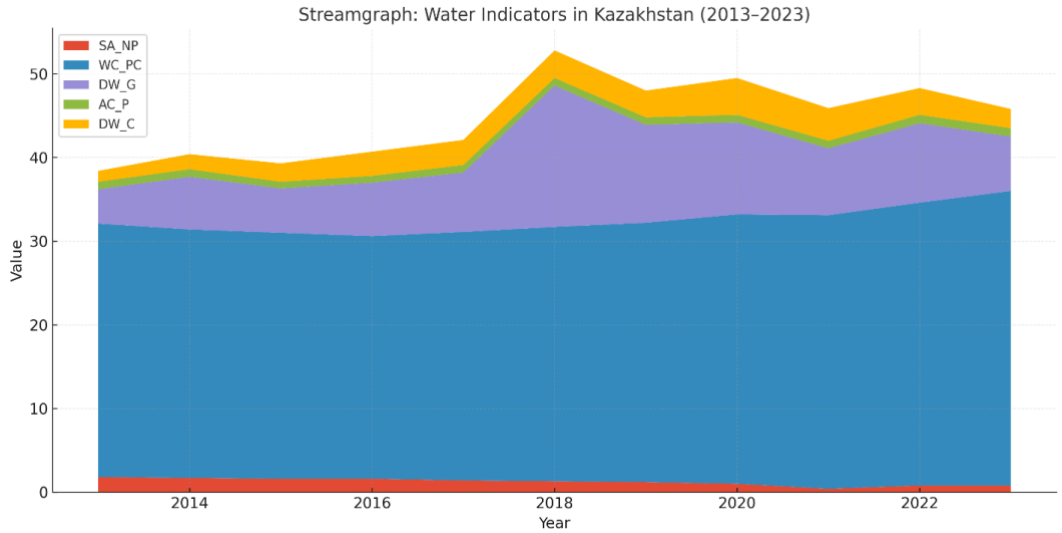

FIGURE 1. Dynamics of water indicators in Kazakhstan for 2013–2023 (Streamgraph)

The graph analysis reveals a steady increase in the WC_PC indicator, indicating a rise in individual water consumption. The peak of groundwater pollution (DW_G) in 2018 is especially pronounced, after which a gradual decrease is noted. The DW_C indicator remains stably low, which may indicate the relative quality of centralized water compared to groundwater sources. At the same time, SA_NP shows a steady decrease, which correlates with the growth of AC_P, indicating an expansion of municipal water supply coverage and a decrease in the share of the population using alternative sources.

Additional analytical insight into the relationships between water indicators is provided by the arc diagram, which visualises the directional relationships between variables based on aggregated data for the entire analysis period for 2013–2023 (Figure 2).

The most pronounced relationships are found between water consumption per capita (WC_PC) and the level of connection to public water supply (AC_P). Both indicators increased during the analyzed period: consumption increased from 30.3 cubic meters in 2013 to 35.2 cubic meters in 2023, while the share of the connected population increased from 89.4% to 96%. This relationship indicates the dependence of water use behavior on infrastructural conditions: the expansion of coverage by centralized systems is accompanied by an increase in consumption, which is directly related to the level of household comfort, sanitary safety, and, in a broader context, to the quality of life.

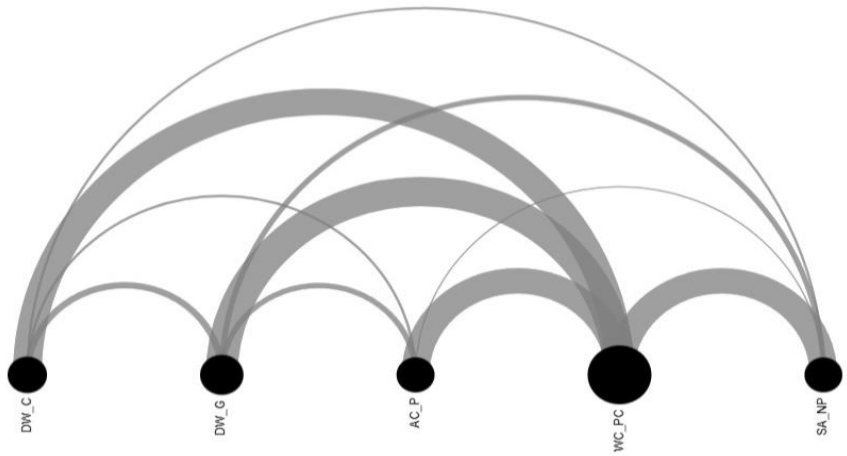

FIGURE 2. Structural relationships between water indicators (Arc Diagram)

A noticeable structural relationship exists between groundwater pollution (DW_G) and the level of self-sufficiency (SA_NP), emphasizing that the deterioration of alternative water sources can limit the possibility of a safe individual water supply. Thus, the level of groundwater pollution in 2018 reached a peak of 16.9%, which was accompanied by a decrease in self-sufficiency from 1.8 million people in 2013 to 0.8 million in 2023. This dynamic is especially relevant for rural areas, where centralized networks are underdeveloped, and access to high-quality water determines the basic conditions of life and health. Weak links with the participation of the quality of centralized water (DW_C), the values of which fluctuated between 1.3% and 4.4% of samples with deviations from standards, may indicate the stability of this indicator and, as a result, its limited impact on the population's behavior. Thus, the arc diagram reflects stable links between the indicators of access, quality, and nature of water consumption, which form the basis of infrastructural provision and sanitary well-being.

Further analysis includes a quantitative test of the relationships between variables based on the correlation matrix, which will clarify and statistically substantiate the identified visual patterns (Figure 3).

The results of the correlation analysis confirmed the key relationships between the variables previously visualized using the arc diagram. The highest and statistically significant correlation was found between water consumption per capita (WC_PC) and the level of connection to public water supply (AC_P), where the Pearson coefficient was $r = 0.901$ at a significance level of $p < 0.001$. Therefore, there is a clear relationship between the expansion of water supply infrastructure and the increase in individual consumption, which is visually reflected in the structure of the arc diagram through the most intense arc.

A strong inverse correlation is observed between self-sufficiency of the population with water (SA_NP) and the indicators AC_P ($r = -0.818$, $p = 0.002$) and WC_PC ($r = -0.824$, $p = 0.002$), which demonstrates the effect of crowding out alternative forms of water supply as centralized systems develop. The decrease in self-sufficiency is accompanied by an increase in the recorded volume of consumption, reflecting the transition to more reliable and stable water supply sources. Structurally, these relationships are presented in the arc diagram through close relationships between the corresponding variables.

The correlation between groundwater quality (DW_G) and centralized water quality (DW_C) also proved to be significant ($r =$

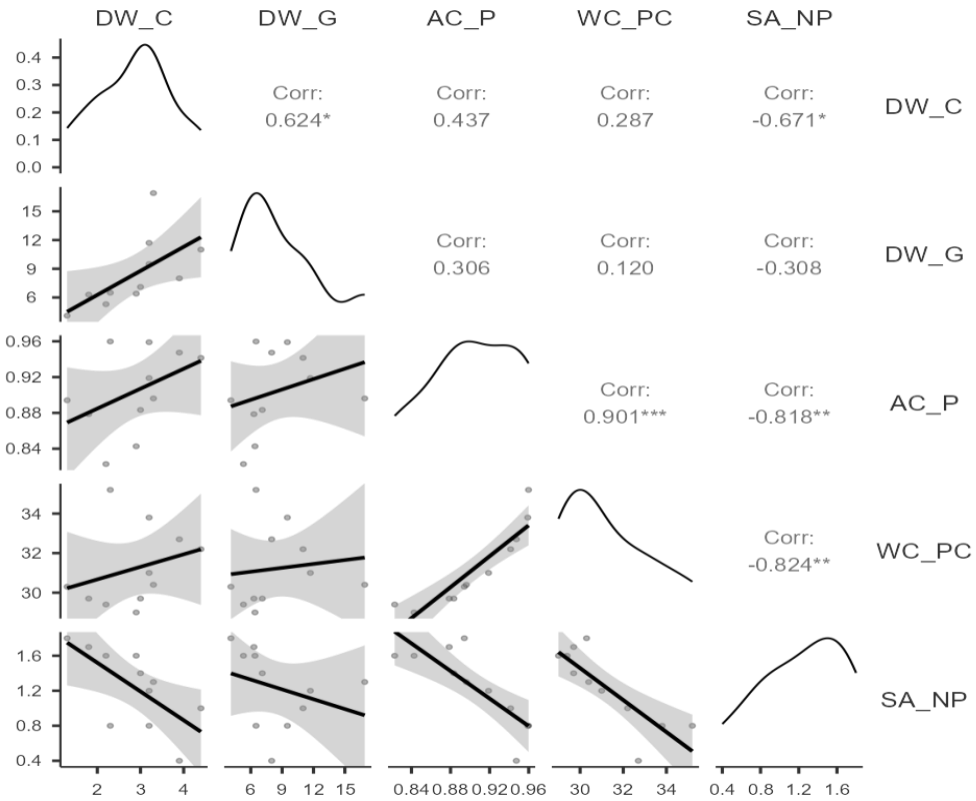

FIGURE 3. Correlation analysis matrix

0.624, p = 0.040), which may indicate the presence of common natural or technological factors influencing the state of water resources. At the same time, DW_G did not demonstrate a statistically significant relationship with consumption (WC_PC) or connection to infrastructure (AC_P), which indicates its indirect influence. At the same time, the negative correlation between DW_G and SA_NP according to the Spearman coefficient (ρ = -0.644, p = 0.033) indicates a decrease in the attractiveness of polluted groundwater sources as a means of self-sufficiency in water supply.

The centralized water quality indicator (DW_C) exhibits limited relationships with other variables, with a moderate correlation with DW_G and AC_P, but no significant relationships with WC_PC and SA_NP, which confirms its relative stability and weak influence on the behavioral aspects of water use. These findings are consistent with the structure of the arc diagram, where DW_C is presented on the periphery of the relationships.

The set of correlation results provides empirical support for confirming the hypothesis on the determination of water consumption per capita through a system of infrastructural, sanitary, and behavioral factors, reflecting the transformation of water use in the context of improving quality of life. The results of model evaluation, to validate the strength and reliability of the regression model, showed the following.

The coefficients R and R^2 indicate a high degree of model fit, with $R^2 = 0.894$ showing that the model successfully explains a substantial proportion of the variation in self-supply levels. This reinforces the idea that a combination of access to centralized water systems, self-supply practices, and the quality of available water sources indeed influences water consumption. To clarify the contribution of each independent indicator to the formation

of SA_NP values and to assess the statistical significance of the corresponding coefficients, the table below shows the results of model evaluation with standard errors, t-statistics, and p-values (Table 2).

TABLE 2. Model coefficients

Predictor	Estimate	SE	t	p
Intercept	6.5971	1.2855	5.13205	0.002
DW_C	-0.2679	0.0886	-3.02286	0.023
DW_G	0.0140	0.0216	0.65034	0.540
AC_P	-0.0126	0.024	-0.00371	0.997
WC_PC	-0.1506	0.0737	-2.04425	0.087

Note: compiled by authors

The most significant factor is the quality of centralized water (DW_C), with $\beta = -0.2679$ ($p = 0.023$), indicating an inverse relationship: as the proportion of samples with deviations from standards increases, the proportion of the population relying on self-sufficiency decreases. This may reflect mistrust of the centralized source as a trigger for returning to alternative forms of water supply or, conversely, the influence of stable quality of centralized water as a factor in abandoning individual systems. A significant but marginal factor in terms of significance is the volume of water consumption per capita (WC_PC), with $\beta = -0.1506$ ($p = 0.087$). The inverse relationship is interpreted as a consequence of the population's transition from unrecorded consumption within self-sufficiency to recorded consumption through centralized networks, consistent with the previously established negative correlations between SA_NP, WC_PC, and AC_P. The coefficients for groundwater quality (DW_G) and the level of connection to the centralized system (AC_P) were statistically insignificant. This may indicate a more complex, indirect relationship between these variables and population behavior or insufficient variability in the series of observations. The model confirmed the importance of the sanitary quality of centralized water and the volume of consumption as key factors influencing the prevalence of self-sufficiency in water. The results complement the findings made earlier during visual and correlation analysis and emphasize the importance of a comprehensive assessment of behavioral, infrastructural, and environmental determinants of water use.

From 2013 to 2023, Kazakhstan's annual per capita water consumption increased from 30.3 to 35.2 cubic meters per person. The dynamics reflect the effects of infrastructure expansion and changing water use patterns at the household level. The increase in consumption indicates a partial restoration of trust in centralized water supply systems, especially in rural and semi-rural areas where individual sources previously predominated. Expanded access has provided greater stability in meeting the population's sanitation and household needs, including cooking, personal hygiene, and home maintenance. Implementing state programs aimed at modernizing the utility sector has led to increased coverage; however, persistent inequalities in service quality across regions signal structural constraints.

Sanitary indicators of centralized water indicate an imbalance between physical access and the safety of the resources provided. In 2018, 16.9% of the water samples collected did not meet the established sanitary standards, despite ongoing system expansion. In 2020, annual water consumption reached a peak of 32.2 m^3 per person, coinciding with the highest consumption level during the study period. The discrepancy between infrastructure expansion and quality indicators indicates the inadequacy of the current control system, especially in non-urbanized areas. Households living in such areas continue to use alternative or backup sources, including wells, filtered bottled water, and seasonal deliveries. Using parallel water supply systems increases household expenses

and limits the potential of centralized networks to achieve sanitary safety. In large cities, where stable sanitary control indicators characterize centralized water supply systems, most of the population relies solely on the connected network. Comparison with international examples allows us to expand the assessment of systemic sustainability. In Germany and France, the daily water consumption level reaches 120-150 liters per person, reflecting the full institutional integration of water supply into daily life. In countries with a high rate of urbanization, such as India and Brazil, the average daily consumption level in large cities is 90-100 liters per person. Regardless of income and technical limitations, a stable relationship exists between the completeness of coverage and the rejection of individual sources. The total amount of water used in such systems becomes an indicator not only of redundancy but also of the trust and sustainability of distribution and regulation mechanisms. In Kazakhstan, the increase in water consumption is accompanied by institutional challenges. The lack of a unified approach to sanitary monitoring, limited coverage of high-quality services in non-urbanized areas, and inconsistencies in administrative mechanisms between levels of governance hinder further sector development. The results confirm the need to shift the emphasis from the physical expansion of infrastructure to ensuring the reliability, sanitary safety, and manageability of systems. The formation of an integrated model in which quality control, regulatory responsibility, and accessibility act in conjunction is a key condition for increasing the efficiency of water use and improving the quality of life of the population.

Thus, the study's results confirm the importance of investing in water supply infrastructure, as improving water quality and expanding access to centralized systems contribute not only to increased water consumption but also to an improvement in quality of life. The economic benefits of expanding water supply infrastructure include reduced health care costs, increased labor productivity, and improved social stability.

5. CONCLUSIONS

The analysis of the factors influencing water consumption and self-supply behaviors in Kazakhstan considered the infrastructure, water quality, and behavioral factors. Water consumption per capita is significantly affected by access to centralized water supply systems, the extent of self-supply, and the quality of groundwater and centralized water sources. The study reveals that improved water quality and increased access to infrastructure reduce reliance on self-supply, which is beneficial for public health and water safety.

The results align with similar trends observed in other countries. Countries with developed economies and increased access to centralized water supply systems tend to have higher per capita water consumption, reflecting improved living conditions and better public health standards. Conversely, limited access to water infrastructure forces the population to rely more on alternative water sources, often leading to higher health risks. The case of Kazakhstan mirrors these patterns, underscoring a critical need to expand and improve water infrastructure.

Further research should consider incorporating socio-economic factors, public awareness, and water pricing to provide a more specific analysis of water consumption behaviors. Additionally, qualitative methods, such as surveys or interviews with local communities, could offer valuable insights into how water access and quality issues are perceived at the household level.

AUTHOR CONTRIBUTION

Writing – original draft: Askar A. Adamov, Aybota M. Rakhmetova , Ainur Zh. Sugriva .
Conceptualization: Askar A. Adamov, Aybota M. Rakhmetova , Ainur Zh. Sugurova.
Formal analysis and investigation: Askar A. Adamov, Aybota M. Rakhmetova, Ainur Zh. Sugriva .

Funding acquisition and research administration: Askar A. Adamov, Ainur Zh. Sugriva.
Development of research methodology: Askar A. Adamov, Gulnara B. Tuleshova, Raushan B. Azbergenova.
Resources: Askar A. Adamov,Ainur Zh. Sugurova.
Software and supervisions: Askar A. Adamov,Ainur Zh. Sugurova.
Data collection, analysis and interpretation: Gulnara B. Tuleshova , Raushan B. Azbergenov .
Visualization: Askar A. Adamov.
Writing review and editing research: Gulnara B. Tuleshova, Raushan B. Azbergenova.

References

Asefa, T., Adams, A., & Kajtezovic-Blankenship, I. (2014). A tale of integrated regional water supply planning: Meshing socio-economic, policy, governance, and sustainability desires together. *Journal of hydrology*, *519*, 2632-2641. https://doi.org/10.1016/j.jhydrol.2014.05.047

Arora, M., Malano, H., Davidson, B., Nelson, R., & George, B. (2015). Interactions between centralized and decentralized water systems in urban context: A review. *Wiley Interdisciplinary Reviews: Water*, 2(6), 623-634. https://doi.org/10.1002/wat2.1099

Bureau of National Statistics. (2024). *Bureau of National Statistics of the Republic of Kazakhstan*. Retrieved May 21, 2025 from https://stat.gov.kz/en

Cipolletta, G., Ozbayram, E. G., Eusebi, A. L., Akyol, Ç., Malamis, S., Mino, E., & Fatone, F. (2021). Policy and legislative barriers to close water-related loops in innovative small water and wastewater systems in Europe: A critical analysis. *Journal of Cleaner Production*, *288*, 125604. https://doi.org/10.1016/j.jclepro.2020.125604

Fletcher, S. M., Miotti, M., Swaminathan, J., Klemun, M. M., Strzepek, K., & Siddiqi, A. (2017). Water supply infrastructure planning: Decision-making framework to classify multiple uncertainties and evaluate flexible design. *Journal of Water Resources Planning and Management*, *143*(10), 04017061. https://doi.org/10.1061/(ASCE)WR.1943-5452.0000823

Hutton, G., & Chase, C. (2016). The knowledge base for achieving the sustainable development goal targets on water supply, sanitation and hygiene. *International journal of environmental research and public health*, *13*(6), 536. https://doi.org/10.3390/ijerph13060536

Issanova, G., Jilili, R., Abuduwaili, J., Kaldybayev, A., Saparov, G., & Yongxiao, G. (2018). Water availability and state of water resources within water-economic basins in Kazakhstan. Paddy and water environment, 16, 183-191. https://doi.org/10.1007/s10333-018-0630-6

Israilova, E., Voronina, A., & Shatila, K. (2023). Impact of water scarcity on socio-economic development. In *E3S Web of Conferences*, 458, 08027. *EDP Sciences*. https://doi.org/10.1051/e3sconf/202345808027

Karatayev, M., Kapsalyamova, Z., Spankulova, L., Skakova, A., Movkebayeva, G., & Kongyrbay, A. (2017). Priorities and challenges for a sustainable management of water resources in Kazakhstan. *Sustainability of Water Quality and Ecology*, *9*, 115-135. https://doi.org/10.1016/j.swaqe.2017.09.002

Kayser, G. L., Moriarty, P., Fonseca, C., & Bartram, J. (2013). Domestic water service delivery indicators and frameworks for monitoring, evaluation, policy and planning: a review. *International journal of environmental research and public health*, *10*(10), 4812-4835. https://doi.org/10.3390/ijerph10104812

Ke, W., Sha, J., Yan, J., Zhang, G., & Wu, R. (2016). A multi-objective input–output linear model for water supply, economic growth and environmental planning in resource-based cities. *Sustainability*, *8*(2), 160. https://doi.org/10.3390/su8020160

Lee, J., Perera, D., Glickman, T., & Taing, L. (2020). Water-related disasters and their health impacts: A global review. *Progress in Disaster Science*, *8*, 100123. https://doi.org/10.1016/j.pdisas.2020.100123

Li, P., & Wu, J. (2019). Drinking water quality and public health. *Exposure and Health*, *11*(2), 73-79. https://doi.org/10.1007/s12403-019-00299-8

Makanda, K., Nzama, S., & Kanyerere, T. (2022). Assessing the role of water resources protection practice for sustainable water resources management: a review. *Water*, *14*(19), 3153. https://doi.org/10.3390/w14193153

Meeks, R. C. (2017). Water works: The economic impact of water infrastructure. *Journal of Human Resources*, *52*(4), 1119-1153. https://doi.org/10.3368/jhr.52.4.0915-7408R1

Omarova, A., Tussupova, K., Hjorth, P., Kalishev, M., & Dosmagambetova, R. (2019). Water supply challenges in rural areas: a case study from Central Kazakhstan. *International journal of environmental research and public health, 16*(5), 688. https://doi.org/10.3390/ijerph16050688

Sapkota, M., Arora, M., Malano, H., Moglia, M., Sharma, A., George, B., & Pamminger, F. (2014). An overview of hybrid water supply systems in the context of urban water management: Challenges and opportunities. *Water, 7*(1), 153-174. https://doi.org/10.3390/w7010153

Tarrass, F., & Benjelloun, M. (2011). The effects of water shortages on health and human development. *Perspectives in public health*, *132*(5), 240-244. https://doi.org/10.1177/1757913910391040

Tussupova, K., Hjorth, P., & Berndtsson, R. (2016). Access to drinking water and sanitation in rural Kazakhstan. *International Journal of Environmental Research and Public Health, 13*(11), 1115. https://doi.org/10.3390/ijerph13111115

Zhang, J. (2012). The impact of water quality on health: Evidence from the drinking water infrastructure program in rural China. *Journal of health economics*, *31*(1), 122-134. https://doi.org/10.1016/j.jhealeco.2011.08.008

Zhang, C. Y., & Oki, T. (2023). Water pricing reform for sustainable water resources management in China's agricultural sector. *Agricultural Water Management*, *275*, 108045. https://doi.org/10.1016/j.agwat.2022.108045

Zhang, D., Sial, M. S., Ahmad, N., Filipe, A. J., Thu, P. A., Zia-Ud-Din, M., & Caleiro, A. B. (2020). Water scarcity and sustainability in an emerging economy: a management perspective for future. *Sustainability*, *13*(1), 144. https://doi.org/10.3390/su13010144

Zhupankhan, A., Tussupova, K., & Berndtsson, R. (2018). Water in Kazakhstan, a key in Central Asian water management. Hydrological Sciences Journal, 63(5), 752-762. https://doi.org/10.1080/02626667.2018.1447111

Food and Agriculture Organization. (2006). *Water: A shared responsibility* (UNESCO-WWAP, ed.). United Nations. Retrieved May 21, 2025 from https://www.fao.org/4/y2006e/y2006e0f.htm

WWT2. (2021). Centralized and decentralized systems of water and sanitation. SSWM University Course. Retrieved May 21, 2025 from https://sswm.info/sswm-university-course/module-2-centralised-and-decentralised-systems-water-and-sanitation

AUTHOR BIOGRAPHIES

Askar A. Adamov – PhD student, Karaganda University of Kazpotrebsoyuz, Karaganda, Kazakhstan. Email: askar.adamov@bk.ru, ORCID ID: https://orcid.org/0009-0008-5425-3376

Aybota M. Rakhmetova – Doc. Sc. (Econ.), Professor, Center for Research, Analysis and Evaluation of Effectiveness, Astana, Kazakhstan. Email: aibota@mail.ru, ORCID ID: https://orcid.org/0000-0002-8741-0373

***Ainur Zh. Sugurova** – Cand. Sc. (Econ.), Assistant Professor, ALT University named after Mukhamedzhan Tynyshpayev, Almaty, Kazakhstan. Email: a.sugurova@mail.ru, ORCID ID: https://orcid.org/0000-0002-9007-1923

Gulnara B. Tuleshova – Cand. Sc. (Econ.), Zhetysu University named after I. Zhansugurov, Taldykorgan, Kazakhstan. Email: tuleshova_04@mail.ru, ORCID ID: https://orcid.org/0009-0001-4717-0969

Raushan B. Azbergenova – Cand. Sc. (Econ.), Associate Professor, Kazakh National Pedagogical University named after Abay, Institute Sorbonne-Kazakhstan, Almaty, Kazakhstan. Email: azbergenova@bk.ru, ORCID ID: https://orcid.org/0000-0003-3721-7361

Received on: 24 April 2025 Revised on: 29 May 2025 Published: 30 June 2025

RESEARCH ARTICLE
DOI: 10.47703/ejebs.v69i2.508

Analysis of Employment Policy Effectiveness in Kazakhstan: Regional Clustering Approach

Baglan M. Aliyeva[1] | **Liya R. Mukhamedyarova**[2*] | **Bayansulu A. Markhayeva**[3] | **Elmira O. Telagussova**[4] | **Yerkebulan Zh. Ydyrys**[5]

[1] Al-Farabi Kazakh National University, Almaty, Kazakhstan
[2] L.N. Gumilyov Eurasian National University, Astana, Kazakhstan
[3] Caspian Public University, Almaty, Kazakhstan
[4] Abai Kazakh National Pedagogical University, Almaty, Kazakhstan
[5] Korkyt Ata Kyzylorda University, Kyzylorda, Kazakhstan

Corresponding author:
*Liya R. Mukhamedyarova – PhD student, L.N. Gumilyov Eurasian National University, Astana, Kazakhstan.
Email: idrissova.ar@gmail.com

How to cite this article:
Aliyeva, B.M., Mukhamedyarova, L.R., Markhayeva, B.A., Telagussova, E.O. & Ydyrys, Y. Zh. (2025). Analysis of Employment Policy Effectiveness in Kazakhstan: Regional Clustering Approach. Eurasian Journal of Economic and Business Studies, 69(2), 141-157.

Conflict of interest:
author(s) declare that there is no conflict of interest.

ABSTRACT

Effective evaluation of public employment programs in transition economies requires analytical frameworks that can address institutional complexity, spatial disparities, and inconsistent performance monitoring. The purpose of this article is to conduct a state audit of the implementation of the "Enbek" employment program in Kazakhstan from 2017 to 2021, taking into account both spatial and institutional aspects. The study employs a combination of pre- and post-analysis, regional comparative assessment, hierarchical clustering, and benchmarking against official unemployment targets to assess policy coherence and execution. The empirical base comprises panel data from 17 regions of Kazakhstan, covering the period from 2014 to 2024. The results demonstrate the achievement of the national target for the unemployment rate (<4.8%) and a decrease in the share of informal employment from 25% to 12.5%. However, pronounced regional imbalances and institutional constraints remain. The findings of the cluster analysis reveal three regional typologies reflecting disparities in labor market structure and policy responsiveness. Regions with developed labor infrastructure exhibit relative stability, while peripheral regions remain characterized by persistent structural misalignments. However, the results suggest that current evaluation methods are insufficient to fully assess the effectiveness of employment programs across different regions. Future research should focus on developing indicators for regional inclusivity, integrating program sustainability assessments into strategic planning, and institutionalising the adaptation of public employment tools.

KEYWORDS: Employment, Employment Economics, Regional Policy, State Audit, Business Activity, Enbek Program, Kazakhstan

SCSTI: 06.77.01

JEL Code: H53, J21, J48

FINANCIAL SUPPORT: This study was not sponsored.

1. INTRODUCTION

Employment policy has become an integral part of state regulation, aimed at reducing unemployment, ensuring access to employment opportunities, and promoting economic stability and sustainability. While global practices include a variety of instruments, such as the European Union's active labor market policies and targeted support measures in Latin America and Asia, the relevance of these approaches depends on national context and institutional capacities. International organizations have institutionalized employment as a component of social justice. The International Labour Organization (ILO, 2023) defines decent work as a fundamental right that ensures dignity, income stability, and social inclusion. Within the United Nations Sustainable Development Goals framework, full and productive employment is consolidated in SDG 8, which assigns responsibility for its achievement to national governments (United Nations, 2015).

Kazakhstan's employment system is characterized by structural imbalances inherent to resource-dependent economies in transition. Significant regional asymmetries, a high prevalence of informal labor, and weak institutional capacity in policy enforcement have resulted in a persistent misalignment between declared goals and actual outcomes. Although strategic planning mechanisms have been introduced and formal conformity with international frameworks has been established, their practical impact remains limited. The distribution of responsibilities across administrative levels is poorly coordinated, performance control mechanisms are underdeveloped, and vertical feedback remains fragmented.

Against this backdrop, the state program Enbek (2017–2021) was launched as a national policy tool to stimulate productive employment and expand mass entrepreneurship (Ministry of Labor and Social Protection of the Population of the Republic of Kazakhstan, 2018). Quantitative targets were defined to increase employment, formalize labor relations, and reduce interregional disparities in labor market development. However, existing assessments focus primarily on financial execution and generalized employment statistics, lacking analysis of spatial variation or institutional coherence.

The present study conducts a comprehensive performance audit of the Enbek program. The analysis is based on a combination of statistical methods, regional profiling, and cluster-based evaluation. The object of investigation is the alignment between program objectives and actual results in the field of employment, with a focus on territorial divergence, sectoral structure, and the dynamics of informal employment. The goal of the study is to assess the effectiveness of Enbek through the lens of public audit, linking spatial heterogeneity in implementation to the structural characteristics of Kazakhstan's administrative and labor systems. The research contributes a context-specific analytical framework that integrates quantitative benchmarks and regional typologies into the evaluation of national employment policy.

2. LITERATURE REVIEW

Employment is seen as a key focus in public policy strategies in all countries, and the development and implementation of programmes in this area have become institutionalised. According to Schneider and Ingram (1988), public policy is shaped through a deliberate process of selecting objectives, instruments, and the logic of action, where the fit between design intent and actual implementation plays an important role. However, in practice, this fit is often violated, as shown by the research of Mosher and Trubek (2003), who show how the European Employment Strategy (EES) has identified a discrepancy between normative guidelines and actual institutional constraints. At the same time, as Wilthagen, Tros, and Van Lieshout (2004) emphasize, the EU has developed an approach of flexicurity, which emphasizes a balance between employment flexibility and social stability. Still, its application also faces

difficulties associated with the fragmentation of labor markets. Heyes (2011) points out that even within the framework of programs aimed at adapting the labor market to economic crises, employment mechanisms can exacerbate rather than alleviate inequalities if there is no absolute protection for those employed. These problems are particularly evident in the process of transferring the implementation of employment policies to non-governmental agencies, which, as Bredgaard and Larsen (2007) show, leads to a loss of control over performance and complicates the audit of implementation. This raises the need for new approaches, such as those proposed by Rodrik (2022), which explicitly focus industrial policy on creating quality jobs rather than solely on quantitative indicators. From a political economy perspective, as Juhász and Lane (2024) emphasize, the success of such programs depends not only on the substantive decisions but also on the interaction between political actors, which requires a flexible adaptation of the strategy to the specific context. Thus, the review demonstrates that the effectiveness of employment programs is determined by their content and the degree to which the mechanisms for implementation, monitoring, and adaptation to the institutional environment are integrated.

Employment occupies a central place in the system of state social obligations and is institutionally embedded in national strategic programs. The influence of international organizations, primarily the International Labor Organization (ILO), has shaped the normative foundation of employment policy, particularly through the global dissemination of the concept of decent work (Standing, 2010). This framework integrates legal standards with operational indicators such as wage levels, employment stability, and social protection (Burchell et al., 2014). The practical implementation of these standards in national policy depends on institutional consolidation mechanisms, including labor legislation and regulatory coordination (Çoçka et al., 2017; Koliev, 2022). However, studies consistently highlight practical barriers to implementation. Limited administrative capacity, political fragmentation, and inadequate monitoring hinder alignment with ILO conventions, even when they are formally ratified (Rukevwe & Nwachukwu, 2024). As a result, the performance of employment programs often falls short of declared international commitments, underscoring the need for stronger procedural transparency and policy accountability.

Auditing in public programs has moved away from formal reporting toward examining how policies are implemented in practice. Ha (2005) presents audit as a management function embedded across all stages of a policy cycle. Liimatainen et al. (2008) propose an architectural model where evaluation focuses on the alignment between a program and the institutional, informational, and administrative structures of the public sector. Slobodianyk et al. (2018) highlight the role of regulatory clarity, transparency, and administrative accountability, particularly in regional initiatives. International institutions have further refined these approaches. The ILO (2020) recommends evaluating employment programs not only by outcomes but also by their sustainability, inclusiveness, and structural impact on labor markets. Quantitative indicators alone are insufficient; spatial and social dimensions must also be incorporated. Together, these perspectives emphasize identifying institutional limitations and operational inconsistencies rather than simply verifying formal compliance.

Program evaluation methodologies have undergone a substantive transformation, shifting from isolated financial inspections toward analytical frameworks that capture institutional structures and spatial disparities. The Inter-American Development Bank (2016) proposed an audit model focused on territorial clusters, emphasizing the assessment of network interactions, institutional coverage, and regionally differentiated development trajectories. The integration of quantitative and qualitative dimensions enables the detection of inconsistencies in policy implementation across territorial units. Peters and Pierre (2020)

emphasized the transition from program-specific reviews to institutional auditing, focusing on decision-making architecture, coordination channels, and the distribution of administrative functions. In a similar vein, Noch and Sonjaya (2024) conceptualized audit as a forward-looking component of strategic planning designed to evaluate implementation risks, construct scenarios, and adapt policy instruments to address institutional constraints.

Employment policy in Kazakhstan reflects contradictions typical of resource-dependent transition economies. Initial programmatic efforts, according to Kalyuzhnova and Nygaard (2008), were focused on short-term macroeconomic stabilization and did not imply institutional consolidation. The modernization of management through a program-targeted approach and the introduction of strategic planning in the 2000s marked a formal shift, but it did not eliminate the fragmentation of mechanisms. Bhuiyan and Amagoh (2011) revealed weak monitoring, a lack of vertical accountability, and inadequate feedback between management levels. Bekniyazova et al. (2021) confirmed the discrepancy between the stated goals, indicators, and actual implementation mechanisms, indicating institutional incoherence and a lack of operational logic. There is a misalignment between strategic planning and operational outcomes. Deficient functional integration, weak monitoring mechanisms, and uneven indicator systems hinder implementation. Structural imbalances are intensified by administrative divergence and territorial disparities. The identified discrepancies necessitate a methodology that can capture temporal and spatial deviations, identify institutional constraints, and facilitate a comparison between policy intent and actual outcomes. The evaluation of the Enbek program requires a multidimensional audit approach that includes time series analysis, regional typology, and cluster grouping. Comparison with target benchmarks, such as the 4.8% unemployment threshold, enables the identification of deviations and an assessment of the extent to which the stated effects have been achieved. Existing control methods, limited by budgetary and reporting parameters, do not provide a holistic picture of territorial coverage and institutional capacity. A transition to an integrated evaluation system that combines quantitative, spatial, and substantive parameters is necessary. The choice of methodology, based on a comparison of implementation periods, territorial differentiation, and alignment with program guidelines, enables the development of a multi-level model for auditing state employment policy tailored to the Kazakh institutional context.

3. METHODOLOGY

As part of the assessment of the implementation of the state program “Enbek” (2017-2021), a preliminary review of the regulations and strategic goals laid down in this initiative was conducted. The program analysis identified key areas related to employment issues, including reducing unemployment, increasing sustainable employment opportunities, and mitigating regional imbalances. The methodology employed is based on approaches previously used in international practice for auditing state programs (Peck, 2004; IDB, 2016; ILO, 2020), and adapted to the specificities of the Kazakhstani model.

These aspects formed the basis of Table 1, which presents the program's main objectives, related problems, and expected results, allowing for the focus on the most significant targets.

Each task reflects structural and territorial issues facing the state's labor market management system. Thus, reducing the unemployment rate focuses on achieving a key indicator - reducing the official unemployment rate to ≤4.8%. This goal requires a comparison of target values with actual data by region, as well as an assessment of their change over time. The second task, increasing sustainable employment, is associated with the need for a qualitative shift from unstable, informal

TABLE 1. Target objectives of the state program "Enbek" in terms of employment

Objective	Problem	Expected result	Indicator (available in data)
Reduce unemployment	Stable unemployment, especially in regions with low activity	Reduction of unemployment to ≤ 4.8%	Unemployment rate (%) by region
Increase sustainable employment	Prevalence of short-term, unstable employment	Increase in formal and long-term employment	Employment and Income Index
Reduce regional imbalances	Uneven distribution of employment across regions	More equal employment structure	Dynamics of the number of employees by region (2013–2023)

Note: compiled by authors based on the Bureau of National Statistics (2024)

employment to stable, formal employment, which is reflected in the dynamics of the integral index "Employment and Income". The third task - eliminating regional imbalances - raises the issue of territorial inequality in access to employment opportunities, which requires spatial and cluster analysis of regional differences.

By this, a multi-stage method was proposed, which included comparing periods before and after the program's implementation, analyzing dynamics by region, constructing visual profiles, and grouping regions based on the similarity of their development trajectories (Figure 1).

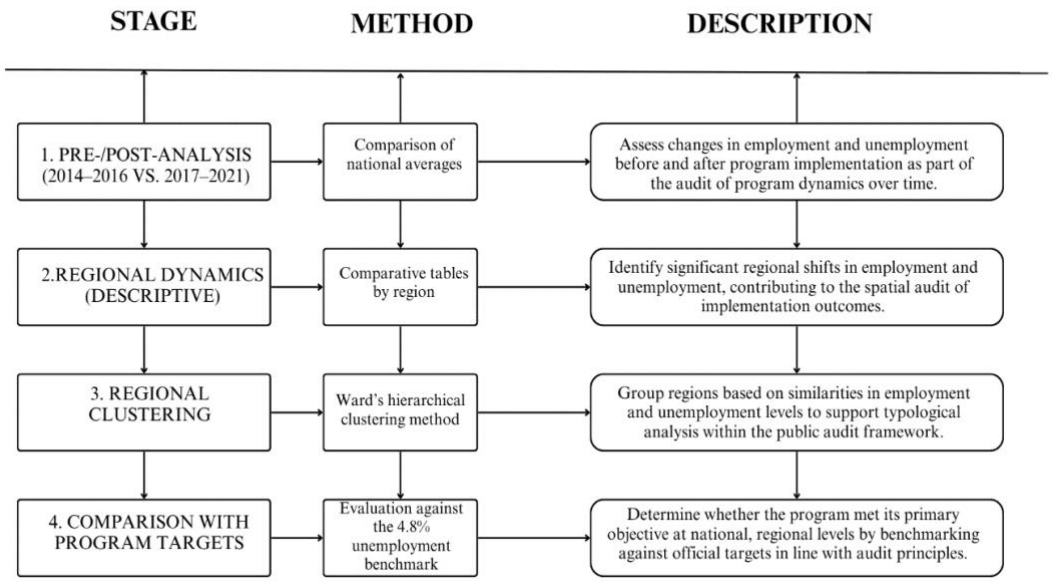

FIGURE 1. Methodological framework for public audit of the "Enbek" state employment program

The research methodology comprises four main stages of the analytical procedure, applied to assess the "Enbek" program through the lens of public audit. The sequence begins with time-based comparisons and continues through regional differentiation, cluster identification, and outcome verification. Each stage addresses a specific dimension of policy

performance, system-wide shifts over time, territorial divergence in employment outcomes, structural segmentation of regions, and verification against official targets. The proposed methodology ensures a formal assessment and the identification of spatial and institutional constraints that affect the program's implementation. Six key indicators were selected to conduct a comprehensive assessment of the implementation of state employment policy, within the scope of a public audit, reflecting both quantitative and structural characteristics of the labor market.

Table 2 presents the characteristics of the variables, including coding and units of measurement.

TABLE 2. Indicators Used in the Public Audit of the Employment Program

Indicator	Code	Unit of measurement
Employment rate to working-age population, %	EMP	%
Unemployment rate to working-age population, %	UNEMP	%
Share of informal employment in total employment, %	INFORM	%
Share of employment in agriculture, %	AGRIC	%
Share of employment in industry and construction, %	INDUS	%
Labor compensation as a share of GDP, %	LAB_GDP	%

Note: compiled by authors based on Bureau of National Statistics (2024)

The selected variables capture essential dimensions of the labor market: levels of employment and unemployment, the extent of informality, sectoral composition, and the economic role of labor income. The inclusion of these indicators corresponds to the strategic priorities of the "Enbek" program and relies on the availability of regionally and temporally comparable statistical data for the evaluation period.

The approaches reviewed in the literature demonstrated that public audit is losing its pure control function and is increasingly acting as a tool for substantive assessment of program effectiveness and institutional viability. The variety of methods, ranging from system monitoring (Ha, 2005) and architectural compatibility (Liimatainen et al., 2008) to compliance auditing (Slobodianyk et al., 2018) and strategic diagnostics (Noch & Sonjaya, 2024), confirms the need for multi-level analysis. Studies by the IDB (2016), ILO (2020), and Peters and Pierre (2020) emphasize the importance of transitioning from formal evaluation to measuring real impact, especially in employment. The proposed methodology is based on international standards, enabling the audit to serve as an analytical platform for assessing public employment.

4. RESULTS AND DISCUSSION

State employment programs serve as a central mechanism for economic regulation and social stabilization. In Kazakhstan, public initiatives in the labor market have acquired strategic importance due to persistent regional imbalances, the scale of informal employment, and limited diversification of employment sources. The Enbek state program (2017–2021) was introduced as a key policy instrument to stimulate productive employment and support entrepreneurial activity, with a particular focus on regional alignment. A structured evaluation of the program begins with the analysis of key labor market indicators across Kazakhstan. This stage provides a quantitative foundation for identifying variations in employment structure and program impact.

Table 3 presents descriptive statistics for key variables, including employment and unemployment levels, the share of informal employment, and the role of labor income in gross domestic product over the period 2014-2024.

TABLE 3. Descriptive Statistics Analysis

Indicator	Valid	Missing	Mean	Std. Devi.	Minimum	Maximum
EMP	12	0	77.992	0.532	77.400	79.100
INFORM	12	0	16.788	4.736	12.500	25.000
UNEMP	12	0	4.967	0.150	4.800	5.300
AGRIC	12	0	15.244	3.639	11.600	24.194
INDUS	12	0	19.375	2.184	12.570	20.783
LAB_GDP	12	0	30.838	0.558	30.300	32.192

Note: compiled by authors

The analysis of descriptive statistics for key employment indicators in Kazakhstan from 2014 to 2024 demonstrates the overall stability of the employment level (77.99% on average), with a gradual decrease in the unemployment rate toward the target value of 4.8% by 2024. A significant reduction in the share of the informal sector — from 25% to 12.5% — indicates increased formalization of labor relations, which is in line with the strategic guidelines of the Enbek program. At the same time, a pronounced transformation of the sectoral structure of employment is observed: the share of those employed in agriculture decreased from 24.2% to 11.6%, reflecting the transition of the labor force to other sectors of the economy, while employment in industry also decreased (from 20.8% to 12.6%), which may indicate weak sustainability of industrial growth. The share of wages in GDP remained relatively stable but low (30.8% on average), indicating the continued limited participation of hired workers in forming the country's total income. Taken together, these data provide an empirical basis for a public audit of employment policy, reflecting gradual structural shifts in the labor market that have occurred in the context of economic modernization, digitalization, and the impact of macroeconomic shocks, including the effects of the COVID-19 pandemic in 2020 and subsequent recovery years.

To visualize changes in the labor market in the Republic of Kazakhstan within the context of implementing the state program "Enbek," a graph was constructed to reflect the dynamics of six key indicators for the period from 2014 to 2024 (Figure 2).

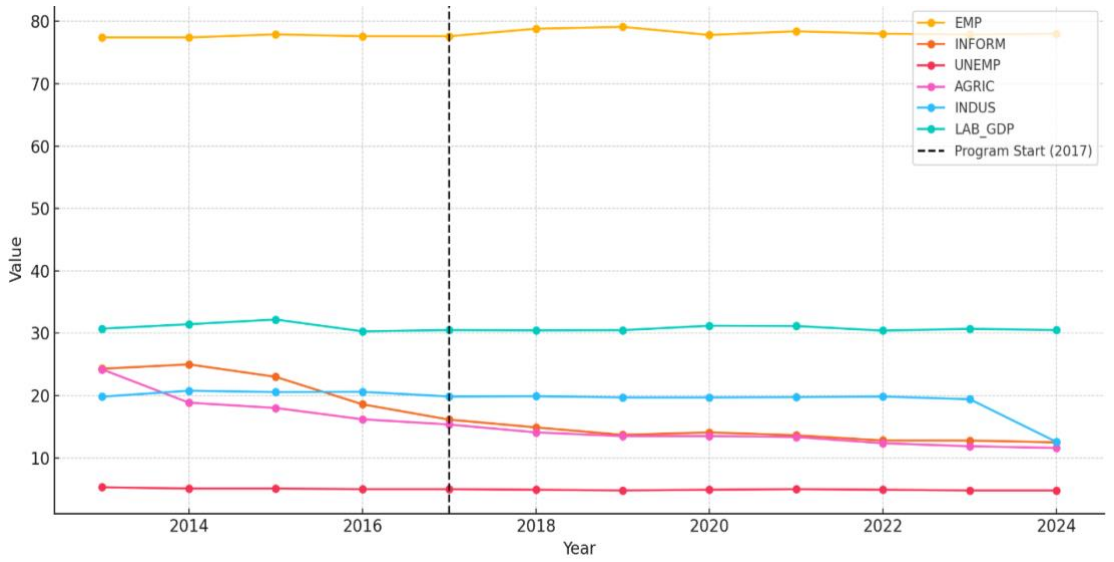

FIGURE 2. Labour market indicators in Kazakhstan for 2014-2024

The vertical line for 2017 marks the start of the program, which allows for a clear distinction between the stages "before" and "after" its implementation. The graph analysis indicates that the employment rate (EMP) has remained generally stable, with a slight increase in the first few years after the program's launch. The unemployment rate (UNEMP) has shown a moderate decline, from 5.1% in 2014 to the target of 4.8% by 2024. The positive dynamics in reducing the share of the informal sector (INFORM) are most clearly visible: from 25% in 2014 to 12.5% in 2024, which indicates successful efforts to formalize employment. At the same time, the share of workers in agriculture (AGRIC) has almost halved over the decade, from 18.9% to 11.6%, reflecting a structural shift in the economy. In the industry and construction (INDUS) sector, the share of employment remained stable until 2023 but decreased sharply in 2024, which warrants a separate analysis. The share of wages in GDP (LAB_GDP) remained virtually unchanged, without sustained growth, indicating weak dynamics of income redistribution in favor of labor resources. Thus, the graph records the program's achievements in reducing unemployment and informal employment but emphasizes the need to strengthen structural and institutional mechanisms in industrial policy and income justice. For an in-depth public audit of regional differences and dynamics in the labor market, an analysis of data on two key indicators was conducted: the number of employed and the number of unemployed in the regions of Kazakhstan from 2014 to 2024.

Table 4 presents data on the number of people employed in Kazakhstan's regions.

TABLE 4. Dynamics of the number of employed people by regions of Kazakhstan in 2014-2024

Region	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Akmola	422,7	408,1	416,4	408,3	408,7	408	398	397	421,4	407,1	401,8
Aktobe	410	404,8	408,6	408,9	417,6	416,5	416,4	419,8	424,7	434,9	457,9
Almaty	1013,3	943	985,3	988,4	994,5	991	974	973	697,7	704,8	722,3
Atyrau	286,1	296,3	296,4	300,1	304	316,3	314,5	317,7	326,7	335,1	347,8
West Kazakhstan	316,8	309,3	319,5	320,2	321	321,7	321	322,3	330,9	333,3	336,8
Zhambyl	530,2	498,5	501,1	505,3	507	507	503,8	502,7	539,5	543,7	544,8
Karaganda	678,4	670	656,4	652,4	654	648,9	641,8	643,4	534,8	535,8	542,7
Kostanay	493,9	484,2	493,5	492,1	488,2	484,8	466,3	475,2	453,8	449,5	439,3
Kyzylorda	311,1	307,8	328,6	330,6	332,9	332,3	329,4	330,1	330,1	331,5	334,5
Mangystau	248,8	277	277,8	277,8	304,7	305,5	308,4	331,7	332,7	336,7	347,4
Pavlodar	420,3	405,1	401,1	396,4	393,3	390,5	387,1	383,7	384,2	385,2	386,1
North Kazakhstan	313,8	312,8	303,1	295,2	296,2	293,4	289,3	287,3	279,1	274,5	267,7
Turkestan	876,9	780,9	789,3	779,1	789	784,3	779,4	777,6	792,2	800,6	817,1
East Kazakhstan	705,5	679,7	684,3	687,6	679	681	669,5	668,3	366,5	368,8	367
Astana city	431,6	466,1	466,1	497,5	507,5	553,3	563,4	580,3	625,5	658,7	685,1
Almaty city	764,5	838,5	867,9	889,6	911,9	936,5	959,3	982,8	998	1045,5	1083
Shymkent city	286,3	351,1	358	355,8	385,4	409,8	410,3	414,3	426,1	433,5	446,4

Note: compiled by authors

The most noticeable increase in employed people is observed in the Aktobe region - from 410.0 thousand people in 2014 to 457.9 thousand in 2024 (+47.9 thousand). A significant increase was also recorded in the city of Astana - from 431.6 thousand to 685.1 thousand people (+253.5 thousand). In the city of Almaty, the number of employed people increased from 764,500 to 1,083,000 people (+318,500). Such dynamics reflect the increasing concentration of economic activity in cities of national significance. At the same

time, a significant decrease in the number of employed people is observed in the East Kazakhstan region, from 705.5 thousand people in 2014 to 367.0 thousand in 2024 (-338.5 thousand), and in the Karaganda region from 678.4 thousand to 542.7 thousand people (-135.7 thousand). A steady decrease is also observed in the Kostanay region (-54.6 thousand) and the North Kazakhstan region (-46.1 thousand), which may indicate migration flows, deindustrialization, or a change in the economy's structure. These regional trends serve as a key reference point for conducting a public audit of spatial disparities in employment outcomes.

Table 5 presents data on the number of unemployed by regions of Kazakhstan.

TABLE 5. Dynamics of the number of unemployed by regions of Kazakhstan in 2014-2024

Region	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Akmola	22	21,8	21,6	20,6	20,5	20,3	20,3	20,5	21	20,5	19,4
Aktobe	20,9	21,8	20,7	20,6	21,1	20,8	20,9	21,2	21,5	21,7	22,6
Almaty	52	49,5	49,4	49,1	48,7	47,8	48,7	48,5	34,1	34,8	34,9
Atyrau	15,2	15,7	15,4	15,6	15,7	16,1	16,2	16,3	16,6	17	17,7
West Kazakhstan	16,8	16,7	16,4	16,4	16,4	16,4	16,8	16,4	17,4	17	17,2
Zhambyl	27,5	26,7	25,6	25,8	26	25,4	25,7	25,7	28,2	27,2	27,3
Karaganda	34,7	37,7	34,2	32,6	31,4	30	30,7	30	24,8	22,9	22,9
Kostanay	26,1	26,1	25,7	25	24,5	24,1	24,1	24,1	23,2	22,6	21,6
Kyzylorda	16,4	16,6	17,1	16,8	16,8	16,8	16,9	17	17	17	16,9
Mangystau	13	14,9	14,5	14,2	15,5	15,4	15,8	16,9	17,7	17,6	18,3
Pavlodar	21	21	20,3	19,9	19,6	19,1	19,6	19,4	19,2	19,3	19,2
North Kazakhstan	16,5	16,8	15,8	15,2	15,1	14,9	15,1	14,7	14,2	13,8	12,9
Turkestan	50,7	44,6	42,8	42,5	43	41,9	42,5	41,8	43,1	41,7	41,6
East Kazakhstan	35,5	35,9	34,9	34,7	34,6	34,1	34,1	33,5	18,1	18	17,5
Astana city	23	22,7	22,7	24	24	25,5	27,1	28,1	29,9	31,2	31,4
Almaty city	44,8	46,5	48,4	49,6	49,8	50	52,2	53,5	53	52,5	52
Shymkent city	16	19,3	20	19,7	21	22,1	22,2	21,9	22,4	22,2	22,6

Note: compiled by authors

The most significant decrease in the number of unemployed was recorded in the East Kazakhstan region, from 35.5 thousand people in 2014 to 17.5 thousand in 2024 (-18 thousand), as well as in the Karaganda region from 34.7 thousand to 22.9 thousand people (-11.8 thousand). In the Kostanay and North Kazakhstan regions, there is also a steady decrease in unemployment (-4.5 thousand and -3.6 thousand, respectively), due to population migration and a decrease in economic activity. At the same time, in the cities of Almaty and Astana, the number of unemployed increased over the analyzed period: in Almaty from 44.8 thousand to 52.0 thousand, in Astana, from 23.0 thousand to 31.4 thousand people. Such dynamics may reflect an increase in the labor supply due to internal migration. In addition, the unemployment rate in the Zhambyl region remains consistently high, about 27-28 thousand people throughout the entire period. These differences underscore the need for differentiated regional employment policies that take into account local socio-economic conditions and highlight the importance of public audit in monitoring spatial imbalances in labor market performance.

Cluster analysis, based on the number of employed and unemployed individuals, enabled the categorization of Kazakhstan's regions by their labor profile type. Based on the Ward method, dendrograms were constructed separately for employment (Figure 2) and unemployment (Figure 3), allowing for the visualization of differences and similarities between the regions. Based on the analysis

results, three stable clusters were identified, each of which unites regions with close values of key indicators. This typology provides an analytical basis for conducting a public audit of spatial differentiation in the implementation of employment policies.

Figure 3 shows a dendrogram constructed from employment data, which enables the visual identification of differences between regions in terms of the scale of population involvement in the economy.

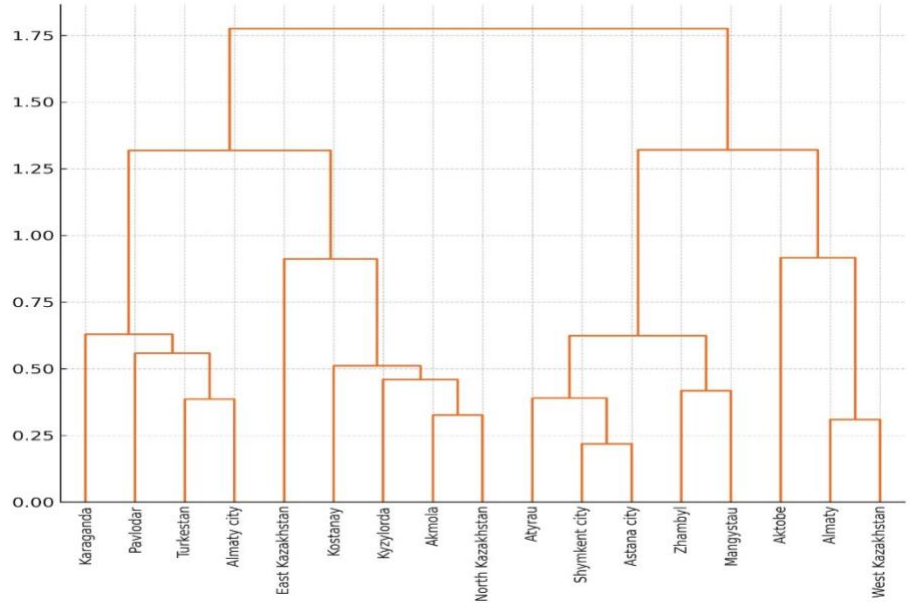

FIGURE 3. Dendrogram of regions of Kazakhstan by number of employed (Ward's method)

The analysis of the dendrogram presented in Figure 2 shows that the regions of Kazakhstan are grouped into three clusters based on the number of employed individuals. The first cluster comprises the Almaty, Astana, Karaganda, and Turkestan regions, where the most significant volume of the economically active population and a high level of labor market involvement are observed. The second cluster comprises the East Kazakhstan, Kostanay, Pavlodar, Akmola, Aktobe, Mangistau, and Zhambyl regions, characterized by moderate employment and relatively stable labor markets. The third cluster comprises the Abay, Zhetysu, Ulytau, North Kazakhstan, and Atyrau regions, which are characterized by the lowest employment rates and limited labor resources. Clustering provides a recording of differences in the distribution of employed individuals by region. It identifies groups that require differentiated approaches in public policy, while also supporting public audit tasks related to territorial segmentation.

Figure 4 illustrates a dendrogram constructed from data on the number of unemployed individuals by region in Kazakhstan, facilitating the visual identification of groups with varying levels of labor market tension.

The analysis of the dendrogram shows the formation of three clusters. The first cluster comprises Almaty, Astana, and the Turkestan region, where the highest unemployment rates are recorded in absolute terms, which is attributed to both population size and the influx of labor migrants. The second cluster includes the Karaganda, East Kazakhstan, Kostanay, Pavlodar, Akmola, Aktobe, and Zhambyl regions, where the unemployment rate is moderate and relatively stable. The third cluster includes the Ulytau, Zhetysu, Abay, North Kazakhstan, Mangistau, and Atyrau regions, which are distinguished by the lowest values in

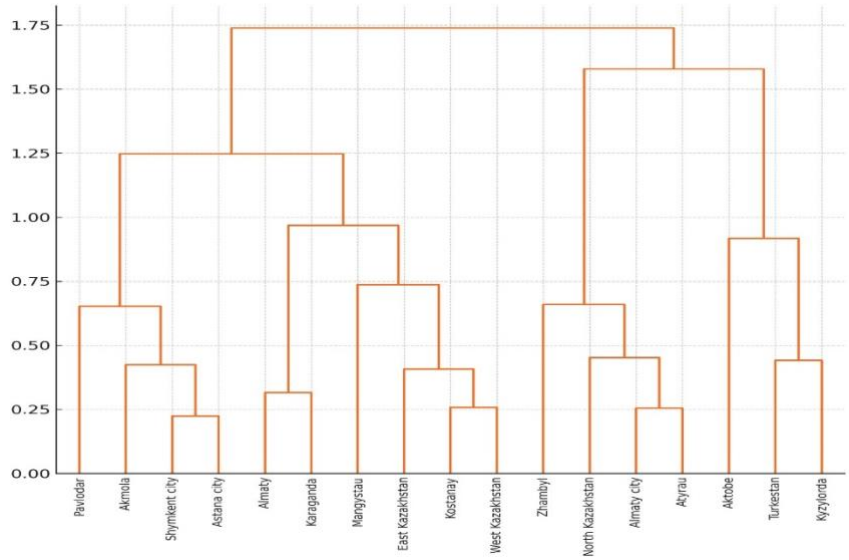

FIGURE 4. Dendrogram of regions of Kazakhstan by number of unemployed (Ward's method)

terms of the number of unemployed, which may be due to both low population density and failure to take into account hidden unemployment. The results highlight the importance of considering territorial differences when devising measures to reduce unemployment and underscore the role of public audit in identifying structural imbalances. For a more accurate interpretation of the results and to reflect the typical profile of the region within the corresponding cluster, cluster centroids were calculated – average values for the number of employed and the number of unemployed (in thousands of people) for each cluster (Table 6).

TABLE 6. Cluster centroids for employment and unemployment (in thousands of people)

Region	Employment			Unemployment		
	1	2	3	1	2	3
Akmola	410.100	402.925	413.875	20.300	20.633	21.900
Aktobe	439.167	417.575	408.075	21.933	20.883	21.350
Almaty	708.267	983.125	982.500	34.600	48.700	50.750
Atyrau	336.533	313.125	294.725	17.100	15.883	15.450
West Kazakhstan	333.667	321.500	316.450	17.200	16.467	16.750
Zhambyl	542.667	505.125	508.775	27.567	25.700	27.100
Karaganda	537.767	647.025	664.300	23.533	31.483	36.200
Kostanay	447.533	478.625	490.925	22.467	24.583	26.100
Kyzylorda	332.033	331.175	319.525	16.967	16.900	16.500
Mangystau	338.933	312.575	270.350	17.867	15.383	13.950
Pavlodar	385.167	388.650	405.725	19.233	19.650	21.000
North Kazakhstan	273.767	291.550	306.225	13.633	15.133	16.650
Turkestan	803.300	782.575	806.550	42.133	42.417	47.650
East Kazakhstan	367.433	674.450	689.275	17.867	34.317	35.700
Astana city	656.433	551.125	465.325	30.833	25.233	22.850
Almaty city	1042.167	947.625	840.125	52.500	50.583	45.650
Shymkent city	435.333	404.950	337.800	22.400	21.150	17.650

Note: compiled by authors

Clusters identified based on the number of employed individuals demonstrate noticeable territorial differentiation. The first cluster comprises regions with the highest employment values, including the cities of Almaty and Astana, as well as the Turkestan region, regions characterized by developed infrastructure, high population density, and robust economic activity. The second cluster comprises regions with an average level of employment, including Karaganda, East Kazakhstan, Kostanay, and Zhambyl regions, where a stable but less intensive labor potential is present. The third cluster is represented by regions with the lowest number of employed individuals: North Kazakhstan, Atyrau, Abay, Zhetysu, and Ulytau regions, which may be due to both demographic characteristics and a limited economic base. The employment centroids capture these differences, showing that in the first cluster, the employment figures exceed 900,000 people, while in the third, they do not reach even 400,000 people. A three-tier structure can also be traced to the number of unemployed people. The first cluster comprises the Almaty and Astana cities, as well as the Turkestan region territories with the highest number of unemployed individuals, which is attributed to the size of the labor market and the influx of migration. The second cluster comprises regions with average unemployment rates, including Karaganda, East Kazakhstan, Kostanay, Zhambyl, and Pavlodar regions. The third cluster comprises regions with the lowest number of unemployed individuals — North Kazakhstan, Atyrau, Mangistau regions, and the city of Shymkent, which may indicate a limited labor force or incomplete registration of the unemployed. The centroids by the number of unemployed confirm this structure: for the first cluster, the values exceed 50 thousand; for the second, they are in the range of 25–35 thousand; and for the third, they do not exceed 20 thousand. These groupings serve as a foundation for territorial segmentation in the public audit of labor market performance.

Regional variation in employment and unemployment levels stems from differences in demographic density, industrial base, and administrative capacity. Urban centers attract labor due to their superior infrastructure and service availability, while peripheral regions struggle with weak economic diversification and high outmigration rates.

A comparison of dendrograms and calculated centroids shows that the clustering results using the Ward method and the cluster's numerical characteristics mutually confirm each other. The spatial structure revealed graphically is entirely consistent with the ranges of values recorded in the centroids, which confirms the correctness and stability of the chosen approach (Table 7).

TABLE 7. Public audit-based assessment of the implementation of the "Enbek" program objectives

Component	Target by 2021	Observed Outcome (2024)	Evaluation
Unemployment rate	≤ 4.8%	4.8% (national average)	Target met at the national level
Employment rate	Steady growth	Relatively stable (~78%)	Partially met (no significant increase)
Informal employment share	Decreasing trend	Reduced from 25% (2014) to 12.5% (2024)	Target achieved
Structural balance (agriculture)	Decreased dependency	Drop from 18.9% to 11.6%	Target achieved
Industrial employment share	Stable or moderate growth	Slight decline to 12.57%	Not achieved (decline observed)
Labor income share in GDP	Increase or stabilization	Stable ~30.5%	Target not achieved
Regional differentiation	Reduced gaps	Cluster analysis shows persistent gaps	Partially achieved

Note: compiled by authors

An analysis of the state program "Enbek" implementation, based on key quantitative indicators and regional typology, allows for drawing comprehensive conclusions about the degree of achievement of goals and the effectiveness of the mechanisms applied. From the public audit perspective, the main target — reducing the unemployment rate to 4.8% — was achieved at the national level. At the same time, the persistence of differences between regions identified in the cluster analysis indicates territorial unevenness of the impact. In the cities of Almaty and Astana, the number of unemployed increased despite high economic activity and labor flow density, which may indicate an imbalance in migration and infrastructure policies within the program.

Employment rate – Partially met

The relatively stable employment rate, without significant growth, may reflect limited job creation in the private sector and a mismatch between labor supply and structural economic shifts. The decrease in the share of people employed in the informal sector from 25% to 12.5% should be recognized as a significant achievement. This change reflects the expansion of coverage through formal employment arrangements, increased digitalization of the labor market, and the development of legal mechanisms for protecting workers. In addition, there is a significant shift in the sectoral structure, as evidenced by a reduction in agricultural employment from 18.9% to 11.6%, indicating de-agrarianization; however, this is not accompanied by growth in industry.

Industrial employment share – Not achieved

The decline in industrial employment indicates a lack of synchronization between employment policy and industrial strategy. While the "Enbek" state program formally declares support for job creation in the industrial sector, actual employment figures show a downward trend. This suggests that current industrial development measures either do not prioritize labor-intensive growth or fail to account for employment generation altogether. Specifically, several structural factors may have contributed to the decline: the introduction of automation has reduced demand for low-skilled labor; the focus on capital-intensive mega projects—such as resource extraction and centralized manufacturing plants—has limited labor absorption capacity; and the insufficient integration of small and medium-sized enterprises (SMEs), which typically generate more jobs, has further constrained employment growth. The imbalance between large-scale investment and inclusive employment mechanisms highlights the need for industrial policy to incorporate labor-market sensitivity as a key performance criterion.

Labor income share in GDP – Not achieved

Stagnation in labor income share suggests persistent income inequality and weak bargaining power of employees due to the dominance of capital-intensive sectors. The share of people employed in industry and construction has decreased to 12.57%, which contradicts the stated priorities of the program and requires strengthening support measures in the sector.

Regional differentiation – Partially achieved

Regional clustering by the number of employed and unemployed confirmed the stability of differences and identified groups with pronounced inequality in labor potential. Regions with high employment, such as Almaty, Astana, and the Turkestan region, form the core of labor growth. Despite the formal implementation of uniform policy measures, significant disparities remain due to differences in infrastructure, labor mobility, and local economic capacity.

These results provide an empirical foundation for territorial segmentation within public audit procedures and emphasize the relevance of differentiated assessment in labor policy evaluation. The applied methodology demonstrates how public audit tools can be used to link quantitative performance with spatial and institutional dimensions of employment policy implementation.

One of the key limitations in achieving the declared objectives of the "Enbek" program relates to insufficient expansion of

employment opportunities in the industrial sector. Despite formal prioritization, actual job creation in the industry remains modest, with employment levels continuing to decline.

One of the key constraints on industrial employment growth is the prevalence of capital-intensive investment models that prioritize technological renewal without parallel expansion of workforce demand. Employment dynamics are further weakened by the limited involvement of small and medium-sized enterprises, which typically maintain higher labor intensity. Therefore, the sector's capacity to accommodate workers shifting from agriculture and informal occupations has reduced. The decline in labor demand is most noticeable in standard and medium-skill job categories, where mechanized systems increasingly replace manual processes. Instead of balancing modernization with job creation, industrial policy has reinforced a model less responsive to labor market needs.

Divergences in regional labor dynamics additionally complicate the implementation of employment programs. In particular, the Abay, Zhetysu, and Ulytau regions record not only low employment volumes but also stagnant or negative trends over the analyzed period, as confirmed by cluster centroids. Moreover, such areas as Abay, Zhetysu, and Ulytau continue to exhibit narrow sectoral specialization and limited administrative mechanisms for responding to labor market changes. In contrast, Almaty and Astana maintain higher employment volumes, supported by developed service sectors, centralized institutional functions, and steady labor inflows from other regions.

The spatial concentration of economic activity has intensified regional asymmetries. Ongoing migration to urban centers, without a corresponding expansion of employment capacity, has increased pressure on housing, transport systems, and municipal services. Regions with sustained out-migration exhibit reduced workforce engagement and erosion of local labor capacity, which constrains economic renewal and institutional responsiveness. The absorption capacity of regional economies in growth centers remains insufficient to accommodate continuous labor inflows, while departure regions face prolonged depopulation and economic attenuation. The imbalance between labor supply and demand across space calls for a more spatially adaptive employment strategy.

Corrective measures should not only address the structural gaps in industrial employment but also recognize the territorial unevenness of labor market responses. Support for labor-intensive production, sectoral diversification in lagging regions, and alignment between regional development tools and employment policy are necessary to restore the redistributive and stabilizing function of labor markets in the national context.

5. CONCLUSIONS

The assessment of the “Enbek” state employment program highlights the value of integrating public audit logic with spatially sensitive evaluation tools. Through a multi-stage methodology that combines temporal comparison, regional analysis, clustering, and target benchmarking, the study revealed not only the partial success in achieving national-level indicators, such as the 4.8% unemployment threshold, but also the persistence of structural and territorial disparities. The results indicate that employment programs implemented in transition economies require not only macro-level objectives but also mechanisms for regional differentiation, ongoing monitoring, and institutional flexibility. The use of hierarchical clustering revealed clear groupings of regions based on employment performance, supporting the need for adaptive policy measures tailored to distinct labor market profiles. Moving forward, public audit-based methodologies should be further developed to account for local implementation gaps, coordination challenges, and long-term sustainability of employment outcomes. This study reinforces the importance of designing employment strategies that are not only

quantitatively trackable but also qualitatively responsive to institutional and regional conditions.

Based on the empirical findings, several measures are recommended to improve the effectiveness of the "Enbek" program:

(1) Align industrial support tools with employment-generation targets by prioritizing labor-intensive industries in investment incentives.

(2) enhance regional components of the program through differentiated instruments targeting structurally weak labor markets;

(3) strengthen monitoring and feedback mechanisms to identify implementation delays or mismatches at the local level; and

(4) Reinforce the institutional capacity of local employment centers to act as mediators between state policy and regional labor needs.

AUTHOR CONTRIBUTION

Writing – Original Draft: Baglan M. Aliyeva, Liya R. Mukhamedyarova, Bayanslu A. Markhayeva.
Conceptualization: Liya R. Mukhamedyarova.
Formal Analysis and Investigation: Baglan M. Aliyeva, Yerkebulan Zh.Ydyrys.
Funding Acquisition and Research Administration: Liya R. Mukhamedyarova.
Development of Research Methodology: Baglan M. Aliyeva, Bayanslu A. Markhayeva.
Resources: Elmira O.Telagussova, Yerkebulan Zh.Ydyrys.
Software and Supervision: Liya R. Mukhamedyarova.
Data Collection, Analysis, and Interpretation: Elmira O.Telagussova, Yerkebulan Zh.Ydyrys.
Visualization: Liya R. Mukhamedyarova, Bayanslu A. Markhayeva.
Writing – Review and Editing: Baglan M. Aliyeva, Liya R. Mukhamedyarova, Elmira O.Telagussova.

References

Bekniyazova, D. S., Kaliskarova, A. Z., Baiburina, D. O., & Reshina, G. A. (2021). Methodological approaches to evaluating the quality of state programs of the Republic of Kazakhstan (on the example of the employment sector). *Bulletin of the Innovative University of Eurasia*, (3), 35-43. https://doi.org/10.37788/2021-3%2F35-43

Bhuiyan, S. H., & Amagoh, F. (2011). Public sector reform in Kazakhstan: Issues and perspectives. *International Journal of Public Sector Management*, *24*(3), 227-249. https://doi.org/10.1108/09513551111121356

Bredgaard, T., & Larsen, F. (2007). Implementing public employment policy: What happens when non-public agencies take over? *International Journal of Sociology and Social Policy*, *27*(7/8), 287-300. https://doi.org/10.1108/01443330710773863

Burchell, B., Sehnbruch, K., Piasna, A., & Agloni, N. (2014). The quality of employment and decent work: definitions, methodologies, and ongoing debates. *Cambridge journal of economics*, *38*(2), 459-477. https://doi.org/10.1093/cje/bet067

Çoçka, K., Maxhelaku, A., & Rusi, I. (2017). Employment Policy and International Labour Standards. *Mediterranean Journal of Social Sciences, 8*, 366 - 371. Retrieved June 5, 2025 https://www.richtmann.org/journal/index.php/mjss/article/view/9704

Ha, B. (2005). System-based auditing and monitoring of government programs and projects. *International Journal of Government Auditing*, *32*(4), 11- 14.

Heyes, J. (2011). Flexicurity, employment protection and the jobs crisis. *Work, employment and society*, *25*(4), 642-657. https://doi.org/10.1177/0950017011419723

Inter-American Development Bank. (2016). *Evaluating the impact of cluster development programs*. Retrieved June 5, 2025 https://publications.iadb.org/en/evaluating-impact-cluster-development-programs

International Labour Organization. (2020). *Global employment policy review 2020: Employment policies for inclusive structural transformation*.

International Labour Organization. (2023). *World Employment and Social Outlook: Trends 2023*. Geneva: ILO. Retrieved June 5, 2025

https://www.ilo.org/sites/default/files/wcmsp5/groups/public/%40dgreports/%40inst/documents/publication/wcms_865332.pdf
Juhász, R., & Lane, N. (2024). The political economy of industrial policy. *Journal of Economic Perspectives*, *38*(4), 27-54. https://doi.org/10.1257/jep.38.4.27.
Kalyuzhnova, Y., & Nygaard, C. (2008). State governance evolution in resource-rich transition economies: An application to Russia and Kazakhstan. *Energy Policy*, *36*(6), 1829-1842. https://doi.org/10.1016/j.enpol.2008.01.035
Koliev, F. (2022). Promoting international labour standards: The ILO and national labour regulations. *The British Journal of Politics and International Relations*, *24*(2), 361-380. https://doi.org/10.1177/13691481211027513
Liimatainen, K., Heikkilä, J., & Seppänen, V. (2008). A framework for evaluating compliance of public service development programs with government enterprise architecture. In *Proceedings of the 2nd European Conference on Information Management and Evaluation*, 269-276.
Ministry of Labour and Social Protection of the Population of the Republic of Kazakhstan. (2018). *Gosudarstvennaya programma razvitiya produktivnoy zanyatosti i massovogo predprinimatel'stva «Enbek» na 2017–2021 gody* [State program for the development of productive employment and mass entrepreneurship "Enbek" for 2017–2021]. Retrieved June 5, 2025 https://adilet.zan.kz/rus/docs/P1800000746
Mosher, J. S., & Trubek, D. M. (2003). Alternative approaches to governance in the EU: EU social policy and the European employment strategy. *JCMS: Journal of Common Market Studies*, *41*(1), 63-88. https://doi.org/10.1111/1468-5965.00411
Noch, M. Y., & Sonjaya, Y. (2024). Leveraging Governmental Auditing for Strategic Decision-Making and Policy Evaluation. *Advances in Managerial Auditing Research*, *2*(1), 40-50. https://doi.org/10.60079/amar.v2i1.286
Peck, L. R. (2004). Using cluster analysis in program evaluation. *Evaluation Review, 28*(3), 270–299. https://doi.org/10.1177/0193841X04266335
Peters, B. G., & Pierre, J. (2020). From evaluation to auditing and from programs to institutions: Causes and consequences of the decline of the program approach. *Governance*, *33*(3), 585-597. https://doi.org/10.1111/gove.12455
Rodrik, D. (2022). *An industrial policy for good jobs. Hamilton Project—Policy proposal.* Washington, DC: Brookings Institution. Retrieved June 5, 2025 https://www.hamiltonproject.org/wp-content/uploads/2023/03/20220928_THP_Proposal_Rodrik_GoodJobs.pdf
Rukevwe, E., & Nwachukwu, A. E. (2024). Implementation of International Labour Organization (ILO) Policy on Health, Safety and Welfare of Workers in Central Senatorial District, Delta State, 10(3), 1-22. https://dx.doi.org/10.47772/IJRISS.2024.802114
Schneider, A., & Ingram, H. (1988). Systematically pinching ideas: A comparative approach to policy design. *Journal of public policy*, *8*(1), 61-80. https://doi.org/10.1017/S0143814X00006851
Slobodianyk, Y., Shymon, S., & Adam, V. (2018). Compliance auditing in public administration: Ukrainian perspectives. *Baltic journal of economic studies*, *4*(5), 320-331. https://doi.org/10.30525/2256-0742/2018-4-5-320-331
Standing, G. (2010). The international labour organization. *New Political Economy*, *15*(2), 307-318. http://dx.doi.org/10.1080/13563460903290961
United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. New York: United Nations. Retrieved June 5, 2025 from https://sdgs.un.org/2030agenda
Wilthagen, T., Tros, F., & Van Lieshout, H. (2004). Towards 'flexicurity'? Balancing flexibility and security in EU Member States. *European journal of social security*, *6*(2), 113-136. https://doi.org/10.1177/138826270400600202

AUTHOR BIOGRAPHIES

Baglan M. Aliyeva – PhD, Senior Lecturer, Al-Farabi Kazakh National University, Almaty, Kazakhstan. Email: baglan_a74@mail.ru, ORCID ID: https://orcid.org/0000-0002-9034-8910

***Liya R. Mukhamedyarova** – PhD student, L.N. Gumilyov Eurasian National University, Astana, Kazakhstan. Email: idrissova.ar@gmail.com, ORCID ID: https://orcid.org/0009-0004-5059-9186

Bayanslu A. Markhayeva – Doc. Sc. (Econ.), Professor, Caspian Public University, Higher School of Economics and Management, Almaty, Kazakhstan. Email: markhaeva@mail.ru, ORCID ID: https://orcid.org/0000-0002-7354-7125

Elmira O. Telagussova – PhD, Senior Lecturer, Abai Kazakh National Pedagogical University, Sorbonne-Kazakhstan Institute, Almaty, Kazakhstan. Email: eltel7@mail.ru, ORCID ID: https://orcid.org/0000-0003-1042-5603

Yerkebulan Zh.Ydyrys – Cand. Sc. (Econ.), Senior Lecturer, Korkyt Ata Kyzylorda University, Kyzylorda, Kazakhstan. Email: erkebulan_idiris@mail.ru, ORCID ID: https://orcid.org/0009-0005-4043-289X

Signed for printing on 30.06.2025
Format 70×100 1/8
Volume 18,5 printed sheets/ Accounting and publishing sheet 17,2 printed sheets /
Conditional 14, 3 printed sheets.
Circulation 300 copies.
Published by University of International Business named after K. Sagadiyev
Kazakhstan, 050010, Almaty, 8a Abay Ave.
+7 (727) 259-80-33
Publishing house LLP Fortuna polygraph, 050063, Almaty, 1-microdistrict, 81
Fpolygraf@bk.ru
+7 707 463 13 22
Price negotiable