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Жоба менеджері
Гульмира Шаккозова
Телефон: +7 701 724 2911
E-mail: Gulmira.Shakkozova@kaznu.kz

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I.T. Akindele[1], B.O. Oginni[2*], M.S. Kasumu[2], O.B. Akande[2]

[1]University of Ilorin, Kwara State, Nigeria
[2]Osun State University, Osun State, Nigeria
*e-mail: babalola.oginni@uniosun.edu.ng

NEXUS BETWEEN RETIREMENT BENEFITS AND STANDARD OF LIVING: THE CASE OF CIVIL SERVICE RETIREES IN NIGERIA

This study examined the nexus between retirement benefits and the standard of living of Osun State civil service retirees. The study identified pension schemes, gratuity, and healthcare services as the basic retirement benefits offered by the Osun State Government to retired civil servants, which were also the variables used to measure the standard of living of retired civil servants. A questionnaire as the research instrument was administered to 363 respondents obtained from the Nigeria Union of Pensioners in Osogbo, Osun State. Findings from the study showed that the pension scheme is adequate and there exists a strong relationship between the variables of retirement benefits (pension schemes, gratuity, and healthcare services), and the standard of living of the retirees. The study concluded that the module operandi of retirement benefits as currently being practiced affects the standard of living of retirees negatively and thus, recommended that the implementation of pension schemes, gratuity, and healthcare services should reflect socio-economic factors with priority on inflation and social support systems.

Key words: pension schemes, gratuity, and healthcare benefits, standard of living, retirement, well-being.

И.Т. Акинделе[1], Б.О. Огинни[2]*, М.С. Касуму[2], О.Б. Аканде[2]

[1]Илори университеті, Квара, Нигерия
[2]Осун мемлекеттік университеті, Осун, Нигерия
*e-mail: babalola.oginni@uniosun.edu.ng

Зейнетақы төлемдері мен өмір сүру деңгейінің өзара байланысы: Нигериядағы мемлекеттік қызметтен зейнетке шыққандардың мысалы

Бұл зерттеу Осун штатының мемлекеттік қызметінен зейнетке шыққандардың зейнетақы төлемдері мен олардың өмір сүру деңгейінің өзара байланысын қарастырды. Зерттеу барысында Осун штаты үкіметі зейнетке шыққан мемлекеттік қызметкерлерге ұсынатын негізгі зейнетақы төлемдері ретінде зейнетақы жүйесі, біржолғы төлем (гратуитет) және денсаулық сақтау қызметтері анықталды. Бұл айнымалылар зейнеткерлердің өмір сүру деңгейін өлшеу үшін қолданылды. Зерттеу құралы ретінде сауалнама жүргізіліп, Осун штатының Осогбо қаласындағы Нигерия зейнеткерлер одағына мүше 363 респонденттен жауап алынды. Зерттеу нәтижелері зейнетақы жүйесінің жеткілікті деңгейде екенін және зейнетақы төлемдері (зейнетақы жүйесі, біржолғы төлем және денсаулық сақтау қызметтері) мен зейнеткерлердің өмір сүру деңгейі арасында тығыз байланыс бар екенін көрсетті. Зерттеу нәтижесінде қазіргі зейнетақы төлемдерінің тәртібі зейнеткерлердің өмір сүру деңгейіне теріс әсер ететіні анықталды. Осыған байланысты зейнетақы жүйесін, біржолғы төлемдер мен денсаулық сақтау қызметтерін жүзеге асыру барысында инфляция және әлеуметтік қолдау жүйелері сияқты әлеуметтік-экономикалық факторларды ескеру ұсынылды.

Түйін сөздер: зейнетақы жүйесі, біржолғы төлем (гратуитет), денсаулық сақтау қызметтері, өмір сүру деңгейі, зейнетке шығу, әл-ауқат.

И.Т. Акинделе[1], Б.О. Огинни[2]*, М.С. Касуму[2], О.Б. Аканде[2]
[1]Университет Илора, Квара, Нигерия
[2]Государственный университет штата Осун, Осун, Нигерия
*e-mail: babalola.oginni@uniosun.edu.ng

Связь между пенсионными выплатами и уровнем жизни: случай пенсионеров государственной службы в Нигерии

В данном исследовании рассматривается взаимосвязь между пенсионными выплатами и уровнем жизни государственных служащих, вышедших на пенсию в штате Осун. В качестве ключевых показателей, используемых для измерения уровня жизни пенсионеров, были определены пенсионные схемы, единовременные выплаты (гратуитет) и медицинское обслуживание, предоставляемые правительством штата Осун бывшим государственным служащим. В рамках исследования был проведен опрос среди 363 респондентов, являющихся членами Союза пенсионеров Нигерии в городе Осогбо, штат Осун. Результаты исследования показали, что пенсионная система является достаточно развитой, а также существует сильная взаимосвязь между показателями пенсионных выплат (пенсионные схемы, единовременные выплаты и медицинские услуги) и уровнем жизни пенсионеров. Исследование пришло к выводу, что действующая система пенсионных выплат негативно сказывается на уровне жизни пенсионеров. В связи с этим было рекомендовано учитывать социально-экономические факторы, включая инфляцию и системы социальной поддержки, при реализации пенсионных схем, единовременных выплат и медицинского обслуживания.

Ключевые слова: пенсионные схемы, единовременные выплаты (гратуитет), медицинские услуги, уровень жизни, выход на пенсию, благосостояние.

Introduction

There is a saying that goes like this whatever has a beginning must have an end, the employment life of every employee in the world of work lent credence to this statement to imply that employment of all employees will come to an end one day although the statutory time frame varies from continents to continents, regions to regions, and countries to countries. In the case of Nigeria, 35 years of service or 60 years of age is the retirement age for all categories of employees in the civil service which is the unit of analysis of this study. The employee employment life span revolves around the transition from active employment to retirement with significant shifts in the sources of income and lifestyles. This explains why over the years, the well-being of employees after meritorious service has always been of great concern to the employers of both private and public sectors with a focus on their standard of living after retirement.

The economic well-being and standard of living of retirees, particularly those in the civil service had received more attention from the government in the last decade with the provision of retirement benefits in tune with the rising inflation. The provision of retirement benefits was mainly in the areas of pension schemes, gratuity, and healthcare benefits. However, the retiree's standard of living has been impacted by several elements, such as the state of the general economic situation, the design of the pension plans, and the promptness and sufficiency of pension payments. Thus, rendering various pension reforms incapacitated in bringing the desired results to the retirees. In the views of Adams (2019), the provision and adequacy of retirement benefits are crucial factors that influence the post-retirement standard of living of employees which have been the veritable variables to measure retiree's standard of living while Oke (2021) posited that the standard of living of retirees is a reflection of the effectiveness and efficiency of the retirement benefits system put in place at any given time. It was alluded from the works of Oke (2021) and Adams (2019) that the provision but not inadequate retirement benefits and poor implementation of the retirement benefits system is the rationale behind the falsification of age and corruption.

According to Johnson and Akinola (2020), retirement has always been a joy that every employee looks towards not solely because of the accrued benefits but on account of the rest and opportunity to do other things. However, the problem of consistency and adequacy of retirement benefits in the face of present economic reality has made retirees struggle to afford necessities, and access quality healthcare, and other essential services, thus, resulting in a decrease in their overall quality of life. Therefore, the study seeks to examine the relationship between retirement benefits and standard of living; focus on the implications of retirement benefits on the retirees' standard of living by examining the adequacy of

retirement benefits; implementation of the pension schemes, and consistency of the gratuity payment to the retirees, and accessibility of retirees to the provided healthcare services on the standard of living of the retirees.

Literature Review

Standard of Living

The standard of living is a multifaceted concept that encompasses the overall quality of life and well-being of individuals or groups, characterized by both material and non-material factors. It takes into account income, employment status, class disparities, poverty rates, housing affordability, crime rates, and access to education and healthcare facilities (Afolabi, 2022). In the views of Smith and Cummins, (2020) standard of living involves more subjective measures such as life satisfaction, freedom, and leisure time and largely depends on the quantity and quality of the goods and services available to people because it is influenced by many factors such as inflation, healthcare accessibility, social services, financial security, community services, and infrastructural facilities (Anidi & Anoke, 2017; Adebayo & Udegbe, 2018; Adeniran, 2019; Adeyemo, 2021; Afolabi, 2022). Since the focus of standard of living is on the overall well-being of the people, it takes into cognisant many issues that would aid the well-being of people such as post-retirement financial stability, quality healthcare, social and emotional support systems, education, and lifelong learning, housing affordability, social connectedness, infrastructure, and personal fulfillment (Etodike, Ezeh & Chukwura, 2017).

The works of Ayeni and Oginni (2021) supported this position and posited further that the degree of attaining sustainable well-being of people is constraint by many factors not limited to the following; financial insecurity, income volatility, limited savings, high debt levels, unaffordable housing (rising housing costs), healthcare costs, retirement challenges, healthcare non-accessibility, geographical barriers, health insurance coverage gaps, complex healthcare systems, cultural and linguistic barriers, social isolation, sparse population density, limited transportation options, and long distances to social amenities, socioeconomic factors, poverty, unemployment, low educational attainment, technological barriers, stagnant incomes, low-wage workers, and employment opportunities (Giddings, Grant & Hills, 2018). Therefore, Adewumi (2020) concluded that the standard of living of any individual or a group of individuals is the level of comfort and wealth attained after interaction with these factors which could be high or low depending on the degree of influence of these factors i.e., the well-being of people is based on the degree of comfort and wealth at their disposal at any given period.

Oke (2021) corroborated the position of Adewumi (2020) by positing that the cost of living is a good indicator to determine whether the standard of living of an individual or a group of individuals is high or low. It was concluded that there exists an inverse relationship between cost of living and standard of living i.e., whenever cost of living is high, standard of living would be low and whenever cost of living is low, standard of living would be high. Adams (2019) asserted that a living wage is an integral part and important component element in the cost of living and standard of living due to the challenge posed by inflation which is responsible for the constant rise in the general price level of goods and services. The relationship between and among the three elements (living wage, cost of living, and standard of living) on account of inflation can be described as a cobweb relationship because the reaction is in a cycle or chain form. This explains why the government is always interested in what the living wage is to avoid any form of push or pressure from the labour union. The essence of the interest of the government in the living wage is to operationalise the cost of living that would usher in or sustain a decent standard of living without prejudice to the overall well-being of the people. It is this concern that propels the government to put in place different programmes for employees in the civil service known as retirement benefits upon retirement to ensure a decent standard of living.

Retirement Benefits

According to Afolabi (2022), retirement is the withdrawal of service from an organisation permanently which may be voluntary or involuntary i.e., an end to regular paid employment in business either in industry or sector. By voluntary, it is conformity with stipulated conditions guiding the contract of employment which is usually based on age or year of service, and involuntary signifies withdrawal of service against one's will due to many reasons such as health issues, outsourcing, major reorganisation, reduction in the workforce, incapacitated by an accident, persistent disability, legislation, etc., (Abubakar, 2021; Pillah, 2023) and whichever the case may be, benefits are evolving from such retirement which are in different forms. These benefits are not just a reward for years of service but a fundamental right ensuring that retirees can maintain a decent standard of living after their active working years (Nyangari-

ka & Bundala, 2020; Kotun, Adeoye & Akingbade, 2023). Smith & Baker, (2020) asserted that the benefits are designed to provide financial support and stability to those who retire after retirement which corroborated the earlier works of Adams (2019) and Johnson (2019) that the structure, sufficiency, and stability of retirement benefits have a considerable impact on the financial security and quality life of retirees.

The basic goal of the retirement benefit is to replace a sizeable portion of the income generated by individuals during their working years of active service, thus providing a safety net against the adverse effect of economic hardship, poor standard of living, and destitution in old age (Johnson, 2019; Pillah, 2023). Different countries with different retirement benefits depending on their economic systems, In Nigeria today, there are three major retirement benefits, especially in the civil service namely pension, gratuity, and healthcare services made available to retired employees. Pension and gratuity are under statutory provision while healthcare services have been under the State's discretion which Osun State which is the unit of analysis embraced. The Pension Reform Act, of 2014 discussed in detail the provision of the reform and conditions necessary to be fulfilled before one is eligible and the Pension Reform Act, of 2004 focus was on the gratuity and contributory pension while the healthcare service was not backed up with any statutory provision but a product of the Will of the government of the day in policy form. It is worthy of note, that all the retired employees in Osun State operate under these three benefits.

Relationship Between Retirement Benefits Variables and Standard of Living

Pension and Standard of Living

The pension has been described as a regular income received by an individual at retirement i.e., when an individual has stopped working on account of reaching a certain age, health condition, persistent disability, etc., in order to cater for such individual needs at old age (Abubakar, 2021). Pillah (2023) described pension on the basis of two pension reforms i.e., Pension Reforms Act 2004 and 2014 as a fund from which regular payments are given to support a person's retirement from work after they have contributed a set amount throughout their working years (Hinrichs & Lynch, 2021). The works of Abubakar (2021) on retirement challenges and management strategies among retired civil servants in Kogi state identified pension as one of the major challenges faced by employees in the post-retirement life, especially in terms of prompt payment and reform implementation which corroborated the earlier work of Adams (2019) and Johnson (2019) that the structure, sufficiency, and stability of retirement benefits have a considerable impact on the financial security and quality life of retirees. Ayeni and Oginni (2021) posited that the Pension Reform Act 2014 sole aim was to ensure that employees live a decent life after retirement through seamless payment of the retirement benefits when due. Pillah (2023) deviated by acknowledging the adequacy of pension in terms of implementation over payment amid inflation which is devoid of corrupt practices to usher or herald quality life i.e., payment is ideal but adequacy and implementation should be paramount. Abubakar (2021) posited that the adequacy of pension schemes is not enough rather the administration and operationalisation of pension schemes should be simplified to be effective and efficient. Hence, the formulation of hypothesis one that

H_1: Implementation of pension schemes has a significant and positive influence on the Standard of living.

Gratuity and Standard of Living

Gratuity is one of the retirement benefits that provide financial support to employees after their retirement. It has been described as a lump sum payment made to an employee by an employer in recognition of long and meritorious service, above and beyond the usual wages or salary upon retirement and it is usually a one-time lump sum payment made to an employee upon completion of the eligibility criteria (Fred, Udoh & Kpurunee 2019; Nyangarika & Bundala, 2020). In Nigeria, all employees employed in the civil service on or before 2004 are eligible for gratuity payment without any exemption while the Pension Reform Act 2014 removes gratuity from the retirement benefits. The works of Fred, Udoh, and Kpurunee (2019) alluded that there exists a strong relationship between gratuity and retirees' financial and health well-being. Etodike, *et al.* (2017) explored the predictors of retirement stress among Nigeria's public service retirees and found that delay in gratuity payment accounts for 65% of retirement stress and anxiety among retired employees thus preventing their settlement adjustment into a new life. This was buttressed by the findings of Nyangarika and Bundala, (2020) and opined further that for improved well-being of the retirees, gratuity payment should be paramount as a result of poor socio-economic development. Okolie and Idibra's (2022) work shows that delays in gratuity payment contribute to retirees' diminishing status, deteriorating health, and premature mortality shortly after retirement while Oke (2021) concluded that gratuity

as designed, was to help retirees adjust to the cost of living through the provision of a lump sum for investment but non-payment or delay has made retirees succumb to early death or become penniless within few periods of their retirement. Hence, the second hypothesis was formulated that

H_2: Consistency of gratuity payment has a significant and positive influence on the Standard of living.

Healthcare Services and Standard of Living

According to Fennell, (2001) the term "health care services" means any service provided by a health care professional, or by any individual working under the supervision of a health care professional, that relates to the diagnosis, prevention, and treatment of any human disease, impairment or assessment and care of the health of human beings. From the position of Fennell, it could be deduced that the focus of healthcare services is on various medical support services provided to people in a given area to restore, maintain, and improve mental and physical health. Therefore, healthcare services play a significant role in the maintenance and improvement of the health and well-being of individuals and communities on account of accessibility, quality, affordability, sensitivity to cultural needs, continuity, and patient-centred care. Montgomery, Gragnaloti, Burke, and Paredes, (2000) postulated that income level is one of the key determinants in the relationship between health and standard of living because an individual's standard of living is a measure of their economic well-being which is contingent upon their disposable income or consumption (Lindelow, 2006; Onwujekwe, Hanson &. Fox-Rushby, 2006). Adeyemo (2021) supported this position however, opined that healthcare services can improve the well-being of people with low income when it is affordable and accessible which was in agreement with the earlier works of Johnson and Jackson (2019) and Kamimura, Trinh, Weaver, Chernenko, Nourian, Assasnik and Tabler (2017) while Thomas (2023) asserted that retirees have been living in poor health condition for years on account of low income preventing accessibility which has consequences on their physical and mental health. Therefore, the third hypothesis was formulated that

H_3: Accessibility to healthcare services has a significant and positive influence on the standard of living.

Conceptual Framework

Fig 1. depicts the conceptual framework for this study containing the independent and dependent variables. The independent variables are pension, gratuity, and healthcare services and the dependent variable is standard of living. These independent variables were used to explain the degree of standard of living.

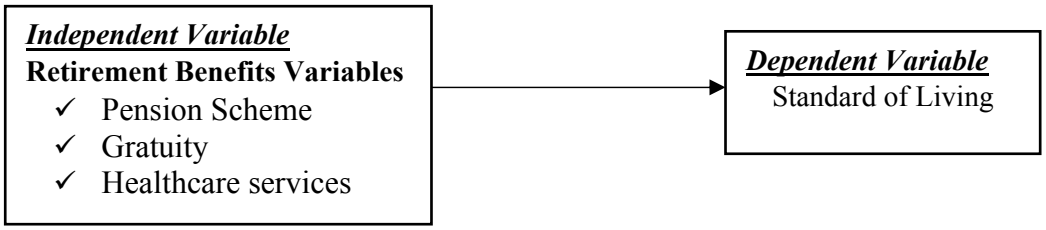

Figure 1 – Conceptual Framework
Note – constructed by the authors

Methodology

The study made use of the survey research method and purposive sampling was adopted to select 363 respondents with a focus on the questionnaire as the research instrument which was randomly distributed. The questionnaire of Johnson (2019) on retirement benefits (pension and gratuity) was adopted while that of Johnson & Jackson (2019) was adopted for the health services questionnaire. The data collected was analyzed using descriptive statistics such as the mean, percentage, and standard deviation of the respondents while Pearson coefficient Correlation and linear regression were used to test the hypotheses of the study to determine if there is a relationship between the variables under study.

Results and Discussion

The data collected were the products of the results discussed under different subheadings. It is however pertinent to know that the study has five

objectives to understand the implication of retirement benefits on the standard of living i.e.,

1. to examine the relationship between retirement benefits and standard of living;

2. the adequacy of retirement benefits on the standard of living;

3. implementation of the pension schemes on the standard of living;

4. consistency of the gratuity payment on the standard of living;

5. accessibility of retirees to the provided healthcare services on the standard of living of the retirees.

Table 1 – Demographic Characteristics of the Respondents

Variables	Characteristics	Frequency	Percentage (%)
Gender	Male	183	50.4
	Female	180	49.6
Age	Less than 45 years	12	3.3
	45 – 50 years	24	6.6
	51 – 55 years	141	38.8
	56 years & above	186	51.2
Marital Status	Single	5	1.4
	Married	163	44.9
	Divorced	91	25.1
	Widowed	104	28.7
Highest Educational Qualification	SSCE/NECO	8	2.2
	Degree	222	61.2
	Diploma	96	26.4
	Postgraduate	37	10.2
Length of Service	Less than 20 years	10	2.8
	21 – 25 years	30	8.2
	26 – 30 years	82	22.6
	31 – 35 years	241	66.4
Note – computed by authors based on the Field Survey (2024)			

The demographic characteristics of the respondents were presented in Table 1 which indicates that all genders were well represented wherein there were slightly more male retirees than female retirees that participated in the study i.e., 183 respondents as male representing 50.4% of the respondents while the remaining 180 respondents were of female gender representing 49.6% of the respondents. Table indicates that the respondents whose ages ranged between 56 years & above constitute the majority which is represented by 51.2% of the total respondents followed by retirees within the range of 51 – 55 years with 38.8% of the respondents and respondents whose ages laid within 45 – 50 years constitutes 6.6% of the total respondents while the 3.3% of the respondents were below the age of 45 years. This result shows that the retirement of these employees was voluntary due to advancement in age while a few of the respondents experienced early retirement. It was evident that the majority of the respondents were married i.e., 163 of the respondents representing 44.9% followed by the widow respondents i.e., 28.7%, divorced 25.1%, while (1.4%) of the respondents were single. It can be deduced that the majority of the respondents 98.6% had marital experience. This category of people will understand the relevance of the retirement benefits on account of their responsibilities after withdrawal of their service which has put an end to regular income.

From the information on the length of service as contained in Table 1, the majority of the respondents had between 31 to 35 years of service representing 66.4% followed by respondents whose length of service was within the range of 26 -30 years representing 22.6% and those who were within 21-25 years of service while only a few respondents served less than 20years representing 2.8% of the total population thus, signifying a good insight into retirement benefits and issues surrounding on account of their length of service. The education status of the respondents shows that 61.2% of the staff respondents were Degree holders, 26.4% had Diplomas, 10.2% had Postgraduate qualifications and only 2.2% percent had school cert as their highest educational

qualification to indicate that Degree holders are dominant in the survey. This indicates that the respondents had sufficient education to respond to the questionnaires making them suitable for the study. The demographic information attests to the fit of the respondents selected for the study.

Objective 1: to examine the relationship between retirement benefits and standard of living.

Table 2 – Pearson Correlation Matrix for the relationship between Retirement Benefits and Standard of Living

Retirement Benefit Variables	Pension	Gratuity	Health Care	Standard of Living
Pension	1	.		
Gratuity	0.591**	1		
Health Care	0.354**	0.673**	1	
Standard of Living	0.682**	0.758**	0.634**	1
**Correlation is significant at 0.05 level (2-tailed)				

Table 2 contains the results of the Pearson Correlation Coefficient on the relationship between retirement benefits and standard of living. It was evident that all the retirement benefit variables have a positive relationship with the standard of living and were significant at 0.05 level Sig. The relationship can be classified into two i.e., moderate and strong relationship. The relationship between pension and standard of living was a linear relationship where r = 0.682, $P< 0.05$, gratuity and standard of living was a linear relationship where r = 0.758 while the relationship between healthcare services and standard of living was also a linear relationship. However, the relationship between pension and healthcare services with standard of living was moderate while that of gratuity was strong. The criterion for the classification of relationship has weak relationship has ≤ 5, moderate relationship has ≤ 7, and strong relationship has > 7. Therefore, the relationship between retirement benefits is moderate and strong with the standard of living to imply that an increase in any of the retirement benefits (pension, gratuity, and healthcare services) will yield an increase in the standard of living of the retirees. Hence, objective one is achieved.

Objective 2: to examine the adequacy of retirement benefits on the standard of living

Table 3 – Descriptive Statistics on the adequacy of retirement benefits on the standard of living

Statement	Total & %	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**	**Mean**	**SD**	**Rank**	**Remark**
I'm aware of the retirement benefits before my retirement	N (%)	134(36.9)	109(30)	38(10.5)	76(20.9)	6 (1.7)	363	3.80	0.876	2	A
Before retirement, I have thought about retirement benefits as provided by the government to be adequate	N (%)	118(32.5)	117(32.2)	28(7.7)	64(17.6)	36(9.9)	363	3.60	0.864	3	A
Retirement benefits have turned out to be adequate because of its operation	N (%)	10(2.8)	50(13.8)	31(8.5)	118(32.5)	154(42.4)	363	2.02	1.276	7	D
Retirement benefits were responsible for my early retirement	N (%)	4(1.1)	52(14.3)	61(16.8)	152(41.9)	94(25.9)	363	2.23	1.025	6	D

Continuation of the table

Statement	Total & %	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	SD	Rank	Remark
Retirement benefits are adequate to sustain my standard of living	N (%)	109(30)	97(26.7)	36(9.9)	79(21.8)	42(11.6)	363	3.42	1.772	4	A
Retirement benefits are adequate to meet basic needs after retirement	N (%)	116(32)	57(15.7)	40(11)	98(27)	52(14.3)	363	3.24	0.934	5	A
The provision of retirement benefits is adequate	N (%)	193(53.2)	85(23.4)	15(4.1)	28(7.7)	42(11.6)	363	3.99	0.864	1	A

Which of the retirement benefits is found to be the most adequate in design? (Tick as appropriate)			
	N	Percentage	Remark
Pension scheme	247	68 %	1
Gratuity	73	20.1 %	2
Healthcare Services	43	11.9 %	3
Total	**363**	**100**	

where Agreement (A) is ≥ 3.0 and Disagreement (D) is ≤ 3.0)
Note – computed by authors based on the Field Survey (2024)

From Table 3, it was evident that the provision of retirement benefits was adequate and among the three elements of the retirement benefit, the pension scheme was found to be more adequate than the rest with 68% of the respondents i.e., 247 respondents attesting to its adequacy. In the same vein, the adequacy of the retirement plan was never the rationale behind early retirement as reported by 67.8% of the respondents and the understanding and knowledge of the retirement benefits before and after retirement made the assessment of its adequacy after retirement realistic. However, 74.9% of the respondents believed in the adequacy of the retirement benefits but felt discomfort in its operation. The agreement and disagreement criterion confirmed the adequacy of the retirement benefit where A ≥ 3.0 and D ≤ 3.0. Disagreement was recorded for the operation of the retirement benefit and reasons for early retirement. Therefore, objective 2 of the study was achieved.

Objective 3: to examine the implementation of the pension schemes on the standard of living

Table 4 – Descriptive Statistics of Pension implementation on the standard of living

Statement	Total & %	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	SD	Rank	Remark
I feel financially secure with the current pension implementation	N (%)	6 (1.7)	38(10.5)	76(20.9)	134(36.9)	109(30)	363	3.65	0.978	6	A
The pension implementation plans provided to meet my financial needs in retirement were good	N (%)	4 (1.1)	20(5.5)	117(32.2)	143(39.4)	79(21.8)	363	3.75	0.895	3	A
Pension implementation structure is good and adequate to maintain a comfortable standard of living	N (%)	5(1.4)	48(13.2)	83(22.9)	168(46.3)	59(16.3)	363	3.63	0.953	5	A

Continuation of the table

Statement	Total & %	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	SD	Rank	Remark
I feel confident that my pension fund is well-managed and has been made available when due.	N (%)	2(0.6)	21(5.8)	77(21.2)	188(51.8)	75(20.7)	363	3.86	0.826	1	A
I am satisfied with the flexibility to withdraw or utilize my pension benefits when the need arises.	N (%)	2(0.6)	24(6.6)	115(31.7)	151(41.6)	71(19.6)	363	3.73	0.869	4	A
I believe how my pension is structured is sufficient to cover my basic living expenses.	N (%)	4(1.1)	52(14.3)	61(16.8)	152(41.9)	94(25.9)	363	3.77	1.025	2	A
where Agreement (A) is ≥ 3.0 and Disagreement (D) is ≤ 3.0) Note – computed by authors based on the Field Survey (2024);											

It was obvious from the information contained in Table 4 that pension implementation has not met the expectations of the respondents. The criterion set for decision-making supported this wherein the mean scores were within the agreement region of A ≥ 3.0. i.e., 3.65 to 3.77 which summarised the responses of the respondents in terms of agreement on the implementation of pension scheme among civil servants as of today. For example, 263 respondents out of 363 respondents representing 72.5% disagreed with the management of the pension funds and availability as at when due while 66% of the respondents did not believe the way pension is structured is sufficient to enable the pensioners to meet their basic needs and ditto for pension implementation structure to usher in comfortable standard of living.

Objective 4: to determine the consistency of the gratuity payment on the standard of living

Table 5 – Descriptive Statistics on the consistency of the gratuity payment on the standard of living

Statement	Total & %	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total	Mean	SD
I received my gratuity payment promptly upon retirement	N (%)	2(0.6)	25(6.9)	87(24)	158(43.5)	91(25.1)	363	3.86	0.893
I am satisfied with the amount of gratuity I received	N (%)	10(0/3)	13(3.6)	97(26.7)	113(31.1)	139(38.3)	363	4.04	0.905
I had sufficient information about gratuity rules before retirement	N (%)	55(15.2)	84(23.1)	86(23.7)	100(27.5)	38(10.5)	363	2.95	1.238
If given the chance, I would suggest improvements to the current gratuity policy	N (%)	109(30)	97(26.7)	36(9.9)	79(21.8)	42(11.6)	363	2.75	1.387
I believe the formula used to calculate gratuity is fair and transparent	N (%)	18(5)	26(7.2)	168(46.3)	114(31.4)	37(10.2)	363	3.35	0.935
The process of receiving gratuity was smooth and efficient.	N (%)	6(1.7)	20(5.5)	56(15.4)	139(38.3)	142(39.1)	363	4.08	0.955
Note – computed by authors based on the Field Survey (2024)									

The result presented in Table 5 summarised the responses of the respondents on the consistency of the gratuity payment to the pensioners. It was evident that the majority of the respondents thought that gratuity payment was not consistent in all its ramifications despite the acquisition of sufficient information on the gratuity payment before retirement. Out of the 363 respondents, 249 respondents believed that the payment of their gratuity payment was never timely upon retirement representing 69% of the total respondents while 77% thought that the process of receiving gratuity was not smooth and efficient. On account of the inconsistency, 57% of the respondents sought the need to suggest improvement on the current gratuity policy and 69% of the respondents opined that the amount of gratuity received was not satisfying which corroborated the inadequacy of gratuity payment as one of the elements of the retirement benefits. Thus achieving objective 4 of the study which seeks to determine the consistency of the gratuity payment to the civil servants.

Objective 5: to examine the accessibility of retirees to the provided healthcare services on the standard of living of the retirees

Table 6 – Descriptive Statistics on the accessibility of retirees to the provided healthcare services on the standard of living

Statement	Total & %	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Total**	**Mean**	**SD**
I faced challenges or barriers in accessing healthcare services as a pensioner	N (%)	24(6.6)	33(9.1)	61(16.8)	166(45.7)	79(21.8)	363	3.67	1.113
I am satisfied with the accessibility of healthcare services for pensioners	N (%)	2(0.6)	14(3.9)	87(24)	169(46.6)	91(25.1)	363	3.92	0.830
I am aware of all the healthcare services available to pensioners	N (%)	17(4.7)	70(19.3)	56(15.4)	108(29.8)	112(30.9)	363	3.63	1.234
I would suggest improvements to the current healthcare services policy	N (%)	116(32)	98(27)	40(11)	52(14.3)	57(15.7)	363	3.08	1.338
I would like the current healthcare services available to meet the basic needs of pensioners	N (%)	109(30)	74(20.4)	48(13.2)	59(16.3)	73(20.1)	363	3.04	1.298
I would recommend the current pensioners' healthcare services to others.	N (%)	6(1.7)	47(12.9)	97(26.7)	131(36.1)	82(22.6)	363	3.65	1.020
Note – computed by authors based on the Field Survey (2024)									

From the results presented in Table 6, it was obvious that the majority of the respondents disagreed with the idea of facing challenges or barriers in the course of accessing services made available i.e., 67.5% of the total population. This attested to problem adequacy identified in objective one where healthcare service was found to be the most inadequate of the three elements of retirement benefits. The implication is that the available healthcare services were without many challenges in accessing but were not adequate which informed the position of the majority of the respondents i.e., 214 respondents representing 59% agreed on the need to improve the current health services policy and likewise the responses to the ability of the current healthcare services to meet the basic needs of the pensioners. However, majority of the respondents of the total respondents i.e., 220 respondents representing 60.6% were not satisfied with the degree of accessibility to healthcare services by the pensioners this may as a result of non-awareness of the healthcare services available which was attested by 220 respon-

dents representing 60.6% of the total respondents. Therefore, the respondents were not satisfied with the degree of accessibility to the healthcare services by the pensioners although there were no serious challenges or barriers when accessing the services. The issue of no serious challenges or barriers when accessing the healthcare services may be as a result of non-awareness of the healthcare services by the pensioners or affordability. Hence, objective 5 is hereby achieved.

Aside from the objectives upon which the study was based, three hypotheses were formulated to further understand the significance of each of the retirement benefits i.e., implementation of pension schemes, consistency of gratuity payment, and accessibility of healthcare service as discussed in the literature review.

Test of hypotheses

H_1: Implementation of pension schemes has a significant and positive influence on the Standard of living.

Table 7 – The influence of the implementation of the pension schemes on the standard of living of the retirees
a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.582[a]	0.339	0.337	0.47153
a. Predictors: (Constant), Pension				

Table 7 through the F-statistics result shows that the model fits well and is statistically significant in explaining the influence of the implementation of pension schemes on the standard of living of retirees. The Table summarised the relationship between the implementation of the pension schemes and the standard of living of the retirees which was found to be a positive linear relationship when R = 0.582 and R^2 = 0.339 i.e., 34% indicates that implementation of the pension schemes can explain the variation in the standard of living of the retirees while the low value of adjusted R^2 i.e., 0.337 indicates that additional predictors are not improving the model and the relationship is significant at $P < 0.05$ (0.000[b]). Therefore, the implementation of pension schemes will moderately influence the standard of living of the retirees at any time on account of the value of R which is 0.582. This result can be linked to objective 3 which seeks to examine the implementation of the pension schemes on the standard of living where it was concluded the current structure for the implementation of the pension schemes cannot herald a favourable standard of living. It can be concluded that where the implementation of the pension schemes is good, the standard of living of the retiree will be good due to the linear relationship that exists between the two variables and vice versa. This confirms the stated hypothesis that the implementation of pension schemes has a significant and positive influence on the Standard of living.

H_2: Consistency of gratuity payment has a significant and positive influence on the Standard of living.

Table 8 – The influence of gratuity payment on the standard of living of the retirees
a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.758[a]	0.575	0.573	0.37816
a. Predictors: (Constant), Gratuity				

It was evident from Table 8 that there exists a strong positive relationship between consistency of gratuity payment and standard of living when R = 0.758 which can be interpreted to mean a linear relationship that is significant at $P < 0.05$ (0.000[b]) i.e., whenever there is consistency in the payment of retirees' gratuity, the standard of living of the retirees will be high and vice versa. It was further revealed that R^2 = 0.575 which implies that 58% of the variation in the standard of living can be explained by consistency in the gratuity payment while adjusted R^2 = 0.573 which was below the value of R to signify that the additional predictor will not improve the model if added although it was positive. This signifies that ad-

justed R^2 has been taken into consideration as being a modifier of the R^2 effect that somewhat overestimates the fit of a model. This result can be linked to objective 4 which seeks to determine the consistency of the gratuity payment on the standard of living which concluded that gratuity payment was not consistent. It can be deduced that since the relationship between gratuity payment and standard of living was a positive linear relationship, consistent payment of retiree's gratuity will usher in a good standard of living. However, the result obtainable for objective 4 concluded that there was no consistency in the payment of the retirees' gratuity. Therefore, the standard of living of the retirees will be low due to the inconsistency of the gratuity payment.

H_3: Accessibility to healthcare services has a significant and positive influence on the standard of living.

Table 9 – The influence of accessibility to healthcare services on the standard of living of the retirees
a) Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.634[a]	0.402	0.400	0.44830
a. Predictors: (Constant), Health Care				

F-statistics result shows that the model fits well and is statistically significant to explain the result obtained for Table 9. It shows that R = 0.634 implies a moderate linear positive relationship between the accessibility to healthcare services and the standard of living. The value of R^2 which was 0.402 signifies that accessibility to healthcare services has about 42% decisive influence on the standard of living while the value of adjusted R^2 of 0.400 has taken into consideration the number of predictors in the model thus, making it fairly fit on account of the low value. A link of this result to the result obtained for objective 5 seeks to examine the accessibility of retirees to the provided healthcare services on the standard of living of the retirees which revealed that the pensioners were not satisfied with the degree of accessibility to the healthcare services even though there were no serious challenges or barrier when accessing the services. This corroborates the outcomes of objectives 3 and 4 on poor implementation of pension schemes and inconsistency in the payment of gratuity otherwise the affordability would be there to induce satisfied accessibility to the healthcare services. Therefore, the inability to be satisfied with the degree of accessibility to healthcare services means a poor standard of living since the relationship was linear i.e., satisfaction with the degree of accessibility to healthcare services will imply a satisfied standard of living.

Discussion of Findings

The discussion was based on the results presented in Table 2 to Table 9. It was evident that there exists a positive linear relationship among all the retirement benefit variables with the standard of living. The relationship was found to be a positive linear relationship which implies the retirees' standard of living would be a product of retirement benefits comprising pension scheme, gratuity, and healthcare. The result confirms the findings of Adams (2019) and Johnson (2019) that the structure, sufficiency, and stability of retirement benefits have a considerable impact on the financial security and quality of life of retirees. This buttressed the position of Kotun, Adeoye & Akingbade, (2023) that the degree of availability of these benefits determines the retirees' decent standard of living after their active working years. The study found that the retirement benefits were adequate, especially the pension scheme but had challenges with the implementation of the schemes which was in tandem with the earlier work of Pillah (2023) that adequacy of pension in terms of implementation over the payment is paramount to guarantee quality life after retirement. However, the study found the implementation of pension schemes to be poor to imply a poor standard of living among the retirees which is in agreement with the work of Abubakar (2021) that the implementation of pension schemes determines the success of its adequacy thus, good implementation will yield a good standard of living and vice versa.

It was found that there exists a strong relationship between gratuity and standard of living which confirms the findings of Fred, Udoh, and Kpurunee (2019) that there exists a strong relationship between gratuity and the health well-being of retirees. The study also found that there was no consistency

in the payment of retirees' gratuity thus subjecting the retirees to poor standard of living. This result supported the earlier works of Etodike, Ezeh, and Chukwura (2017) that delay in gratuity payment accounts for 65% of retirement stress and anxiety among retired employees. The works of Okolie and Idibra (2022) also buttressed the result of this study that delays in gratuity payment contribute to retirees' diminishing status, deteriorating health, and premature mortality shortly after retirement. It was also evident that accessibility to healthcare and standard of living has a positive relationship and there were no serious challenges accessing the healthcare services but the retirees were not satisfied with the accessibility on account of affordability. This result confirms the finding of Montgomery, Gragnaloti, Burke, and Paredes, (2000) that income level is one of the key determinants in the relationship between health and standard of living. Also supports the findings of Thomas (2023) that retirees have been living in poor health conditions for years on account of low income thus, preventing accessibility that will improve their standard of living (Adeyemo, 2021; Johnson & Jackson, 2019).

Conclusion

Based on the findings of the study, it was evident that there exists a nexus between retirement benefits and the standard of living of retirees. The relationship was positive to imply that retirement benefits will progressively influence the direction of retirees' standard of living wherein retirement benefits are good, the standard of living will be good, and vice versa. However, despite the adequacy of the pension schemes, the implementation has been poorly executed thus hindering the expected outcome on the standard of living, the inconsistency in the payment of the retirees' gratuity was confirmed and has affected the standard of living of these retired employees with a corresponding effect on the accessibility to the healthcare services provided. Therefore, the study concluded that the module operandi of retirement benefits as currently being practiced has affected the standard of living of retirees negatively on account of poor implementation of the pension scheme which was considered to be adequate, inconsistency in the payment of gratuity entitlement, and affordability of healthcare services.

Recommendations

Based on the findings and conclusion of the study, it is expedient to take cognisant of the emerging facts about the true position of retirement benefits leading to poor standard of living. Therefore, the researchers arrived at the following recommendations;

1. Revise the policy guiding the implementation of the pension schemes in such a way that implementation will be seamless in operation, environmentally friendly, and readily reflect the dictate of the prevailing circumstance.
2. The law relating to the prompt payment of retirees' gratuity should be enforced to ensure that retirees get their entitlement when due. Delay should not be encouraged thus, starting the processing of retirement documents before the expiration of the contract of employment.
3. The government can put in place a motion or machinery that will ensure feedback on pension implementation and consistent payment of retirees' gratuity.
4. Embark on periodic campaign in form of awareness that will enable retirees to know and understand the best way to access the healthcare services with their low income.
5. The government should form a formidable partnership with the retirees' pension union to understand any plight being faced by retirees in pension implementation, consistency of gratuity payment, and accessibility to healthcare services.
6. The implementation of pension schemes, gratuity, and healthcare services should reflect socio-economic factors with a priority on inflation and social support systems.

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Information about authors:

Akindele Iyiola Tomolayo – PhD, Associate Professor in the Department of Public Administration, Faculty of Management Sciences, University of Ilorin, (Ilorin, Kwara State, e-mail: akindele.it@unilorin.edu.ng);

Oginni Babalola Oluwayemi (Corresponding author) – PhD, Associate Professor in the Department of Employment Relations & Human Resource Management, Osun State University, (Osogbo, Okuku Campus, Osun State, Nigeria. e-mail: babalola.oginni@uniosun.edu.ng);

Kasumu, Modupe Silifat – PhD, Lecturer II in the Department of Sociology, Faculty of Social Sciences, (Osun State University, Osogbo, Okuku Campus, Osun State, Nigeria, e-mail: modupe.Kasumu@uniosun.edu.ng);

Akande Olutayo Bamidele – PhD student (Research Assistant) in the Department of Employment Relations & Human Resource Management, Osun State University, (Osogbo, Okuku Campus, Osun State, Nigeria, e-mail: isomes2011@gmail.com).

Авторлар туралы мәлімет:

Акинделе Ийиола Томолайо – PhD, Қоғамдық басқару кафедрасының қауымдастырылған профессоры, Басқару ғылымдары факультеті, Илори университеті (Илори, Квара штаты, Нигерия, e-mail: akindele.it@unilorin.edu.ng);

Огинни Бабалола Олувайеми (корреспондент автор) – PhD, Еңбек қатынастары және адам ресурстарын басқару кафедрасының қауымдастырылған профессоры, Осун мемлекеттік университеті (Осогбо, Окуку кампусы, Осун штаты, Нигерия, e-mail: babalola.oginni@uniosun.edu.ng);

Касуму Модупе Силифат – PhD, Әлеуметтану кафедрасының II дәрежелі оқытушысы, Әлеуметтік ғылымдар факультеті, Осун мемлекеттік университеті (Осогбо, Окуку кампусы, Осун штаты, Нигерия, e-mail: modupe.kasumu@uniosun.edu.ng);

Аканде Олутаё Бамиделе – PhD докторант (ғылыми көмекші), Еңбек қатынастары және адам ресурстарын басқару кафедрасы, Осун мемлекеттік университеті (Осогбо, Окуку кампусы, Осун штаты, Нигерия, e-mail: isomes2011@gmail.com).

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G.R. Dauliyeva, Zh.B. Ranov, A.G. Sagynbay *, S.T. Makhsutova

Al-Farabi Kazakh National University, Almaty, Kazakhstan
*e-mail: sagynbay_assel3@live.kaznu.kz

NEXUS BETWEEN ENTREPRENEURSHIP AND POVERTY REDUCTION: REGRESSION ANALYSIS OF CAUSALITY

Poverty reduction remains a key priority of Kazakhstan's socio-economic policy. While entrepreneurship is widely acknowledged as a driver of economic growth, its association with poverty alleviation in the country remains insufficiently explored. A comprehensive analysis of this relationship is essential for enhancing policy effectiveness.

This study examines the associations between entrepreneurial activity, business incentives, and poverty reduction in Kazakhstan. The Human Development Index (HDI) is employed as the dependent variable, as it encapsulates not only income levels but also access to education and healthcare.

The study applies linear, logarithmic, and semi-logarithmic regression models, addressing potential issues of multicollinearity and autocorrelation. The independent variables include entrepreneurial activity, business development incentives, trade openness, urbanization, and corruption control.

The results confirm that entrepreneurship and business incentives play a crucial role in poverty reduction. Increased entrepreneurial activity contributes to job creation, income growth, and improved access to essential services. Furthermore, the study highlights the significance of reducing administrative barriers and strengthening anti-corruption measures to foster business development. Additionally, urbanization and trade openness are identified as significant determinants of economic progress.

Unlike traditional studies that focus solely on income-based measures, this research employs HDI as a comprehensive indicator of human development. The findings offer valuable insights for policymakers in designing effective entrepreneurship policies, optimizing regulatory frameworks, and enhancing governance mechanisms to promote sustainable economic growth and poverty reduction in Kazakhstan.

Key words: poverty, entrepreneurship, Human development index, urbanization, trade.

Г.Р. Даулиева, Ж.Б. Ранов, Ә.Ғ. Сағынбай*, С.Т. Махсутова

Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан
*e-mail: sagynbay_assel3@live.kaznu.kz

Кәсіпкерлік пен кедейлікті азайту арасындағы байланыс: себеп-салдарлық регрессиялық талдауы

Кедейлікті азайту – Қазақстанның әлеуметтік-экономикалық саясатының басым бағыты. Кәсіпкерлік экономикалық өсудің маңызды факторы ретінде мойындалғанымен, оның кедейлікті төмендетуге ықпалы әлі де жеткілікті зерттелмеген. Бұл байланысты кешенді талдау мемлекеттік саясаттың тиімділігін арттыруға мүмкіндік береді.

Бұл зерттеу кәсіпкерлік белсенділік, бизнеске ынталандыру шаралары мен кедейлікті төмендету арасындағы өзара байланысты талдайды. Тәуелді айнымалы ретінде Адам дамуы индексі (HDI) алынған, ол табыстан бөлек, білім мен денсаулық сақтауға қолжетімділікті де қамтиды.

Зерттеуде линейлік, логарифмдік және жартылай логарифмдік регрессиялық модельдер қолданылып, мультиколлинеарлық пен автокорреляция мәселелері ескерілді. Тәуелсіз айнымалылар ретінде кәсіпкерлік белсенділік, бизнеске ынталандыру, сауданың ашықтығы, урбанизация деңгейі және сыбайлас жемқорлықты бақылау қарастырылды.

Зерттеу нәтижелері кәсіпкерлік пен бизнеске ынталандыру шараларының кедейлікті төмендетуде маңызды рөл атқаратынын көрсетті. Кәсіпкерліктің дамуы жұмыс орындарының көбеюіне, халық табысының артуына және әлеуметтік қызметтерге қолжетімділікті кеңейтуге ықпал етеді. Сонымен қатар, әкімшілік кедергілерді азайту және жемқорлықпен күресті күшейту бизнес ортасының дамуына оң әсер етеді. Сондай-ақ, урбанизация мен сауданың ашықтығы экономикалық өсімнің маңызды факторлары болып табылады.

Дәстүрлі зерттеулер табыс көрсеткіштеріне ғана сүйенсе, бұл жұмыс Адам дамуы индексін

кәсіпкерлікті дамыту стратегияларын жетілдіру, құқықтық реттеуді оңтайландыру және мемлекеттік басқару сапасын арттыру арқылы Қазақстандағы тұрақты экономикалық өсім мен кедейлікті төмендетуге бағытталған ұсыныстар жасауға негіз болады.

Түйін сөздер: кедейлік, кәсіпкерлік, Адам даму индексі, урбанизация, сауда.

Г.Р. Даулиева, Ж.Б. Ранов, А.Г. Сагынбай*, С.Т. Махсутова

Казахский национальный университет им. аль-Фараби, Алматы, Казахстан
*e-mail: sagynbay_assel3@live.kaznu.kz

Взаимосвязь между предпринимательством и снижением бедности: регрессионный анализ причинно-следственности

Снижение уровня бедности остается одной из ключевых задач социально-экономической политики Казахстана. Несмотря на признанную роль предпринимательства в обеспечении экономического роста, его взаимосвязь с сокращением бедности остается недостаточно изученной. Глубокий анализ данной зависимости необходим для повышения эффективности государственной политики.

В исследовании анализируется взаимосвязь между предпринимательской активностью, мерами поддержки бизнеса и снижением бедности в Казахстане. В качестве зависимой переменной используется Индекс человеческого развития (HDI), который охватывает не только уровень доходов, но и доступ к образованию и медицинским услугам.

Применены линейные, логарифмические и полу-логарифмические регрессионные модели с учетом возможных проблем мультиколлинеарности и автокорреляции. В качестве независимых переменных рассматриваются предпринимательская активность, бизнес-стимулы, открытость торговли, уровень урбанизации и контроль коррупции.

Исследование подтверждает, что предпринимательство и меры поддержки бизнеса являются важными факторами снижения бедности. Рост предпринимательской активности способствует созданию рабочих мест, увеличению доходов населения и расширению доступа к социальным услугам. Кроме того, подчеркивается важность снижения административных барьеров и усиления антикоррупционной политики для стимулирования деловой среды. Также урбанизация и открытость торговли оказывают значительное влияние на экономическое развитие.

В отличие от традиционных исследований, ориентированных исключительно на показатели доходов, данная работа использует HDI как интегральный показатель человеческого развития. Полученные результаты могут быть использованы при разработке эффективной политики поддержки предпринимательства, совершенствовании нормативно-правового регулирования и повышении качества государственного управления, что будет способствовать устойчивому экономическому росту и снижению бедности в Казахстане.

Ключевые слова: бедность, предпринимательство, Индекс человеческого развития, урбанизация, торговля.

Introduction

The fight against poverty is becoming the main problem of international organizations, as well as many countries around the world. Even when the global poverty rate has decreased significantly over the past 30 years, this issue is still relevant. According to the World Bank, between 1985 and 2020, the poverty rate only decreased from year to year, but the Covid-19 pandemic, which began in 2020, reversed this steady decline. The pandemic has negatively affected the quality of life of the population and the well-being of the world's population and, consequently, increased the number of poor (Battilana et al., 2020).

Obviously, poverty and income inequality are a problem that attracts the attention of the entire world's population. The fight against poverty is an urgent SDG issue that must be addressed first. According to the Global Multidimensional Poverty Index 1.1 billion people worldwide live below the poverty line in 2024. And about half of them, 455 million people, are in countries where there is conflict in the world, in conditions of political instability.

Over the years, leaders of various states and social organizations have developed many international programs, paying special attention to social issues such as improving the country's well-being, improving the quality of life, developing human capital, reducing poverty and income inequality. However, this problem has not been completely solved in the world, and even extreme poverty occurs from all over any developed, developing, or remaining country in the world (Rindova et al., 2019).

The poverty rate in the Republic of Kazakhstan in 2024 was 5.4%, 1 million 619 thousand people

(Our world in data, 2024). However, it is worth noting that, according to World Bank statistics, the poverty rate in our country is 15.5% (World Bank, 2024). We believe that these two differences are the result of a gap in the measurement of poverty. The difference in poverty rates (5.4% vs. 15.5%) arises from different measurement methodologies. The Bureau of National Statistics of Kazakhstan calculates poverty based on the national subsistence minimum, while the World Bank uses international poverty lines ($3.65 and $6.85 per day, PPP). The World Bank also considers broader socio-economic factors like education and healthcare, leading to a higher estimate. Additionally, variations in survey methods and data sources contribute to discrepancies. These differences highlight the need to consider both national and international measures for a comprehensive poverty assessment.

Investments, microfinance, social assistance and others that have been widely used in the Republic of Kazakhstan so far have not been able to significantly reduce poverty. Therefore, effective methods and tools are now needed to combat poverty.

The impact of entrepreneurship development on poverty reduction has only recently been analyzed more and more by scientists. Through the development of entrepreneurship, new private enterprises will be opened in the state, and even existing ones will be scaled, respectively, a lot of new jobs will be created in the market. Thanks to new jobs, the incomes of the poor are increasing, the quality of life is improving, and the poverty rate is decreasing. The development of entrepreneurship can have a direct positive impact on the economic development of the country, positively affect the emotional state of the population, increase the motivation of the population to develop and move forward. This is due to the fact that recently more and more scientists have been studying the socio-emotional states of the poor population, and not just the lack of monetary income for the poor population (Steven at al., 2020).

This article analyzes the HDI index as an index for measuring poverty. The Human Development Index plays a very important role in measuring poverty. This is due to the fact that the human development index is an important indicator that takes into account not only the low monetary income of the population, but also education, health and standard of living of the population. For this reason, this index can also be used for large-scale poverty measurements. The HDI takes values from 0 to 1. 1 is the maximum value. Human potential development is not only about increasing the efficiency of the national economy in a country, it means increasing the population's ability to receive the necessary resources for education, better health, higher incomes, and a healthy lifestyle. And people who have received education and health are moving out of poverty and increasing their desire to improve their standard of living (UNDP, 2025).

The purpose of this work is to study the impact of incentives for the development of entrepreneurship and entrepreneurship in Kazakhstan on poverty reduction. All statistics were obtained from official World Bank and UNDP data from 2011 to 2024.

Literature Review

The problem of poverty

The general concept of poverty arises primarily from material scarcity, which we refer to as the lack of housing and food necessary for existence. And then, upon departure, we note the lack of access to basic services (health, education). However, in the modern understanding of poverty, scientists are also increasingly studying the lack of non-material needs, which include social security, insecurity of rights, social bullying, social isolation, etc. Therefore, there are many difficulties for scientists in measuring the modern concept of poverty and developing ways to combat poverty. Even today, there is no definition that can fully describe the concept of poverty (Bitler et al., 2024).

According to Liang's definition (2025), poverty is hunger. Poverty is the lack of housing. Poverty is a fear for the future, the inability to find a job at all. Scientists, investigating the cause of poverty and income inequality, said that the more family members there are, the fewer educational and working opportunities there are for the family, and, accordingly, this condition leads to poverty (Chakrabartty, 2023).

Poverty and income inequality are the main factors. The more income a country's income is unevenly distributed, the poorer people become even more impoverished. Poverty is a social situation that arises from the lack of basic material conditions such as clean drinking water, food, sanitation, and housing (Othman et al., 2024).

Some scientists point out that there is a difference in the definition of poverty in developed and developing countries. For example, the poor in developed countries classify people only if their basic needs, such as housing, food, health, and education, are not being met. But the concept of the poor population in developed countries is different, that is, the poor population in these countries continues to treat the poor population, even if family finances do not satisfy all their desires, they feel excluded from so-

ciety, they feel worse than other people (Olofin et al., 2024).

Amartya Sen's work on poverty extends beyond material deprivation and emphasizes capabilities – the ability of individuals to achieve valuable life outcomes. Sen (1999) argued that poverty is best understood as the deprivation of basic freedoms, which includes not only the lack of income but also limited access to education, healthcare, and political participation. His capability approach has been widely adopted in measuring poverty, influencing frameworks such as the Human Development Index (HDI) and the Multidimensional Poverty Index (MPI).

Martin Ravallion, a leading economist in poverty research, contributed significantly to poverty measurement and policy evaluation. His works (Ravallion, 2016;) focused on absolute versus relative poverty, the effectiveness of anti-poverty programs, and the limitations of traditional income-based poverty measurements. Ravallion emphasized that economic growth alone is not sufficient to reduce poverty; the structure of growth and social policies matter. He developed the $1.90 per day international poverty line, which the World Bank uses to track extreme poverty.

Poverty in Kazakhstan

Research on poverty in Kazakhstan highlights the transition from a centrally planned to a market economy and the resulting economic disparities. Studies indicate that poverty in Kazakhstan is heavily influenced by regional inequality, urban-rural disparities, and the effectiveness of social protection policies (Akhmetova & Izimov, 2023; Satybaldin et al., 2022).

Key findings in the Kazakhstani context include:

- Regional disparities: The western and oil-rich regions have lower poverty rates, while southern and rural areas face persistent poverty.

- Social protection programs: Kazakhstan has introduced various targeted social assistance (TSA) programs, but their effectiveness is debated. Some scholars argue that these programs reduce poverty only temporarily without addressing structural causes (Nurgaliyeva & Abdullayeva, 2021).

- Energy and food security impact: Recent studies (Mukhamediyev et al., 2024) suggest that rising energy costs and food insecurity exacerbate income inequality, disproportionately affecting low-income groups.

Development of entrepreneurship

Entrepreneurship is a special type of economic activity aimed at making a profit, aimed at high responsibility and innovation. Currently, there is no single clearly defined definition of entrepreneurship. An entrepreneur, spending his precious time and effort to come up with something new, risking psychological and financial risks, respectively, makes a profit in the form of remuneration for his work. Noruzi et al. (2021) in his article, he tried to comprehensively study entrepreneurship from a psychological, managerial, and economic point of view.

According to Hamed et al. (2024), the advantage of an individual entrepreneur over an employee is that he can benefit from doing business without pursuing only financial benefits as a result of his work. However, the difficulty of an individual entrepreneur is explained by the fact that he takes on all losses even in the event of bankruptcy.

And Xiong & Sun (2025) emphasized the benefits of entrepreneurship for the population by creating new jobs, producing new goods or services. Entrepreneurship in general leads to the emergence of new business opportunities, new initiatives, and new economic resources in order to make a profit. Such skills allow an entrepreneur to run his business effectively, to think adequately in emerging difficulties and situations.

A modern entrepreneur is a person who comes up with an innovative idea, gets new jobs, new goods or services for the state, can effectively manage their activities without harming the environment, can compete with entrepreneurs from around the world, can take risks, can build a long-term strategy, and make a profit as a result of their work (TorBjörn, 2024).

The impact of entrepreneurship on poverty reduction

The impact of entrepreneurship in general on poverty reduction has only recently been increasingly analyzed. Several works by scientists in the field of economics and management have been studied, which have drawn attention to this problem.

Zainol et al. (2024), in his article on the relationship between entrepreneurship and poverty, said that in developing countries, the poor can improve their social situation through self-employment. Such jobs include, for example, baking bread or pies at home, cleaning or sewing work, etc.

According to Kayenga & Mukanyangezi (2021), entrepreneurship in developing countries has a direct positive impact on economic development and poverty reduction. That is, in most cases, the poor population cannot get a job, since the services provided by the state may be deprived of the education and qualifications of the poor population, and the poor population will be employed by jobs offered by entrepreneurs. Accordingly, entrepreneurs cre-

ate conditions for these people by taking advanced training courses and increasing their ability to work. These classes should be funded by the state.

Indeed, in developing countries, when the poor cannot get a job, they have the opportunity to engage in self-employment and improve their social status. In other words, entrepreneurship is considered as the main instrument of economic development. The development of entrepreneurship is changing the welfare situation in the country. That is, it gives people the opportunity to become economically independent, improve their thinking abilities and increase their incomes even more, despite stable wages. This has a positive effect on the well-being of society (Masa et al., 2024).

The impact of urbanization on poverty reduction and entrepreneurship development

Urbanization plays a very important role in the standard of living of the population. Entrepreneurship promotes the opening of new professions for development, an increase in the urban population, and the growth of the high-income population. Because the incomes of the urban population are always higher than those of the rural population. In addition, urban residents have a very high opportunity to engage in entrepreneurship, compared with the rural population. For this reason, entrepreneurship is more likely to develop in urban areas (Gao, 2024).

Urbanization also increases access to newly opened entrepreneurs, already working entrepreneurs, a wide range of consumers, highly qualified specialists, as well as logistics, raw materials. Starting a business in a big city is very profitable than in rural areas. This is because cities create too many job opportunities. Accordingly, the incomes of the population are growing, while the poverty rate is decreasing (András et al., 2022).

The impact of trade on poverty reduction and entrepreneurship development

According to Fang (2025), trade transparency in the country can promote and develop business in the country, reducing poverty in the country. He paid special attention to the policy of poverty reduction in the Chinese country. The country of China has managed to significantly reduce the poverty rate of its population in several steps. Chinese policy achieves this result by expanding trade opportunities that began in the 1980s. Currently, China's poverty rate is significantly lower than the world's, but in the 1980s, the country's poverty rate was the highest in the world. In other words, Deng Xiaoping's "open door policy" in the 1980s made a much greater contribution to the development of entrepreneurship in this country, improving the country's well-being and reducing poverty.

And according to Sandhu (2024), poverty in developing countries can decrease due to free trade and open trade. They say that for economic stability in the country and improving the welfare of the population, trade transparency should be used as a special tool. Because thanks to this, there are a lot of opportunities for entrepreneurs in the country, and the poverty rate is decreasing accordingly.

Summing up the literature review, the authors began to test the following hypotheses:

Hypothesis 1: There is an significant correlation between the entrepreneurship and poverty.

Hypothesis 2: There is no significant correlation between the entrepreneurship and poverty.

Hypothesis 3: There is an significant correlation between business incentives and poverty.

Hypothesis 4: There is no significant correlation between business incentives and poverty.

Methodology

Data

The dataset covers the period 2000–2024 and includes data from official World Bank and UNDP sources. The Human Development Index (HDI) serves as the dependent variable, while indicators of entrepreneurial activity and business development incentives are used as explanatory variables. Control variables include trade and urbanization.

Table 1 – Variables and their sources

Variables	Definition	Sources
HDI- Human Development Index	HDI is a cumulative indicator of a country's average achievement in three key aspects of human development: health, education, and standard of living.	UNDP
NBD- New Business dencity	The number of newly registered entrepreneurs per 1000 able-bodied people (15-64 years) per year.	World Bank

Continuation of the table

Variables	Definition	Sources
DRSB - Number of days required to start a business	Number of days required to start a business	World Bank
CC - Control of Curruption	Corruption index (From -2.5 to 2.5)	World Bank
Trade	Total trade (% of GDP)	World Bank
UP -Urbanization	% of the total population	World Bank
Note – compiled by the authors based on World Bank (2025); UNDP (2025)		

Methodology

For regression analysis, we considered linear and semi-logarithmic models while ensuring that multicollinearity does not occur. After testing multiple specifications, the following models (1-2) were selected, with coefficients that are statistically significant and overall model quality that is adequate.

The first model is specified as follows:

$$HDI_t = a + \beta_1 NBD_t + \beta_2 DRSB_t + \beta_2 CC_t + \\ + \beta_4 UP_t + \beta_5 Trade_t + \beta_6 HDI_{t-1+u_t} \quad (1),$$

where:

HDI – Human Development Index (dependent variable);

NBD – new business density (number of newly registered businesses per 1,000 working-age population);

DRSB – number of days required to start a business;

CC – corruption control index;

UP – urbanization (% of total population);

Trade – trade openness (sum of exports and imports as % of GDP);

HDI(-1) – lagged value of HDI to account for persistence and eliminate autocorrelation;

ut – disturbance term.

The semi-logarithmic model is specified as follows:

$$Log(HDI_t) = a + \beta_1 NBD_t + \beta_2 DRSB_t + \beta_2 CC_t + \\ + \beta_4 UP_t + \beta_5 Trade_t + \beta_6 HDI_{t-1+u_t} \quad (2),$$

where log(HDI) denotes the natural logarithm of the Human Development Index.

To address the issue of autocorrelation identified in the initial model, we included the lagged dependent variable HDI(-1). Additionally, to ensure robust inference, Newey-West standard errors were applied. The issue of multicollinearity was addressed by testing for Variance Inflation Factor (VIF), ensuring that all independent variables remained within acceptable limits (VIF < 5). The stationarity of all variables was tested using the Augmented Dickey-Fuller (ADF) test, the results of which are provided in the Appendix.

Results and Discussion

The Human Development Index (HDI) is an indicator that measures poverty. The Human Development Index includes education, health and living standards (GDP per capita). Figure 1 below shows the dynamics of the HDI indicator for the Republic of Kazakhstan for the period from 2000 to 2024:

As you can see in Figure 1 Above, the graph contains clear, consistent, and stable time patterns that indicate that changes in variables are suitable for further research. We can see that the Human Development Index grew rapidly until 2019, and then the level of poverty decreased smoothly. Consequently, from 2019 to the present, the Human Development Index HDI has fallen sharply. This decline can be explained by the fact that the global COVID-19 pandemic, which began in 2019, negatively affected the economic and social life of countries around the world, including the Republic of Kazakhstan, as a result of which the number of poor people in the country increased sharply.

For regression analysis, we considered linear and semi-logarithmic models while ensuring that multicollinearity does not occur. After testing multiple specifications, the following models (1-2) were selected, with coefficients that are statistically significant and overall model quality that is adequate.

The linear and semi-logarithmic models evaluated by equations 1 and 2 are presented in the following table 2:

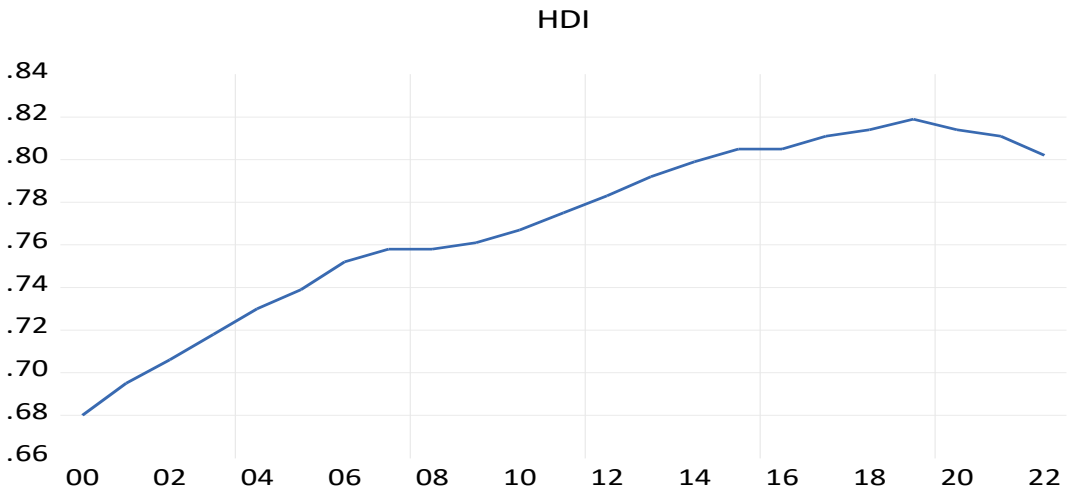

Figure 1 – Index of human development of the Republic of Kazakhstan for 2000-2024y
Note – compiled by the authors based on Our world in data (2024)

Table 2 – Results of LS estimation HDI (2000-2024y)

Independent variables	Model 1 – LS estimation (HDI)	Model 2 – LS estimation (log(HDI))
NBD	0.0048 (0.0016)***	0.0075 (0.0020)***
DRSB	-0.0011 (0.0005)**	-0.0015 (0.0004)***
CC	0.00046 (0.00018)**	0.00056 (0.0002)***
UP	-0.0024 (0.0009)**	-0.0028 (0.0001)***
Trade	-0.0006 (0.0003)**	-0.0007 (0.0003)**
HDI (-1)	0.763 (0.112)***	0.816 (0.095)***
Constant	0.319 (0.045)***	0.285 (0.036)***
R-Squared	0.983	0.991
Durbin-Watson	2.15	2.10
Note: 1) constant coefficients are not recommended; 2) Odds ***1%, **5%, *10% at the level of significance, it is statistically significant. 3) The result is based on data from UNDP and World Bank		

New business density (NBD) is positively associated with HDI (0.0048 and 0.0075 in the two models, respectively), suggesting that entrepreneurship is linked to improvements in human development.

Days required to start a business (DRSB) are negatively associated with HDI (-0.0011 and -0.0015), meaning that longer registration processes correspond to lower human development.

Corruption control (CC) has a positive association with HDI (0.00046 and 0.00056), confirming that stronger anti-corruption measures align with better human development outcomes.

Urbanization (UP) shows a negative association with HDI (-0.0024 and -0.0028), which may suggest that rapid urban growth is not necessarily leading to improvements in human development due to inequality issues.

Trade openness (Trade) has a negative association with HDI (-0.0006 and -0.0007), implying that increasing trade does not always lead to higher human development, potentially due to structural imbalances in the economy.

The lagged dependent variable HDI(-1) is highly significant, confirming the persistence of human development levels over time and addressing autocorrelation concerns.

The study confirms that entrepreneurship (NBD) is strongly associated with human development, while regulatory barriers (DRSB) negatively correlate with HDI. Corruption control fosters human

development, whereas rapid urbanization and trade openness show negative associations with HDI, suggesting potential structural issues in economic growth.

By addressing autocorrelation, multicollinearity, and sample size concerns, the revised model presents a robust analysis covering 2000–2024. The findings provide valuable insights for policymakers aiming to balance economic growth and human development in Kazakhstan.

Conclusion

This study analyzed the association between business incentives, entrepreneurship, and poverty reduction in Kazakhstan. It examined how policies aimed at fostering entrepreneurship contribute to economic opportunities, the creation of new business environments, and overall human development. The Human Development Index (HDI) was chosen as the dependent variable to capture the multidimensional aspects of poverty. To ensure the robustness of the findings, linear, logarithmic, and semi-logarithmic regression models were employed, carefully addressing potential multicollinearity issues.

The results confirm that entrepreneurship and business incentives are positively associated with poverty reduction. Increased entrepreneurial activity expands economic opportunities, promotes innovation, and enhances overall living standards. These findings align with H1 and H3, which hypothesized a strong correlation between entrepreneurship development, business incentives, and poverty alleviation.

Furthermore, the study highlights that corruption control and improved public governance are crucial for fostering an entrepreneurial environment. Strengthening transparency and reducing bureaucratic barriers can enhance business development and support long-term economic sustainability. Additionally, international experience – such as China's trade liberalization – suggests that expanding trade openness may further stimulate entrepreneurship and economic mobility, reducing poverty levels.

Urbanization also plays a significant role in shaping economic opportunities. Cities provide better access to resources, infrastructure, and markets, making them key hubs for business development. However, urban expansion must be managed effectively to prevent rising inequality. Our findings suggest that while urbanization fosters business growth, policies should ensure that its benefits are equitably distributed.

A notable barrier identified in the study is the lengthy business registration process, which negatively impacts entrepreneurship. Reducing the number of procedures and simplifying regulations can encourage more individuals to start businesses, further contributing to poverty alleviation.

In conclusion, this study provides empirical evidence that entrepreneurship is a crucial mechanism for improving living standards and reducing poverty. By fostering a business-friendly environment and addressing institutional barriers, Kazakhstan can enhance human development outcomes. These findings contribute to the existing literature and can serve as a foundation for policy recommendations aimed at achieving sustainable socio-economic progress.

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Appendix

Dataset for 2000–2024

Year	HDI	NBD	DRSB	CC	UP	Trade
2000	0.652	2.055	40.648	-0.418	48.585	49.381
2001	0.656	1.758	37.98	-0.45	49.996	43.436
2002	0.667	2.855	36.146	-0.447	50.491	44.701
2003	0.679	2.7	37.473	-0.366	50.448	46.449
2004	0.677	3.187	37.062	-0.532	51.505	45.66

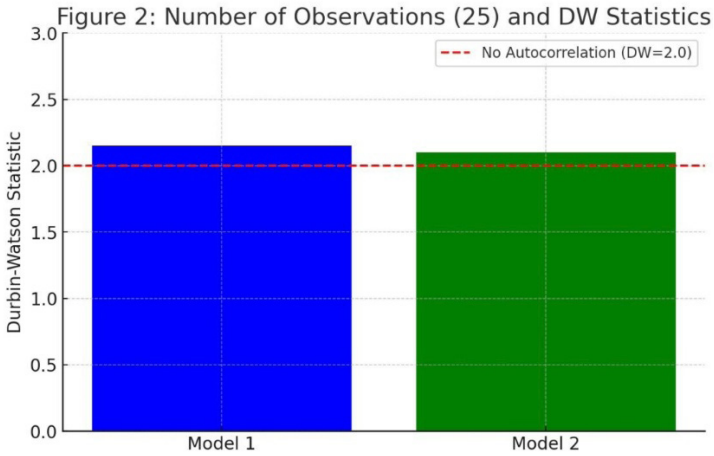
Continuation of the table

Year	HDI	NBD	DRSB	CC	UP	Trade
2005	0.684	3.366	35.613	-0.314	52.487	43.982
2006	0.7	4.926	30.822	-0.214	54.386	47.637
2007	0.703	4.327	30.632	-0.061	53.091	45.792
2008	0.704	4.138	30.663	-0.218	53.591	49.281
2009	0.716	5.411	30.701	-0.206	53.676	46.911
2010	0.719	4.723	26.542	-0.134	52.248	52.267
2011	0.726	5.771	25.879	0.05	54.557	48.017
2012	0.736	5.02	22.787	0.033	55.06	49.356
2013	0.733	5.669	21.358	-0.011	57.88	52.044
2014	0.741	6.765	24.125	0.135	55.641	48.372
2015	0.753	7.369	23.962	0.135	56.552	51.705
2016	0.758	7.419	19.856	0.264	56.632	54.281
2017	0.772	7.609	20.757	0.138	55.915	48.868
2018	0.773	7.849	18.223	0.217	58.643	52.869
2019	0.778	7.594	14.96	0.252	58.669	53.436
2020	0.799	8.307	15.723	0.187	59.124	54.897
2021	0.798	8.77	16.826	0.405	57.841	51.276
2022	0.806	9.862	12.428	0.443	60.569	51.526
2023	0.806	9.838	14.379	0.459	58.181	55.627
2024	0.817	9.118	4.761	0.477	60.587	55.594

Augmented Dickey-Fuller (ADF) Test Results

Variable	ADF Statistic	p-value	Critical Values	Is Stationary?
HDI	2.2689	0.9989	{‘1%’: -4.068853732362312, ‘5%’: -3.1271488757396453, ‘10%’: -2.7017297633136095}	No
NBD	-4.0313	0.0013	{‘1%’: -4.068853732362312, ‘5%’: -3.1271488757396453, ‘10%’: -2.7017297633136095}	Yes
DRSB	-0.3237	0.9221	{‘1%’: -3.769732625845229, ‘5%’: -3.005425537190083, ‘10%’: -2.6425009917355373}	No
CC	-2.1539	0.2234	{‘1%’: -3.769732625845229, ‘5%’: -3.005425537190083, ‘10%’: -2.6425009917355373}	No
UP	-1.2559	0.6491	{‘1%’: -3.769732625845229, ‘5%’: -3.005425537190083, ‘10%’: -2.6425009917355373}	No
Trade	-0.2069	0.9377	{‘1%’: -3.769732625845229, ‘5%’: -3.005425537190083, ‘10%’: -2.6425009917355373}	No

Number of Observations (25 years) and Durbin-Watson Statistics
The bar chart presents the Durbin-Watson statistics for both models:



The DW values close to 2.0 indicate no autocorrelation in the residuals.

Information about authors:

Dauliyeva Galiya Rakhmetovna – candidate of economic sciences, acting professor, acting Dean of the HSEB, Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail:Galiya.Daulieva@kaznu.edu.kz)

Ranov Zhandos Bakitbekovich – PhD, Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail: ranov.1985@mail.ru)

Sagynbay Asel Galymzhankyzy – (corresponding author) PhD student at Al-Farabi Kazakh National University, specialty 8D040102 – Economics (Almaty, Kazakhstan, e-mail: sagynbay_assel3@live.kaznu.kz)

Saltanat Makhsutova Tursynkhankyzy– master of Economics, Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail:makhsutova.saltanat@gmail.com)

Авторлар туралы мәлімет:

Даулиева Галия Рахметовна – э.ғ.к., профессор м.а., әл-Фараби атындағы Қазақ ұлттық университеті, ЭжБЖМ декан м.а. (Алматы қ., Қазақстан, e-mail: Galiya.Daulieva@kaznu.edu.kz)

Ранов Жандос Бакитбекович – PhD, әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, e-mail: ranov.1985@mail.ru)

Сағынбай Әсел Ғалымжанқызы (корреспондент автор) – әл-Фараби атындағы Қазақ ұлттық университетінің PhD докторанты, 8D040102 – Экономика мамандығы (Алматы қ., Қазақстан, e-mail: sagynbay_assel3@live.kaznu.kz)

Махсутова Салтанат Турсынханқызы – экономика магистрі, әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, e-mail: makhsutova.saltanat@gmail.com)

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Sh.G. Sarkambayeva[1], N.T. Sailaubekov[2], G.T. Mynzhanova[3*], L. Vasa[4]

[1] Satbayev University, Almaty, Kazakhstan
[2] Kazakh-German University, Almaty, Kazakhstan
[3] Kazakh Ablai khan university of international relations and world languages, Almaty, Kazakhstan
[4] Széchenyi István University, Győr, Hungary
*e-mail: mynzhanova.g@ablaikhan.kz

AN OVERVIEW OF THE ECONOMY OF KAZAKHSTAN: DEVELOPMENT TRENDS BETWEEN 2008–2022

This study aims to provide a comprehensive understanding of Kazakhstan's economy at present and review the changes that have occurred over the period from 2008 to 2022. To capture the key macroeconomic aspects, the dynamics and directions of significant indicators for long-term economic growth were examined, including overall economic productivity, employment structure, and real output. The study used analytical methods that include trend analysis, structural analysis, comparative analysis (pre/post analysis), descriptive statistics methods, correlation and regression analysis, as well as theoretical provisions of macroeconomics. Statistical data published by the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the National Bank of the Republic of Kazakhstan and international organizations were used. Thus, the purpose of this study is to review the economy of Kazakhstan, and the result is to identify trends in economic development in the period from 2008 to 2022. The results obtained during the study allowed us to draw the following conclusions: the share of the labor force among the population is decreasing and leads to slow economic growth, household incomes and investment opportunities remain quite low, and solving the country's economic security issues is hampered by lopsided exports and inelastic import demand. The results of the conducted research can be useful in the practical activities of government agencies involved in strategic development planning of the Republic of Kazakhstan.

Key words: real GDP, employment, productivity, population income, development trends.

Ш.Г. Саркамбаева [1], Н.Т. Сайлаубеков [2], Г.Т. Мынжанова [3*], Л. Васа [4]

[1] Satbayev University, Алматы, Қазақстан
[2] Қазақ-Неміс Гете Университеті, Алматы, Қазақстан
[3] Абылай хан ат. Қазақ халықаралық қатынастар және әлем тілдері университеті, Алматы, Қазақстан
[4] Иштван Сечени университеті, Дьор, Венгрия
*e-mail: mynzhanova.g@ablaikhan.kz

Қазақстан экономикасына шолу: 2008–2022 жылдар аралығындағы даму үрдістері

Бұл зерттеу Қазақстан экономикасында 2008-2022 жылдар аралығында болған өзгерістерді талдау арқылы Қазақстан экономикасы туралы жан-жақты түсінік беруді көздейді. Негізгі макроэкономикалық аспектілерді қамту үшін жалпы экономикалық өнімділікті, жұмыспен қамту құрылымын және нақты өндірісті қоса алғанда, ұзақ мерзімді экономикалық өсудің маңызды көрсеткіштерінің динамикасы мен бағыттары зерттелді. Зерттеу барысында стратегиялық жоспарлау және реформалар агенттігінің Ұлттық статистика бюросы мен Қазақстан Республикасы Ұлттық Банкінің және халықаралық ұйымдар жариялайтын статистикалық деректер пайдаланылды. Зерттеу әдістеріне трендтерді талдау, құрылымдық талдау, алдын ала/кейінгі талдау, сипаттамалық статистика, корреляциялық-регрессиялық талдау, теориялық макроэкономикалық принциптер жатады. Осылайша, бұл зерттеудің мақсаты-Қазақстан экономикасына шолу жасау, ал зерттеу нәтижесі 2008-2022 жылдар аралығындағы экономиканың даму үрдістерін анықтау болып табылады. Зерттеу барысында алынған нәтижелер мынадай қорытынды жасауға мүмкіндік берді: халық арасындағы жұмыс күшінің үлесі төмендеуде және ол экономиканың баяулауына алып келеді, халықтың табысы мен оның инвестициялық мүмкіндіктері айтарлықтай төмен болып қалуда, елдің экономикалық қауіпсіздігі мәселелерін шешу экспорттың біржақтылығымен және импортқа сұраныстың икемсіздігіне байланысты қиындаған. Жүргізілген зерттеу нәтижелері Қазақстан Республикасының дамуын стратегиялық жоспарлаумен айналысатын мемлекеттік құрылымдардың практикалық қызметінде пайдалы болуы мүмкін.

Түйін сөздер: нақты ЖІӨ, жұмыспен қамту, өнімділік, халықтың табысы, даму тренді.

Ш.Г. Саркамбаева [1], Н.Т. Сайлаубеков [2], Г.Т. Мынжанова [3*], Л. Васа [4]
[1] Satbayev University, Алматы, Казахстан
[2] Казахско-немецкий университет, Алматы, Казахстан
[3] Казахский университет международных отношений и мировых языков им. Абылай хана, Алматы, Казахстан
[4] Университет Иштвана Сечени, Дьор, Венгрия
*e-mail: mynzhanova.g@ablaikhan.kz

Обзор экономики Казахстана:
тенденции развития в период с 2008 по 2022 год

Данная работа призвана дать читателю общее понимание экономики Казахстана на текущий момент и сделать обзор изменений, произошедших за период с 2008 по 2022 годы. Для того, чтобы охватить основные макроэкономические аспекты, рассмотрены направления и динамика изменений показателей, значимых для долгосрочного роста экономики, таких как, например, производительность экономики в целом, структура занятости и реальное производство и др. в проведенном исследовании были использованы методы анализа, которые включают в себя анализ тренда, структурный анализ, сравнительный анализ (пре/пост анализ), методы описательной статистики, корреляционно-регрессионный анализ, а также теоретические положения макроэкономики. При этом были использованы статистические данные, публикуемые Бюро национальной статистики Агентства по стратегическому планированию и реформам Республики Казахстана, Национальным банком РК и международных организации. Таким образом, цель данного исследования – это обзор экономики Казахстана, а результатом является выявление тенденций в развитии экономики в период с 2008 по 2022 годы. Полученные в ходе исследования результаты позволили сделать следующие выводы: доля рабочей силы среди населения снижается и приводит к замедленному приросту экономики, доходы населения и его инвестиционные возможности остаются достаточно низкими, решение вопросов экономической безопасности страны затруднено однобокостью экспорта и неэластичностью спроса на импорт. Результаты проведенного исследования могут быть полезны в практической деятельности государственных структур, занимающихся стратегическим планированием развития Республики Казахстан.

Ключевые слова: реальный выпуск, занятость, производительность, доходы населения, тренды развития.

Introduction

Fifteen years have passed since the global financial crisis (GFC). During this period, Kazakhstan has faced several significant external shocks, including the financial crisis, which threatened the stability of the banking sector, the sharp decline in oil prices (the country's main export commodity), the global economic downturn caused by the pandemic, and sanctions imposed by many countries against Russia.

Over the years, Kazakhstan has implemented various economic reforms and adopted several development strategies, including two industrial-innovative development strategies, pension system reforms, digitalization of the economy, and the transition to Industry 4.0, as well as diversification of the economy.

In 2015, the Kazakh government turned its attention to inflation targeting in its economic policy. Although this was a necessary measure, inflation targeting is also a common goal in the economic policies of developed countries. However, achieving this goal has proven challenging, even with the lessons learned from the experiences of other countries. Despite the 4-6% target, inflation rate rocketed to 20.3% in 2022. All these changes driven by internal and external factors make it necessary to identify their consequences and conduct an analysis of the current state of the economy. Therefore, the aim of this article is to provide some analysis of Kazakhstan's economy.

In the following analysis, we first attempt to evaluate key indicators such as the long-term growth rates of real output, productivity, and economic security among others. Then, we move on to assessing the relationships between several economic indicators to better understand the expected consequences of policy measures. To understand the development of the economy, the following studies were conducted. Based on the volume of production in the country, the economic growth rate is determined. Based on the analysis of foreign trade, the goods in demand have been identified. Based on the assessment of labor productivity, conclusions about the effectiveness of the economy are obtained. The standard of living of the population has been determined. The analysis and assessment of investment opportunities is made. Ultimately, we aim to outline some of the nearest prospects for economic develop-

ment based on the analysis conducted and the conclusions drawn from this research.

Literature review

The literature on Kazakhstan's economy is extensive, with numerous studies focusing on various aspects of economic development. For instance, research has been conducted on institutional reforms, industrial development, monetary policy, regional integration, and its effects on the country's economy, among other topics. This study, however, aims to analyze aggregated economic indicators without delving into specific aspects or sectors to examine the changes that have occurred in the country's economy over the past 15 years and draw conclusions about the overall economic policy implemented during this period.

In contrast to the work by Kuvalgin et al., which analyzed the country's development over 30 years of independence, primarily in comparison with the Russian economy, our study focuses on evaluating the economic indicators as a measure and result of Kazakhstan's economic policy and attempts to cover the most significant aspects in our view (Kuvalgin et al., 2022).

One of the significant problems in Kazakhstan's economy has been its one-sidedness and resource-based orientation, inherited from the Soviet past. Jumadilova (2012) provides a detailed analysis of the significant role of the oil and gas sector in the economy of Kazakhstan during 2008-2009. Over the years of independence, the government has announced various strategies and programs aimed at diversifying the economy and increasing the added value within it. However, Akhmedov (2019) shows that the dependence of macroeconomic indicators on oil prices has increased since 2014 compared to the shocks of 2008, using impulse response analysis on vector autoregression models. Similar results are obtained by Grigore (2023) using panel data from the Caspian region, including Kazakhstan, and Konebayev (2023) used DSGE models. This study will analyze the role of the oil and gas sector in Kazakhstan's economy.

Mouraviev and Koulouri (2021a:251) describe the transition of Kazakhstan's economy to market relations since 1991 and discuss the possibilities for sustainable growth. The study provides a deep analysis of institutional development and obstacles to diversification and development. This article can serve as a good supplement, revealing the economic features of the problems addressed in that book.

Mukhamediyev B., Temerbulatova Zh (2020) constructed the model that showed the degree of influence of the factors to change the global competitiveness index like as gross capital formation, total factor productivity, average labor productivity, pace of inflation rate, share of the current account balance in GDP, share of the employed population in the total population of the country, oil prices, growth rate of oil prices.

Yormirzoev (2023) investigates the sources of long-term economic growth in Central Asian countries through education and health, using an extended neoclassical growth model. The data on physical and human capital in Yormirzoev (2023) are taken from the Penn World Tables. In this study, we used only statistical data from Kazakhstan's National Accounts System.

Mukhamediyev B., Temerbulatova Zh (2021) concludes that revenues from the export of raw materials ensure economic growth of economy of Kazakhstan only in the short term, and long-term sustainable growth requires diversification of the country's economy and exports, in particular, development of service sector, development of human capital and industries with high added value. It is also important to increase the productivity of basic sectors of the economy, such as industry, agriculture, transport.

Most studies on economic development of Kazakhstan focus on individual aspects, such as oil (Zhuparova, A., et.al., 2020) and gas production, tourist potential, human capital development (Kuandyk, Zh., et. al, 2022), and others. All these components are important for the economy, and rapid growth is impossible by the development of only one area. In this study, we attempted to look at the economy of Kazakhstan as a whole and analyze it through the prism of its achievements over the past years and potential for further growth. Therefore, we believe that this article will be of interest not only to specialists in economics but also to a wide range of readers.

Methodology

We utilized data from the bureau of National Statistics of the agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the International Monetary Fund (IMF), and the World Bank (WB) for the period since 2008 to 2022, and for 2023 where such data was available. Primarily, we compared data from 2008 with data from 2022 or 2023 to visualize changes in the values of economic indicators. To test certain theoretical propositions using empirical data, we applied ordinary least

squares (OLS) regression analysis with corresponding time series preparation to assess the impact of fixed asset investments on real GDP growth, as well as to assess the impact of changes in oil prices on changes in exports in the country.

Results and Discussion

In this section, we present the results for each direction in accordance with the research questions posed in the introductory part of the work. Then, by comparing the obtained conclusions for each direction, we synthesize them into a cohesive picture of the current state of the economy, taking into account its dynamics over the past years and outlining the contours of the country's immediate future in subsequent sections.

Production and Economic Growth

Let us begin with the level of output. Over the period from 2008 to 2022, the average annual growth rate of real GDP was 3.5%. However, the difference is significant: from -3.95% to 11.25% per year. For the same period, the average annual growth rate of real GDP per capita was 1.85% with a deviation of -3.8% to 7.3% per year.

Over the 15-year period, real GDP per capita increased by approximately 27% and reached 1645 thousand tenge or 137 thousand tenge per capita (in 2010 prices) or 161 thousand tenge in nominal terms (in 2022 prices).

GDP grows at higher rates than GDP per capita, indicating that population growth outpaces productivity growth in the country. However, this is related to the fact that the labor force participation rate is decreasing.

Let us attempt to calculate labor productivity in the country as a whole by comparing real output to employment and comparing its dynamics over the years (Figure 1). In 2022, labor productivity averaged 3,579 thousand tenge per working individual, and the average annual growth rate of labor productivity from 2008 to 2022 was approximately 2.5%.

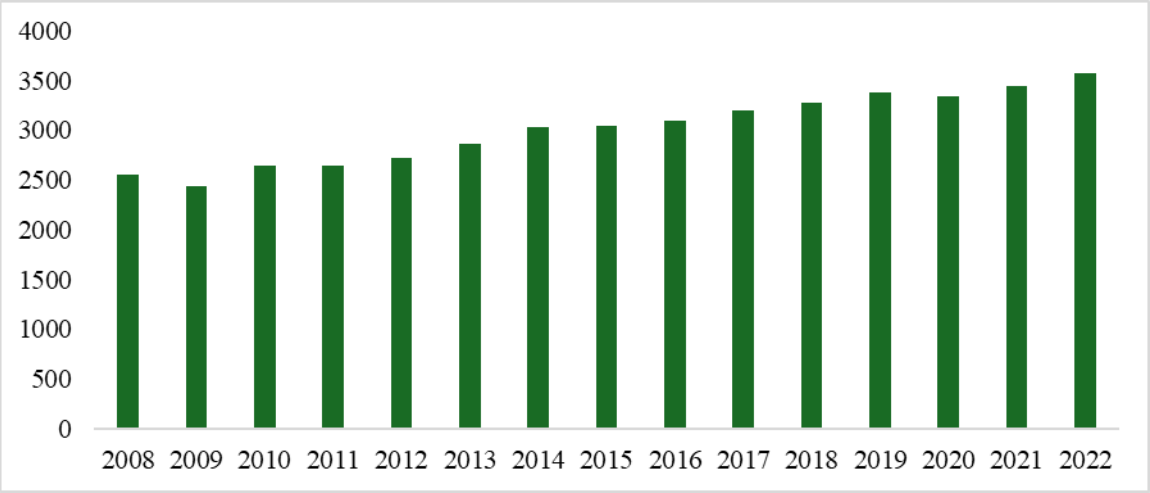


Figure 1 – Labor Productivity Dynamics in Kazakhstan from 2008 to 2022
Note – compiled by the authors according to official data of the bureau of National Statistics of the agency for Strategic Planning and Reforms of the Republic of Kazakhstan (Dynamic Series – Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan)

Investments and government expenditures with fiscal multiplier are significant factors in real GDP growth. However, we will not calculate the fiscal multiplier in this article. Nevertheless, according to Bekishev et al. (2023), the fiscal multiplier equals 0.2, indicating that attempts to use an increase in government expenditures to boost economic growth are unlikely to yield expected results.

Export and Import

The economy of Kazakhstan is extremely one-sided and undiversified. For instance, 77% of the export structure consists of mineral resources. Imports contain 32.2% of consumer goods, 47.8% of intermediate goods, and only 20% of investment goods. Within the 47.8% of intermediate goods, 3.3% are oil products.

Let us examine how the structure of exports and imports by goods has changed over the considered period. Figure 2 provide data for import in 2008 and 2023, while Figure 3 provide data for export in 2008 and 2023, respectively.

As seen from Figures 2 and 3, the main export items (2/3) remain mineral resources, specifically energy and fuel products. A slight decrease in the share of mineral resources is more related to the decline in oil prices rather than a decrease in production volumes. In 2008, the average oil price was around $100 per barrel, while in 2023 it was around $80 per barrel. Machines, equipment, vehicles, instruments, and apparatus also remained the largest group of imported goods, despite the opening of several automobile assembly plants in Kazakhstan. Another aspect is that this group includes not only investment goods such as production equipment but also consumer goods like computers and smartphones. It is even more interesting that, besides chemical products, demand has grown for imported food products. If we compare this with the increased export of food products, it becomes clear that domestic production is exported, while internal demand is met through imports. This can be explained by the fact that some food products (e.g., coffee, exotic fruits) are not produced domestically. However, there is another fact that some food products (e.g., flour, pasta) of high quality are in demand abroad.

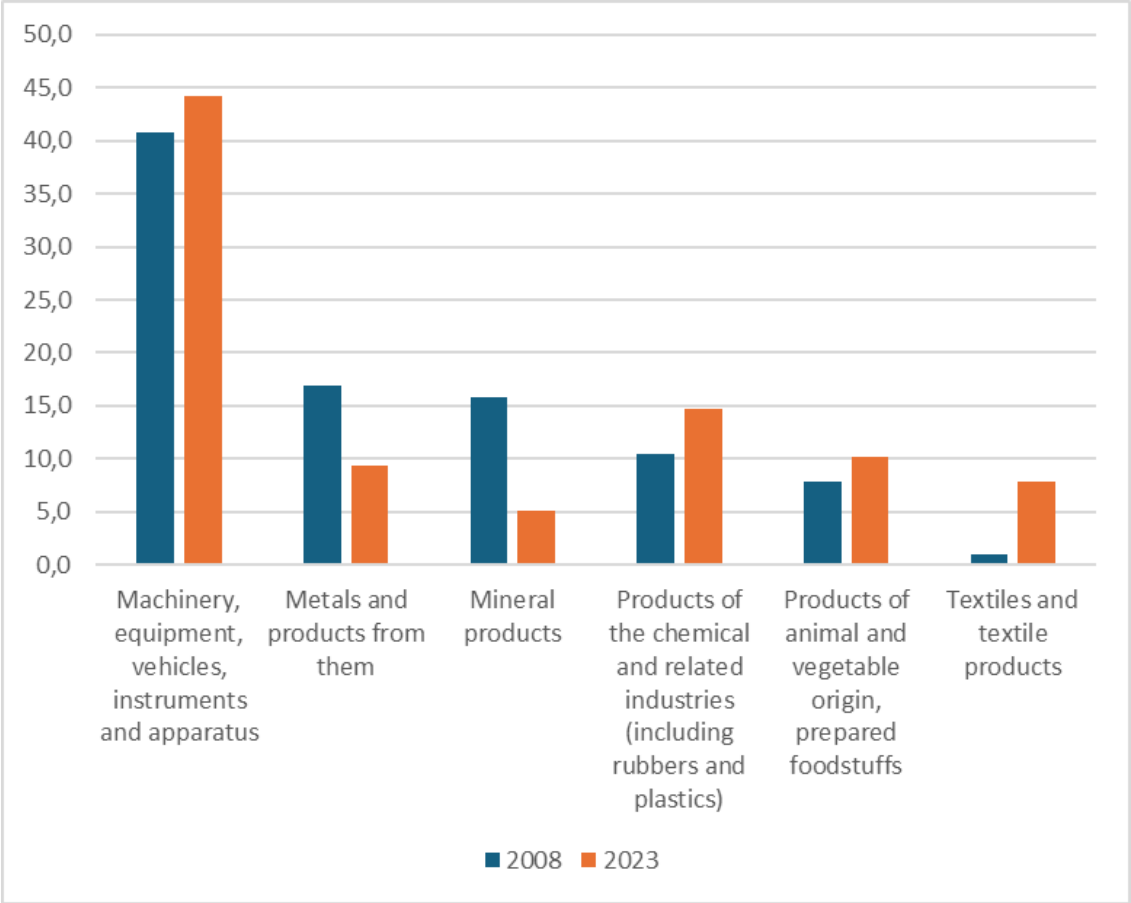


Figure 2 – The structure of import by group of commodities in 2008 and 2023
Note – compiled by the authors according to official data of (Statistics of foreign, mutual trade and commodity markets – the bureau of National Statistics of the agency for Strategic Planning and Reforms of the Republic of Kazakhstan)

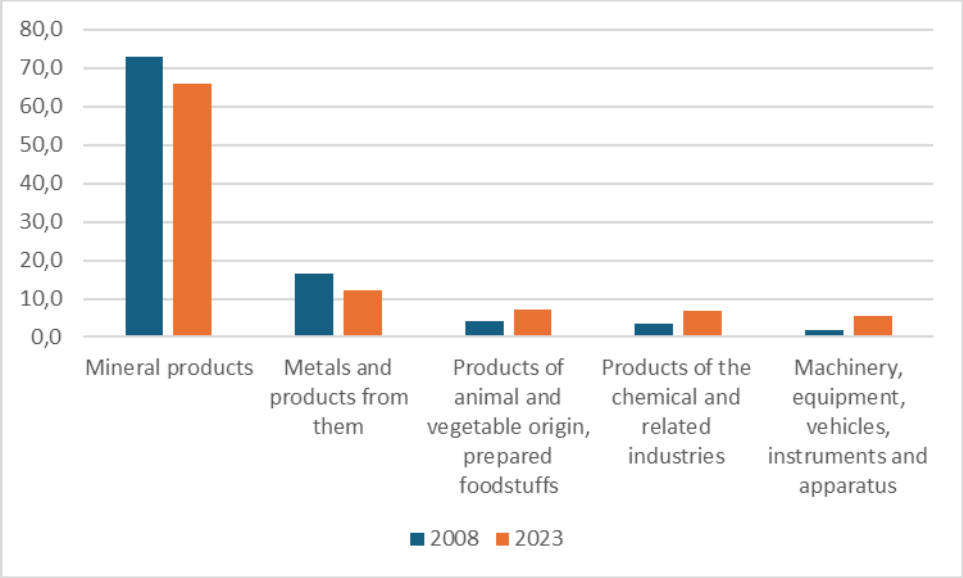


Figure 3 – The structure of export by group of commodities in 2008 and 2023
Note – compiled by the authors according to official data of (Statistics of foreign, mutual trade and commodity markets – the bureau of National Statistics of the agency for Strategic Planning and Reforms of the Republic of Kazakhstan)

According to Konebayev (2023), the price of oil explains 40% of changes in the real exchange rate and significantly contributes to changes in real output. We will analyze the data and perform a calculation of the degree of influence of changes in oil prices on export volumes. We built a regression function of exports in real terms against changes in oil prices. We will take the oil price as a differential value, since there is a first-order integration. The following estimates were obtained:

$$Ex = 2530 + 17.67\Delta P^{oil} \quad (1)$$

standard error 3.74, p-value of the regression 0.00. The coefficient of determination was 0.29. This indicates that the oil price is a significant factor in its export and explains 29% of its fluctuations. Such a coefficient of determination is more explained by the production capabilities of the oil sector rather than the diversification of the export structure.

In theory, volumes of exports and imports correlate with the exchange rate. Strengthening the local currency is expected to lead to a decrease in the competitiveness of export goods on global markets and an increase in the ability of local residents to purchase imported goods. Conversely, devaluation of the currency according to this logic should lead to a greater export and less attractiveness of imported goods. Let us examine how shocks to the exchange rate affect the country's trade.

In August 2015, Kazakhstan transitioned to a flexible exchange rate or, better said, a managed floating exchange rate, since some interventions still occur. Tenge depreciated from 185 tenge per US dollar in the second quarter of 2015 to 300 tenge in the fourth quarter of 2015. And since then, the average annual exchange rate has increased. The elasticity of demand for imported goods to changes in the exchange rate during the period of the flexible exchange rate regime was approximately 0.5. This means that demand for imported goods is inelastic to changes in the exchange rate.

As seen from both quarterly and annual data, the cost of imports and exports, measured in US dollars, practically does not correlate with the exchange rate. Interestingly, the signs of correlation coefficients are negative for exports and positive for imports. It can be concluded that a decrease in tenge exchange rate does not lead to an increase in the competitiveness of domestic goods.

Employment

The population growth over the last 15 years has outpaced employment growth (Figure 4). From 2008 to 2022, the population grew by 25%, while employment grew by 14%. Let us examine the age structure of the population. In 2009, the population of working age accounted for 66% of the total population, while in 2023, it accounted for 59%, and the

employed population accounted for approximately 50% and 45% of the total population, respectively. The increase in population overall leads to an increase in population density and, as a result, an increase in competition and market development. However, if this trend continues, with the decline in the share of the working-age population and the labor force in society, we can draw the following conclusions: this leads to additional pressure on the state budget, and the average per capita income decreases while maintaining labor productivity and levels of wages and profits.

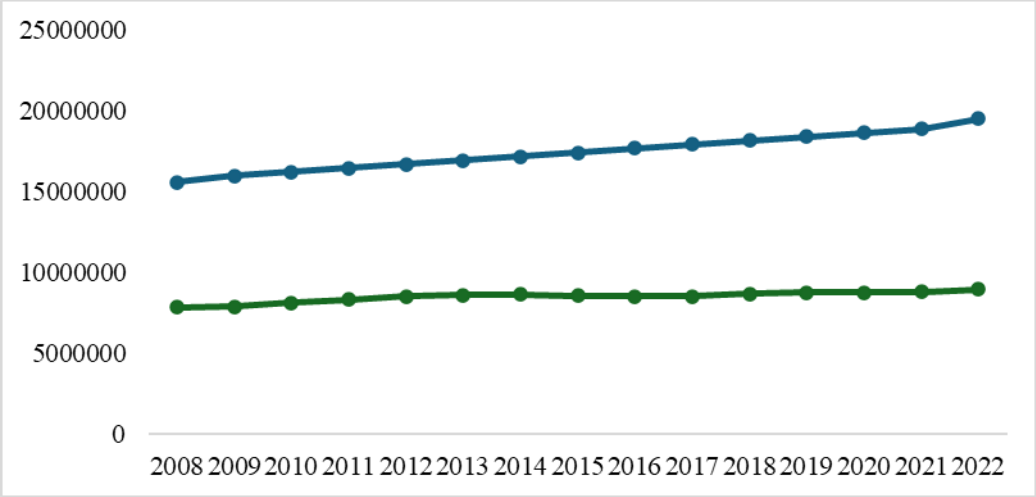


Figure 4 – Dynamics of population and employed population
Note – compiled by the authors according to official data of (Employment and Unemployment – Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan)

Since the bureau of National Statistics of the agency for Strategic Planning and Reforms of the Republic of Kazakhstan stopped publishing data on employment by form of ownership from 2022, we took the latest available data for 2021 and analyzed its structure.

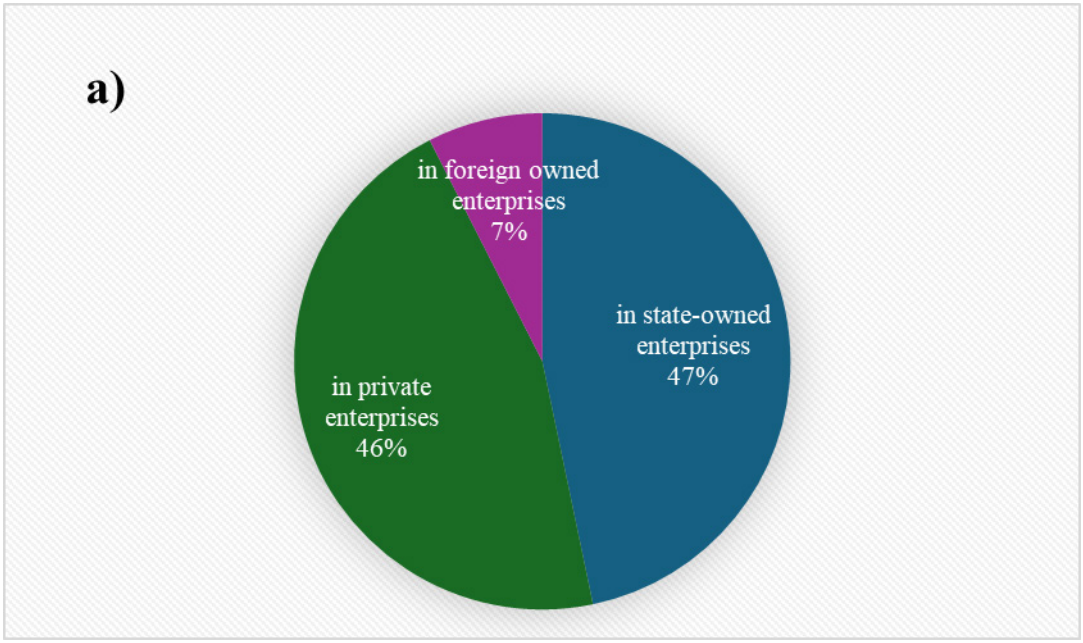
As seen in Figure 5a, 47% of the total number of hired workers in the country are employed by state-owned enterprises. Among the total employed population, including self-employed individuals, the share of state sector workers was 23% (Figure 5b).

For comparison, in 2017, the total number of hired workers in Kazakhstan was 3,712 thousand people, of whom 1,751 thousand were employed by state organizations. This represents 47% of all hired workers. Therefore, this ratio continues to persist, and the share of employed workers in the state sector does not decrease. This situation has its consequences in the form of a significant tax burden on the real sector of the economy.

Employment by sectors

Let us examine the diversification of sectors in the economy not by output, since this more accurately reflects which sector generates more taxes, but by employment of the population, i.e., in which sectors a large part of the population is employed, since this approach shows the significance of sectors for the population directly.

Figure 6 shows the distribution of hired workers in the republic by sectors of the economy (in percentages of the total) in 2008 and 2023. In total, there were 7,857.2 thousand hired workers in 2008 (including 3,712 thousand hired workers), and in 2023, there were 9,081.9 thousand hired workers (including 3,724 thousand hired workers).



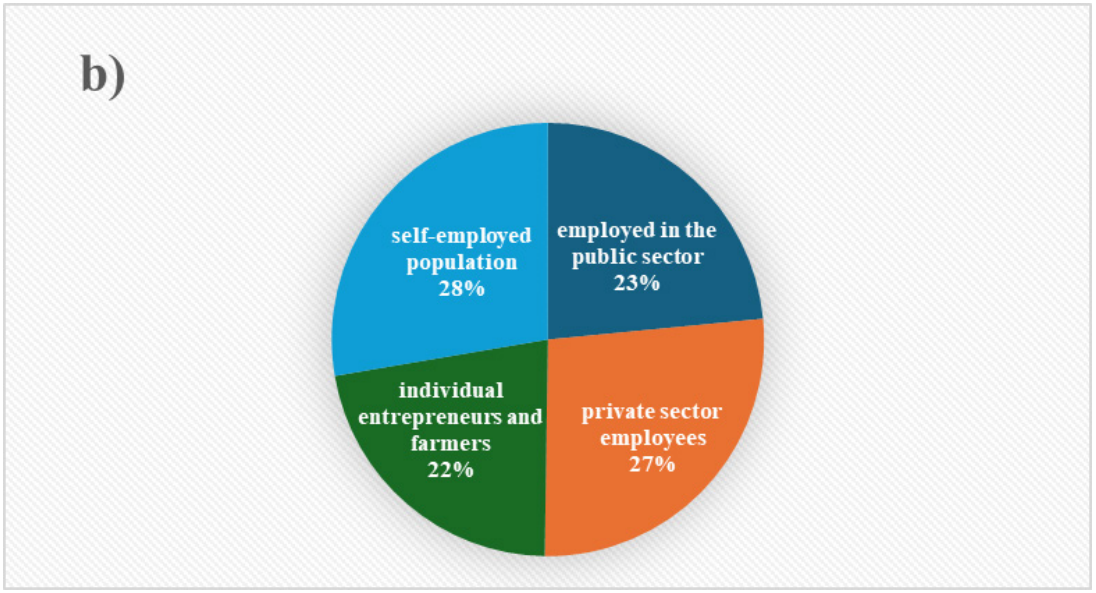


Figure 5 – The structure of employment in 2021
the distribution of hired workers by form of ownership, and
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Note – compiled by the authors according to official data of (Employment and Unemployment –
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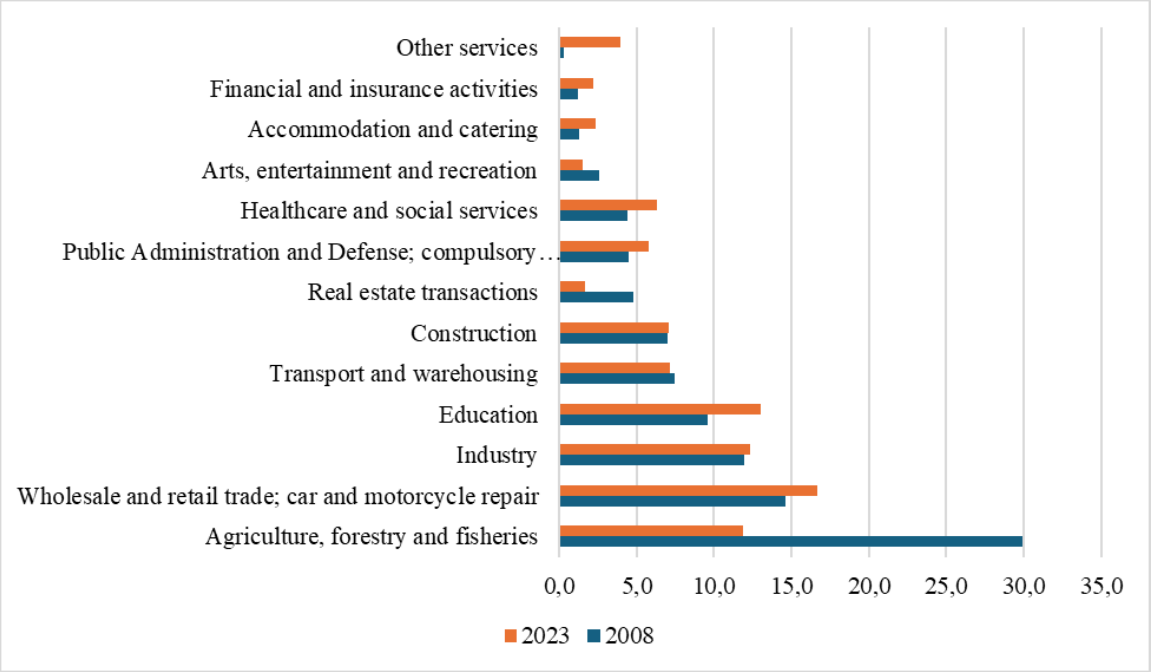

Figure 6 – Employment by Type of Economic Activities in 2008 and 2023
Note – compiled by the authors according to official data of (Employment and Unemployment – Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan)

As evident from Figure 6, the structure of employment by sectors of the economy has changed. The share of employed individuals in agriculture has significantly decreased, from 29.9% to 11.8%. Conversely, the share of workers in trade and education has increased. There have been no significant changes in the share of employment in the sectors of industry and transportation.

Income

In December 2023, the average nominal per capita income was 187,100 tenge per month, while the average monthly wage was 393,605 tenge, and the median wage was 259,463 tenge. This disparity reflects the decreasing share of the working-age population and labor force participation.

Let us compare the per capita income with the GDP per capita. For 2023, the following data were calculated: according to statistics, as of January 1, 2024, the population was 20,033,546 people, and the GDP at current prices for 2023 amounted to 119,251,165.7 million tenge. Consequently, the GDP per capita per month was approximately 496,000 tenge, which is 2.65 times higher than the average nominal per capita income. In other words, the population receives about 38% of the national income. Hence, the conclusion that the country is wealthy, but the people are poor.

Nearly half of the population's income is spent on food products. The marginal propensity to consume food averages 45% of household income. Coupled with the fact that items such as electronics, household and transportation equipment, many construction materials, household chemical products, and other goods are imported and relatively expensive (for instance, cell phones are sold by global manufacturers at roughly the same price worldwide, while the incomes of people in developed countries and Kazakhstan differ significantly), it becomes apparent that living standards in the country are relatively low. This results in the population needing to save for many years to meet basic needs such as housing or a car, which in turn reflects the low investment potential of the country.

Loans

A significant socio-economic issue in Kazakhstan is the high level of household indebtedness. As illustrated by Ybrayev (2023), for the first time in Kazakhstan's macroeconomic history, the absolute value of household loans exceeded corporate non-bank sector loans as of October 2020. The accessibility of consumer loans, along with the population's low financial literacy, has led to several negative consequences, such as problems with banks' "non-performing loans," the emergence of the "personal bankruptcy" phenomenon, and more.

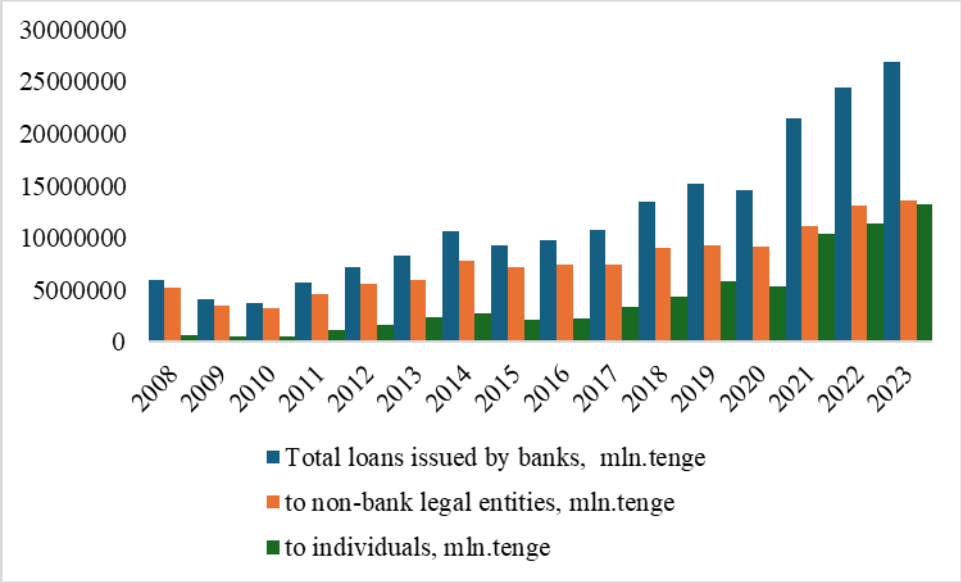

Figure 7 – Loans issued by banks to non-bank legal entities and individuals in 2008-2023
Note – compiled by the authors according to official data of (NBC Statistical Bulletin)

Analyzing the data on the volume of loans issued by commercial banks to businesses and individuals (Figure 7), it is evident that, with few exceptions, the volume of loans to both legal and physical entities has been continuously increasing since 2011. There was a sharp rise in personal loans in 2021, likely due to decreased economic activity during the pandemic in 2020 and a subsequent "compensation" in 2021. Personal loans have been growing at a faster rate compared to business loans. Personal loans mainly consist of mortgage loans and consumer credits (Ybrayev, 2023). The growth in the former poses a latent threat to the economy if such loans are taken to purchase housing with the intention of generating rental income. In this case, a "bubble" is being inflated, as an oversupply in the rental housing market could lead to a drop in prices and a sudden inability of borrowers to service their loans. The number of mortgage loans where debt payments constitute 70-80% of household income has increased in recent years (Ybrayev, 2023, p. 67). Although consumer loans generate relatively high-interest income, they are the riskiest and pose a significant threat of "non-performing loans" or "bad debts".

The chart in Figure 8 demonstrates that the de-dollarization policy significantly impacted bank loans. There has been an increase in loans denominated in the national currency, although a small portion remains in foreign currency.

When analyzing determinants of long-term economic growth, various factors are typically considered, such as investment (and savings) ratios, education, openness, and different types of institutions. To study the potential for economic growth, we will analyze the population's investment capabilities and the state's contribution to human capital.

Investment and Savings

Let's examine the population's savings capacity. Given the available data, this analysis considers savings in the form of bank deposits by individuals and non-banking legal entities. We will compare these to income from wages and net profits. In 2023, the propensity to save was 38.4% compared to 57.2% in 2008. Hence, the propensity (or ability) to save has decreased by almost 20% of total income. This decline is attributed to high inflation rates significantly eroding real incomes while wages remain sticky, thus increasing the relative share of consumption.

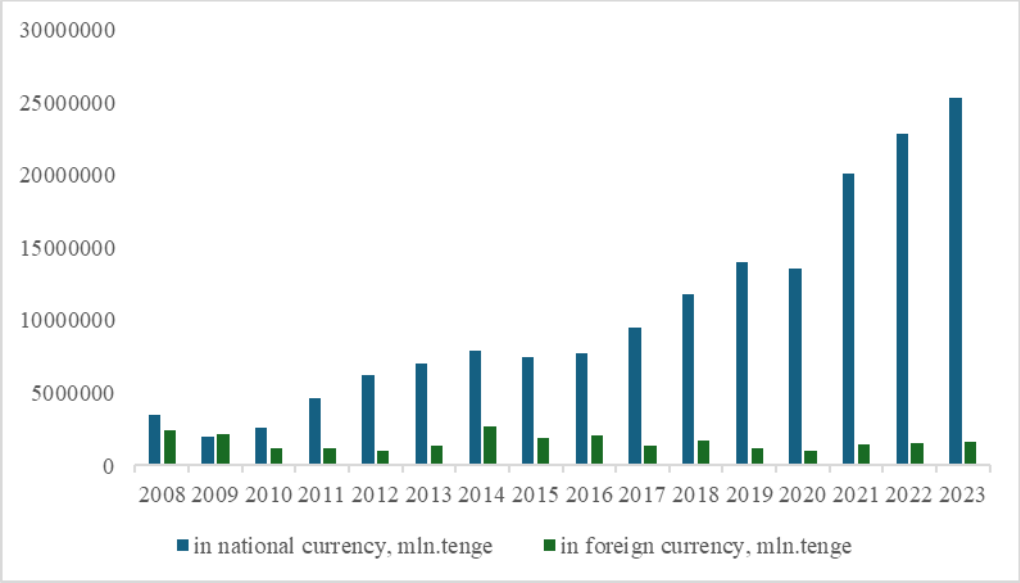

Figure 8 – Loans issued by banks in national and foreign currencies in 2008-2023
Note – compiled by the authors according to official data of (NBC Statistical Bulletin)

Economic growth is impossible without investments. Here, it is appropriate to consider investments in fixed capital (or capital assets). Over the 15-year period, we will calculate the return on these investments, i.e., how many tiyns (one hundreds part of a unit of Kazakh currency) each invested tenge (unit of Kazakh currency) yields. To do this, we construct a regression equation of the form (Jumadilova, 2017):

$$Y_{t+4}^{real} = \alpha + \beta I_t^{CA},$$

where Y_{t+4}^{real} is a real GDP in the period *t+4* (a year after investments), I_t^{CA} is an investment into fixed capital at *t*, t – respective quarter of a certain year.

Based on data for 2008:Q1-2022:Q4 the following estimates were calculated:

$$Y_{t+4}^{real} = 4724 + 1.52\ I_t^{CA}$$
$$(525) \qquad (0.4)$$

$R^2 = 0.2$. This implies that 20% of the changes in real GDP can be explained by investments in fixed capital. Several factors can explain this result: firstly, no new deposits have been discovered in the extractive sector, and changes in production volumes occur at existing sites; secondly, the service sector, which does not require significant capital investments, is growing.

Therefore, based on the estimated model, we can conclude that investments in capital assets yield an average return of 52% after one year. However, given the significant standard error, we can say with 95% confidence that the return can vary from a 30% loss to a 130% profit.

Education and Human Capital

To assess the role of education and healthcare as contributions to human capital by the state, we will examine the proportion of these sectors within the structure of the state budget. We will use data from 2014 to 2022 to form a comprehensive understanding of the expenditure shares rather than focusing on a single year.

In 2023, the total volume of services provided by educational organizations in the Republic of Kazakhstan amounted to 5,392,868 million tenge, of which 87% was funded by the budget, 11% by funds received from the population, and 2% by funds from enterprises.

Healthcare

In 2023, the total volume of services provided by healthcare and social service organizations in the Republic of Kazakhstan amounted to 777,007.2 million tenge, with 74.6% funded by the budget, 16.6% by funds received from the population, and 8.8% by funds from enterprises.

Thus, 4,691,795 million tenge was spent on education from the budget, while 2,473,881 million tenge was spent on healthcare and social services, which is 52% of the education budget.

Let us now consider the structure of government expenditures from 2014 to 2023.

Table 1 – Structure of the state budget expenditures in 2014-2023

Expenditures	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Public services of a general nature	6.2	8.5	6.6	5.2	5.4	5.5	5.2	4.8	6.1	6.0
Defense	5.5	5.5	4.6	3.6	4.8	5.5	4.0	4.1	5.6	4.7
Public order, security, legal, judicial, penal activities	7.7	6.8	6.2	5.7	7.0	6.2	6.1	5.6	6.7	6.5
Education	17.4	16.6	17.7	14.8	17.1	17.2	18.8	20.5	22.9	23.4
Public Health	11.0	10.5	11.0	9.0	10.3	9.5	11.7	12.6	2.2	2.2
Social assistance and social security	19.9	20.8	20.9	18.4	24.2	25.6	22.6	22.4	22.8	21.3
Housing and Utilities	7.1	5.4	5.4	5.5	6.6	6.7	8.4	6.9	6.6	7.7
Culture, sports, tourism and information space	3.8	3.6	3.5	3.2	4.0	3.4	3.0	2.9	3.5	3.5
Fuel and energy complex and subsoil use	1.6	1.4	1.1	1.1	1.1	0.9	1.0	0.9	1.1	1.4
Agriculture, water, forestry, fisheries, specially protected natural areas, environmental and wildlife protection, land relations	4.5	4.6	4.4	3.8	4.4	4.3	4.0	4.0	4.1	4.0
Industry, architectural, urban planning and construction activities	0.5	0.7	0.5	0.2	0.3	0.5	0.6	0.3	0.6	0.4
Transport and communications	7.9	8.3	8.1	6.8	7.3	6.6	6.4	5.7	6.9	7.0
Others	3.7	3.8	4.3	18.7	2.0	3.0	3.6	3.5	3.8	4.3
Debt servicing	3.0	3.6	5.5	3.7	5.2	5.0	4.6	5.7	6.9	7.5
Transfers	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Note – compiled by the authors according to official data of (GOV.KZ – Unified Platform of Internet Resources of Government Agencies (UPIR GO))										

From the data presented in Table 1, several conclusions can be drawn:

Overall, the relative proportions of expenditure categories remain consistent year to year, with the notable exception of healthcare expenditures, which have sharply decreased following the implementation of the mandatory health insurance system. There has been a significant increase in the share of expenditures on debt servicing and education. Consequently, the reallocation of funds from healthcare financing to the insurance fund has not led to an increase in government investments but has instead been directed towards servicing public debt.

Given the substantial budgetary expenditures on education and science, one would expect these investments to result in growth and potentially an increase in the share of high-tech sectors, as well as an overall improvement in labor productivity. However, the growth rate remains relatively low for a developing economy. This can be partially attributed to the "brain drain" phenomenon, where skilled individuals, having received their education in the country (largely funded by the state budget), emigrate abroad. Thus, the return on government investments in education is low.

From 2008 to 2023, a total of 399,613 people emigrated from the country, of whom 277,724 (69%) were professionals, and 34% had higher education. During the same period, 306,014 people immigrated to the country, of whom 130,931 (43%) had vocational or higher education (17% had higher education). Figure 10 clearly illustrates the quality of migration in terms of education level.

Therefore, it can be concluded that government investments in education and human capital do not lead to the expected productivity growth due to the emigration of skilled personnel.

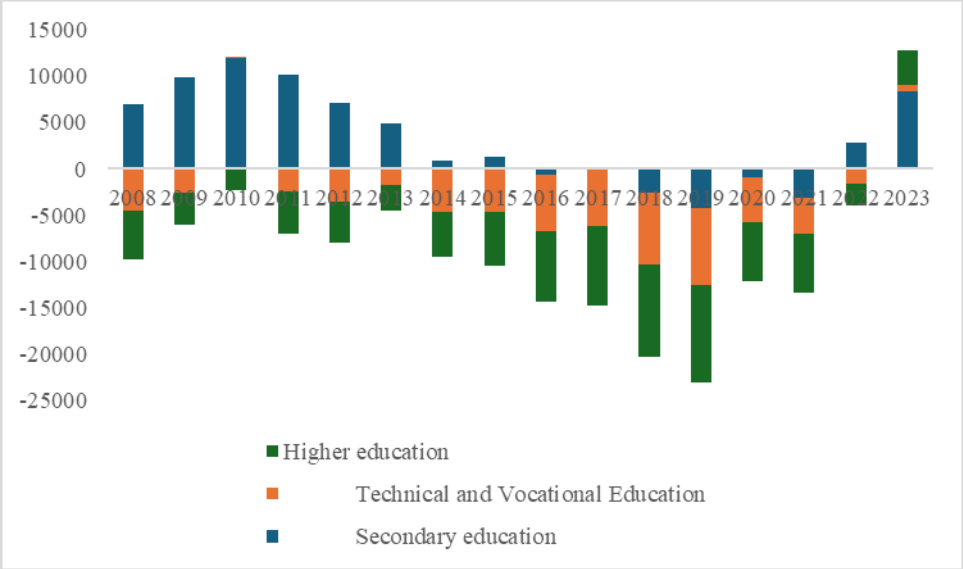

Figure 10 – Net Migration Balance of the Population of the Republic of Kazakhstan by Education Level since 2008 to 2023
Note – compiled by the authors according to official data of (Dynamic Series – Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan)

Thus, alongside the annual investments in education and science, a well-thought-out policy must be implemented to stimulate the development of human resources within the country to ensure productivity and output growth.

Conclusion

The average growth rate of real output is less than 2 percent per year, which is quite low for developing economies worldwide. Attempts to diversify the economy have not resulted in significant shifts in the structure of exports and imports. Given the substantial share of oil and gas products in exports, the economy and the exchange rate remain highly dependent on global oil prices. This is corroborated by Grigore (2023) findings, where the authors concluded that exports and oil production have a direct, positive, and statistically significant influence on economic growth.

Konebaev (2023) used a DSGE model to demonstrate that oil price shocks account for more than 40% of the deviations in the real exchange rate in the long term and affect real GDP growth. The overwhelming dominance of mineral resources in the export structure has persisted over the past 15 years, perpetuating the problem of an extractive-focused economy and a high dependency on changes in the global energy market and oil prices. Akhmedov (2019) concluded that the dependence of Kazakhstan's economy on oil price fluctuations has intensified since 2008.

Our study found that the average labor productivity growth since 2008 to 2022 was approximately 2.5%, whereas Yormirzoev (2023) calculated a rate of 2.17% for 2010-2019 and 1.4% for the period since 1990 to 2019. Yormirzoev (2023) examined the long-term economic indicators of Central Asian countries and concluded that the average total factor productivity (TFP) growth rates during the independence period were not remarkable.

Real household incomes and purchasing power remain low. Given the high proportion of autonomous consumption, private investment opportunities are minimal. Despite increased revenues from the sale of natural resources, the population receives only about a third of this income.

Considering the outflow of skilled professionals from the country despite substantial state subsidies for education, it seems more prudent to create a more competitive environment for educational institutions. This would involve balancing state expenditures on education with appropriate incentives for human resource development within the country and creating conditions for professional growth to reduce brain drain. This can be achieved by granting greater autonomy to educational organizations alongside an adequate system for monitoring and incentivizing education quality, as proposed by Mouraviev and Koulouri (2021b:256).

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Information about authors:

Sarkambayeva Shynara – PhD, Associate Professor, Satbayev University (Almaty, Kazakhstan, e-mail: sh.sarkambayeva@satbayev.university)

Saylaubekov Nurlan – doctor of economic sciences, Professor, Kazakh-German university (Almaty, Kazakhstan, e-mail: sailaubekov@rambler.ru)

Mynzhanova Gulzhakan – PhD, Associate Professor, Abylai Khan Kazakh University of international relations and world languages (Almaty, Kazakhstan, e-mail: mynzhanova.g@ablaikhan.kz)

Laszlo Vasa – PhD, Professor, Széchenyi Istvàn University, (Győr, Hungary, e-mail: vasalaszlo@gmail.com)

Авторлар туралы мәлімет:

Саркамбаева Шынара Галимжановна – PhD, қауымдастырылған профессор, Сәтпаев университеті (Алматы қ., Қазақстан, e-mail: sh.sarkambayeva@satbayev.university).

Сайлаубеков Нурлан Турсынбекович – доктор экономических наук, Қазақ-Неміс университеті (Алматы қ., Қазақстан, e-mail: sailaubekov@rambler.ru);

Мынжанова Гульжакан Тлесовна (корреспондент-автор) – PhD, қауымдастырылған профессор, Абылай хан атындағы Қазақ халықаралық қатынастар және әлем тілдері университеті (Алматы қ., Қазақстан, e-mail: mynzhanova.g@ablai-khan.kz);

Ласло Васа – PhD, профессор Иштвана Сечени Университеті (Дьор қ., Венгрия, e-mail: vasalaszlo@gmail.com).

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S. Lan*, O.Zh. Zhadigerova, A.B. Assanova, N.Sh. Syrlybayeva

Al-Farabi Kazakh National University, Almaty, Kazakhstan
*e-mail: lan_sushan@kaznu.edu.kz

A STUDY ON THE IMPACT OF ESG PERFORMANCE, CORPORATE RESILIENCE ON TOTAL FACTOR PRODUCTIVITY

The aim of this study is to examine the impact of total factor productivity (TFP) on corporate performance, considering the sustainability of the company, including its ESG (Environmental, Social, and Governance) indicators, which have a significant influence on TFP. In a global environment marked by uncertainty, companies with high ESG scores demonstrate greater adaptability and resource allocation efficiency, contributing to the growth of TFP.

Based on a rich sample of Chinese listed companies from 2010 to 2023, this study constructs a multiple regression fixed-effects model and conducts an empirical study using panel data. At the same time, we use multiple methods for robustness testing to ensure the reliability of the research results. The findings indicate that ESG has a positive effect on TFP, with corporate sustainability playing a mediating role through innovation capabilities, operational resilience, organizational resilience, and financial flexibility. Furthermore, significant differences are observed in the impact of ESG between companies with high market concentration, capital-intensive industries, high-pollution industries, and others. The study emphasizes the need for companies to develop resilience and innovation capabilities to enhance productivity and sustainability.

Key words: ESG, Corporate Resilience, Operational Resilience, Financial Flexibility, Total Factor Productivity.

С. Лан*, О.Ж. Жадигерова, А.Б. Асанова, Н.Ш. Сырлыбаева

Әл-Фараби ат. Қазақ ұлттық университеті, Алматы, Қазақстан
*e-mail: lan_sushan@kaznu.edu.kz

ESG көрсеткіштері мен корпоративтік тұрақтылықтың жалпы факторлық өнімділікке әсерін зерттеу

Зерттеудің мақсаты – жалпы факторлық өнімділіктің (ЖФӨ) компанияның тиімділігіне әсерін зерттеу, сонымен қатар компанияның орнықтылығын, оның ішінде ЖФӨ-ге елеулі әсер ететін ESG (экологиялық, әлеуметтік және корпоративтік басқару) көрсеткіштерін ескеру. Белгісіздікке толы жаһандық ортада ESG көрсеткіштері жоғары компаниялар икемділік пен ресурстарды тиімді бөлу қабілеті арқылы ЖФӨ-нің өсуіне ықпал етеді.

Бұл зерттеу 2010–2023 жылдар аралығындағы Қытайдың биржаға тіркелген компанияларының кең көлемді үлгісіне сүйене отырып, бірнеше регрессиялық тұрақты әсерлер моделін құрастырады және панельдік деректерге эмпирикалық талдау жүргізеді. Сонымен қатар зерттеу нәтижелерінің сенімділігін қамтамасыз ету мақсатында бірнеше тұрақтылық тестілеу әдістері қолданылады.

Зерттеу нәтижелері ESG көрсеткіштері мен ЖФӨ арасындағы оң байланысты көрсетеді. Бұл ретте, компанияның орнықтылығы – инновациялық әлеует, операциялық тұрақтылық, ұйымдық икемділік және қаржылық икемділік арқылы делдал рөл атқарады. Бұдан бөлек, ESG көрсеткіштерінің әсері нарықтық шоғырлану деңгейі жоғары, капитал сыйымды және экологиялық тұрғыдан зиянды салалардағы компанияларда айтарлықтай ерекшеленетіні анықталды.

Зерттеу компаниялардың өнімділігі мен орнықтылығын арттыру үшін олардың инновациялық және бейімделу қабілеттерін дамыту қажеттігін атап көрсетеді.

Түйін сөздер: ESG, корпоративтік орнықтылық, операциялық тұрақтылық, қаржылық икемділік, жалпы факторлық өнімділік.

С. Лан*, О.Ж. Жадигерова, А.Б. Асанова, Н.Ш. Сырлыбаева
Казахский национальный университет им. аль-Фараби, Алматы, Казахстан
*e-mail: lan_sushan@kaznu.edu.kz

Исследование влияния показателей ESG и корпоративной устойчивости на общую факторную производительность

Цель данного исследования – изучить влияние совокупной факторной производительности (СФП) на корпоративную эффективность с учетом устойчивости компании, включая ее ESG-показатели (экологические, социальные и управленческие), которые оказывают значительное влияние на СФП. В условиях глобальной неопределенности компании с высокими ESG-оценками демонстрируют лучшую адаптивность и эффективность распределения ресурсов, способствуя росту СФП.

На основе обширной выборки китайских публичных компаний за 2010–2023 годы в исследовании построена модель множественной регрессии с фиксированными эффектами и проведен эмпирический анализ с использованием панельных данных. Одновременно для обеспечения надежности результатов исследования применяются различные методы проверки устойчивости.

Результаты показывают, что ESG положительно влияет на СФП, при этом устойчивость компании опосредует это влияние через инновационный потенциал, операционную устойчивость, организационную гибкость и финансовую маневренность. Кроме того, выявлены значительные различия во влиянии ESG в зависимости от уровня рыночной концентрации, капиталоемкости отрасли и уровня загрязнения окружающей среды.

Исследование подчеркивает необходимость развития адаптивности и инновационного потенциала компаний для повышения их производительности и устойчивости.

Ключевые слова: ESG, корпоративная устойчивость, операционная устойчивость, финансовая гибкость, совокупная факторная производительность.

Introduction

Against the backdrop of a changing global environment and increasing attention to social responsibility, companies are facing more complex challenges in their production and operations. Factors, like Economic volatility, policy uncertainties, limited resources, and the growing expectations from consumers and investors regarding corporate social responsibility, require companies to enhance their competitiveness while taking on greater environmental and social responsibilities. Environmental, social and corporate governance (ESG) performance has emerged as a key driver of corporate sustainability. ESG performance not only reflects a company's level of social responsibility, corporate branding and governance, but also plays an important role in operational efficiency and organisational effectiveness. In recent years, ESG performance has come to be seen as an important reflection of a company's operational efficiency and overall management capabilities.

Moreover,total factor productivity (TFP) is a core indicator for evaluating the productivity and competitiveness of enterprises. At the same time, TFP also reflects the comprehensive capabilities of an enterprise in terms of technological innovation, operational efficiency and managerial competence. In view of the important role of ESG and TFP in enterprise management, the relationship between ESG and TFP has increasingly received attention and research from academics and the business community. Research has shown that good ESG performance enhances the risk resilience of enterprises, thereby increasing TFP.

In the globalised market competition, improving TFP is a key initiative for enterprises to achieve sustainable development. Firms' developmental resilience is mainly reflected in their ability to innovate, supply chain stability, organisational adaptability and financial flexibility. Therefore, examining how ESG performance affects TFP and how ESG affects various dimensions of corporate resilience will ultimately improve TFP. In order to explore these topics in depth, this paper analyses the role of corporate resilience in the relationship between the two from an innovative perspective, constructing an impact mechanism from operational resilience, organisational resilience and financial resilience, further enriching the study of ESG impact mechanisms. This not only provides theoretical insights for enterprises to formulate effective strategies, but also provides references to support enterprises to achieve long-term competitive advantages and sustainable development in dynamic market environments.

This paper selects China's A-share listed companies from 2010 to 2023 as the research sample, and the rich sample provides sufficient conditions for the study. TFP is measured using the LP method, and the impact and mechanism of ESG performance

on TFP are systematically investigated. The study finds that (1) ESG performance has a significant impact on total factor productivity; (2) ESG performance improves TFP through the key mechanism of corporate resilience. Further, we investigate the heterogeneity of TFP based on industry characteristics.

The possible contributions of this paper are summarised in two main areas:

The first is the expansion of impact mechanisms. This paper explores the impact mechanism of ESG on TFP from the perspective of corporate resilience. In contrast to existing literature focusing on innovation capacity, technological progress, corporate governance, and management efficiency, this paper introduces operational resilience and financial flexibility as new mediating variables. It reveals how companies improve long-term productivity by enhancing resilience. This perspective enriches the research related to ESG impact mechanisms.

The second is deepening heterogeneity analysis. This paper further investigates the heterogeneity of the ESG-TFP relationship based on industry characteristics, especially focusing on the differentiation effects in industries with high market concentration, heavy assets, and heavy pollution. By examining these industries, the paper reveals how ESG practices impact TFP in different ways depending on the industry context. To further enrich the research on industry differences in the impact of ESG on TFP, and to provide lessons and references for subsequent ongoing research.

Literature review

ESG Performance and Total Factor Productivity

ESG performance refers to a company's environmental, social and governance (ESG) performance, which is the standard by which corporate sustainability and social responsibility are assessed. It serves as a benchmark for evaluating corporate sustainability and social responsibility. Total Factor Productivity (TFP) is a company's production efficiency indicator. It reflects its ability to enhance output through technological advancement and management innovation under unchanged input factors (e.g., capital, labor, technology). TFP represents the portion of output not directly explained by input factors and is generally considered an embodiment of technological progress and managerial innovation (Solow,1957). ESG performance is rooted in social responsibility theory and has evolved into a multidimensional and systematic framework. Early ESG research primarily focused on social and environmental aspects. With the rise of sustainable development principles, scholars have recognized that ESG is not only linked to corporate social responsibility and brand image but also closely associated with operational efficiency, risk management, resource integration, and competitive advantage enhancement. Recent studies have increasingly focused on the relationship between ESG performance and TFP, especially in corporate innovation, resource allocation efficiency, and risk management. Specifically, different dimensions of ESG affect corporate TFP through the following mechanisms.

In recent years, scholars have paid increasing attention to the potential impact of environmental factors on corporate productivity. Environmental performance refers to a company's efficiency in reducing pollution emissions and optimizing resource use during production.Enterprises can improve productivity through environmentally friendly technologies. It has been found that corporate environmental responsibility promotes TFP (Cao & Xu, 2024). Excellent social responsibility makes firms better able to cope with external pressures (Vallaster, 2017). ESG performance improves TFP for a firm's downstream customers (Yang et al., 2024).

Research has shown that corporate social responsibility (CSR) can increase TFP in a number of ways. CSR performance tends to be closely related to technological innovation, employee motivation and brand reputation. There have been more studies on the relationship between social responsibility and TFP. There is a positive correlation between CSR and TFP (Edmans, 2011). Enterprises increase TFP when they fulfil their social responsibilities (Li & Cao, 2025). The Relationship between CSR and Performance (Cho et al., 2019). The relationship between corporate environmental responsibility and TFP has been further explored (Ding et al., 2024).

Corporate governance structure and level of governance also have a significant impact on the TFP of firms. A sound governance structure reduces agency costs and business risks, optimises resource allocation and improves operational efficiency. Enterprises with good governance structures and mechanisms are more likely to incorporate ESG into their operations and management, thereby increasing TFP (Xiong et al., 2024). Rational incentives significantly increase TFP (Li et al., 2024). ESG performance improves firms'TFP by increasing investment efficiency (Ge et al., 2024).

In this research project, we have chosen China, the largest emerging market economy, as a sample to study how environmental, social and corporate governance performance affects TFP from a broad-

er perspective and diverse industries. Therefore, we propose the following research hypotheses:

Hypothesis 1: ESG performance enhances corporate TFP.

ESG Performance, Corporate Resilience and Total Factor Productivity

Corporate resilience refers to the ability of an enterprise to recover quickly and achieve normal development when it is faced with the impact of major events such as macro-environmental changes, technological changes and natural disasters. With the fierce competition in the global market and significant changes in the environment, enterprise resilience has become an important criterion for measuring whether enterprises can operate stably and have long-term competitive advantages. Based on relevant research, it is possible to summarise the mechanisms by which corporate resilience affects TFP and explore its relationship with environmental, social and governance (ESG) performance.

In recent years, scholars have been actively researching the relationship between corporate resilience and environmental, social and governance (ESG) performance.Proactive environmental practices by enterprises can enhance adaptive capacity and survivability, especially when faced with major environmental changes or climate event shocks, and help enterprises minimise losses and resume normal production and operations. It has been shown that firms with higher social responsibility performance are more resilient (Huang et al., 2020). Excellent ESG performance improves total factor productivity (Lu et al., 2020).

Corporate resilience has an important impact on TFP. Innovation capability is the core ability of enterprises to be resilient and to achieve sustainable development, and enterprises with good innovation capability can maintain technological leadership in the market, while enterprises with innovation capability tend to have excellent operation management and business performance. The ability to innovate not only enhances TFP directly, but also contributes to TFP indirectly through capital (Ma et al., 2022).

Operational resilience of an enterprise is a guarantee for achieving healthy operations. The operational management of the supply chain system is the organisational ability of the core enterprise to manage upstream and downstream enterprises, reflecting the core enterprise's position in the industry. When an enterprise faces major changes in the market, having a stable and strong supply chain system can ensure the continuity and stability of the enterprise's production. The more stable an enterprise's supply chain is, the higher its TFP will be (Liu & Wang, 2024). Firms with resilient supply chains can contribute to business growth by increasing TFP (Lin & Li, 2025).

Financial resilience plays an important role in improving TFP. Good financial resilience indicates that an organisation's financial position is at a relatively healthy level, with sufficient financial strength to invest and sufficient financial resources to support business development and operations management. Enterprises with strong financial resilience are able to respond quickly to changes in the market and drive sustained productivity growth (Cheong et al., 2024). In addition, strong organisational resilience is another key factor for enterprises to improve TFP. Through an efficient organisational structure and excellent operational systems, companies can coordinate resources efficiently and improve overall operational efficiency.

Building on existing research and considering the unique context of Chinese enterprises in emerging markets, This paper provides insights into the impact of ESG performance on TFP. It specifically reveals how ESG performance contributes to TFP growth through pathways such as technological innovation, operational resilience, and financial flexibility. Based on the above theoretical analyses, the following basic assumptions are made in this paper:

Hypothesis 2: ESG performance enhances a company's TFP by improving innovation capabilities.

Hypothesis 3: ESG performance enhances a company's TFP by improving operational resilience.

Hypothesis 4: ESG performance enhances a company's TFP by improving organizational resilience.

Hypothesis 5: ESG performance enhances a company's TFP by improving financial flexibility.

Methodology

Dependent Variables

Total Factor Productivity (TFP) is the dependent variable. The current main methods for calculating TFP include Ordinary Least Squares (OLS), Fixed Effects (FE) ,Levinsohn-Petrin (LP), Generalized Method of Moments (GMM), Olley-Pakes (OP), and these five TFP indicators are calculated by adapting the method proposed by (Lu & Lian, 2012). Given that the LP addresses endogeneity problems through intermediate inputs, it provides more accurate estimates of TFP. Therefore, the LP, as referenced in (Zhu et al., 2024), is adapted to calculate TFP (denoted as TFP_LP) as the dependent variable. In

subsequent robustness tests, TFP calculated by using the OLS (TFP_OLS) and the FE (TFP_FE) are employed as alternatives.

Independent Variable

ESG is the core independent variable. This study adopts Huazheng ESG ratings as a proxy variable for corporate ESG performance. Sino-Securities Index Information Service (Shanghai) Co.Ltd is a company specialising in ESG ratings and providing investment services, and its ESG ratings cover all A-share listed companies in China, making it a more recognised ESG rating company in the industry and academia.

Control Variables

At the firm level, micro control variables that may influence TFP include Lnsize, Lev, ROA, ATO, Cash, Growth, MO, and TOP. T Variables are defined in Table 1.

Table 1 – Definition of variables

Variables	Deffnitions
TFP_LP	Calculation of TFP using the LP
ESG	Sino-Securities Index ESG
Lnsize	Logarithm of total enterprise assets
Lev	Asset-liability ratio
ROA	Net Profit/Total Assets
ATO	Operating income/Average total assets
Cash	Net operating cash flow/total assets
Growth	$(Sales_{i,t}\text{-}Sales_{i,t-1})/Sales_{i,t-1}$
MO	Number of shares held by management/Total shares
TOP	Shareholding of the top shareholder/ total shares
Note – In this study, the authors defined the variables.	

Sample Selection and Data Sources

In order to make the research sample representative enough, all A-share listed companies in China from 2010 to 2023 are selected in this paper, except for financial industry, ST companies and delisted companies. The sample covers a wide range of industries including machinery manufacturing, aerospace, information technology, power, road transport, pharmaceuticals, non-ferrous metals, chemicals, agriculture, retail and many others. The range of sample periods covers a 14-year period from 2010-2023, and the rich and heterogeneous sample provides favourable conditions for the study. All variables of the firms are obtained from the China Securities Market and Accounting Research Database (CSMAR), except for the indicators of ESG and TFP. To further control for bias in the estimates, we winsorized all enterprise control variables at the 1st and 99th percentiles, and regression analyses were performed in this study using Stata software.

Model Specifications and Estimation Method

This study examines the impact of ESG on TFP using a fixed effects model to regress the panel data of listed companies. The benchmark regression model is as follows:

$$TFP\_LP_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 Lnsize_{i,t} + \\ + \beta_3 Lev_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ATO_{i,t} + \beta_6 Cash_{i,t} + \\ + \beta_7 Growth_{i,t} + \beta_8 MO_{i,t} + \beta_9 TOP_{i,t} + \\ + V_i + Year_t + \varepsilon_{i,t} \quad (1)$$

Where $TFP\_LP_{i,t}$ is the dependent variable, representing the TFP indicator for firm i in year t, and $ESG_{i,t}$ is the ESG performance score for firm i in year t. Eight enterprise control variables are included: Lnsize, Lev, ROA, ATO, Cash, Growth, MO, and TOP. V represents enterprise fixed effects, Year represents time fixed effects, and $\varepsilon_{i,t}$ is the error term.

Descriptive Statistics

Descriptive statistics are represented in Table 2 for the main variables, showing that the mean, standard deviation, and median of TFP_LP are 8.3580, 1.0797, and 8.2582, respectively, indicating some variation in TFP across different enterprises. The mean, standard deviation, and median of ESG are 73.1941, 5.0304, and 73.4200, respectively, in which the relatively large standard deviation suggests significant variation in ESG performance among different enterprises.

Table 2 – Descriptive Statistics

Variables	N	Mean	p50	SD	Min	Max
TFP_LP	38923	8.3580	8.2582	1.0797	3.9201	13.1064
ESG	42256	73.1941	73.4200	5.0304	36.6200	92.9300
Lnsize	43328	22.1624	21.9600	1.3110	19.7200	26.2400
Lev	43328	0.4146	0.4033	0.2103	0.0502	0.9252
ROA	43328	0.0365	0.0381	0.0642	-0.2601	0.2001
ATO	43315	0.6059	0.5147	0.4101	0.0765	2.4788
Cash	43328	0.0469	0.0465	0.0691	-0.1623	0.2425
Growth	43131	0.3457	0.1188	0.9293	-0.6813	6.5221
MO	42075	14.7539	1.3647	20.2401	0.0000	69.0864
TOP	43275	34.0994	31.8306	14.8952	8.4498	74.4510
Note – compiled by the authors based on the CSMAR sample.						

Correlation Analysis

Without considering other factors, the correlation coefficient between ESG and TFP is 0.22, which is statistically significant at the 1% level, indicating a positive relationship between the two, according to Pearson correlation analysis in Table 3. Other potential influencing factors will be controlled in subsequent robustness tests and heterogeneity analysis. In addition, the correlation coefficients of most control variables are below 0.5, indicating that there is no issue of multicollinearity in the model.

Table 3 – Correlation Analysis

Variables	TFP_LP	ESG	Lnsize	Lev	ROA	ATO	Cash	Growth	MO	TOP
TFP_LP	1									
ESG	0.22***	1								
Lnsize	0.79***	0.23***	1							
Lev	0.43***	-0.13***	0.46***	1						
ROA	0.14***	0.22***	0.04***	-0.36***	1					
ATO	0.55***	0.01**	0.07***	0.17***	0.13***	1				
Cash	0.11***	0.11***	0.09***	-0.17***	0.41***	0.12***	1			
Growth	-0.02***	-0.01	-0.00	0.07***	-0.01	-0.15***	-0.10***	1		
MO	-0.24***	0.09***	-0.32***	-0.31***	0.14***	-0.07***	0.02***	-0.04***	1	
TOP	0.17***	0.09***	0.18***	0.03***	0.15***	0.08***	0.10***	0.01*	-0.07***	1
Note – The authors analysed the samples based on CSMAR using Stata software.										

Results and Discussion

Benchmark Regression Results

Stata statistical software is applied for the regression analysis. Table 4 presents the results of the benchmark regression on the impact of ESG performance on TFP. In column (1), without control variables, ESG performance shows a significant positive correlation with TFP. In column (2), ESG performance remains significantly positively correlated with TFP when control variables are included but individual and time-fixed effects are excluded. In column (3), the impact of ESG performance on TFP remains significantly positive after including control variables and controlling for individual and time-fixed effects. The impact of ESG performance on TFP is significantly positive at the 1% level in these three scenarios, indicating that the empirical results are supportive of the fundamental hypotheses and conclusions.

Table 4 – Benchmark Regression Results

Variables	TFP_LP	TFP_LP	TFP_LP
	(1)	(2)	(3)
ESG	0.0113***	0.0066***	0.0018***
	[0.0011]	[0.0008]	[0.0005]
Lnsize		0.6255***	0.6473***
		[0.0051]	[0.0085]
Lev		0.1582***	0.0259
		[0.0343]	[0.0317]
ROA		1.0378***	0.8605***
		[0.0692]	[0.0471]
ATO		1.2973***	1.2634***
		[0.0204]	[0.0217]
Cash		-0.5454***	0.0751**
		[0.0530]	[0.0364]
Growth		0.0583***	0.0066*
		[0.0054]	[0.0035]
MO		0.0022***	0.0007**
		[0.0002]	[0.0003]
TOP		-0.0012***	0.0000
		[0.0003]	[0.0005]
_cons	7.5357***	-6.9178***	-7.0006***
	[0.0777]	[0.1146]	[0.1889]
Firm FE	YES	NO	YES
Year FE	YES	NO	YES
N	38166	37461	37050
adj. R^2	0.8401	0.8829	0.9594
F	113.6426	3.2e+03	1.2e+03

Standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1
Note – Compiled by the authors based on CSMAR sample data

Robustness Tests

Replacing Dependent Variable

For robustness considerations, TFP calculated by the OLS (TFP_OLS) and by the FE (TFP_FE) is selected as an alternative dependent variable, and performs regression tests with ESG performance against TFP_OLS and TFP_FE. Following the approach used in the benchmark regression, three methods are applied: (1) without control variables; (2) without controlling for individual and time-fixed effects; (3) with all control variables included and controlling for individual and time-fixed effects.

The results in Table 5 show that the impact of ESG performance on TFP_OLS and TFP_FE is significantly positive at the 1% level in using these three methods, indicating that the conclusion is reliable. The detailed results are presented in Table 5.

Including Lagged Dependent Variable

Considering that the total factor productivity of the previous period may have an impact on the total factor productivity of the current period, the lagged dependent variable was included and regression tests were conducted to eliminate the potential effect of correlation between the dependent variables in different periods. The results in table 6 show that ESG performance positively affects TFP at the 10 per cent level, indicating that the findings are robust.

Table 5 – Replacement of dependent variable regression results

Variables	TFP_OLS	TFP_OLS	TFP_OLS	TFP_FE	TFP_FE	TFP_FE
	(1)	(2)	(3)	(4)	(5)	(6)
ESG	0.0571***	0.0040***	0.0018***	0.0144***	0.0039***	0.0020***
	[0.0030]	[0.0006]	[0.0004]	[0.0012]	[0.0006]	[0.0004]
Lnsize		0.8218***	0.8320***		0.8821***	0.8912***
		[0.0043]	[0.0080]		[0.0044]	[0.0085]
Lev		0.1631***	0.0746***		0.1679***	0.0907***
		[0.0259]	[0.0272]		[0.0263]	[0.0282]
ROA		0.7621***	0.6416***		0.7092***	0.5844***
		[0.0519]	[0.0412]		[0.0522]	[0.0421]
ATO		1.2949***	1.2697***		1.3191***	1.2851***
		[0.0176]	[0.0209]		[0.0183]	[0.0216]
Cash		0.1343***	0.2236***		0.2993***	0.2531***
		[0.0401]	[0.0316]		[0.0404]	[0.0319]
Growth		-0.0001	-0.0010		-0.0146***	-0.0032
		[0.0031]	[0.0030]		[0.0031]	[0.0030]
MO		0.0014***	0.0006***		0.0014***	0.0006**
		[0.0002]	[0.0002]		[0.0002]	[0.0002]
TOP		-0.0003	0.0005		-0.0001	0.0007*
		[0.0002]	[0.0004]		[0.0002]	[0.0004]
_cons	6.4569***	-8.8420***	-8.8729***	10.2777***	-9.5118***	-9.5409***
	[0.2145]	[0.0977]	[0.1784]	[0.0912]	[0.1012]	[0.1886]
Firm FE	YES	NO	YES	YES	NO	YES
Year FE	YES	NO	YES	YES	NO	YES
N	38578	37461	37050	38166	37461	37050
adj. R^2	0.0520	0.9548	0.9794	0.8694	0.9596	0.9815
F	370.8569	9.4e+03	2.1e+03	132.5682	1.1e+04	2.2e+03
Standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1 Note – Compiled by the authors based on CSMAR sample data						

Table 6 – Including Lagged Dependent Variable

Variables	TFP_LP	TFP_LP
	(1)	(2)
ESG	0.0029***	0.0009*
	[0.0006]	[0.0004]
TFP_LP_1	0.6996***	0.2759***
	[0.0082]	[0.0109]
Lnsize		0.4878***
		[0.0097]
Lev		0.0886***
		[0.0259]
ROA		0.9548***

Continuation of the table

		[0.0428]
ATO		1.0235***
		[0.0232]
Cash		0.0416
		[0.0356]
Growth		0.0251***
		[0.0036]
MO		0.0006**
		[0.0003]
TOP		0.0001
		[0.0004]
_cons	2.3606***	-5.5659***
	[0.0769]	[0.1729]
Firm FE	YES	YES
Year FE	YES	YES
N	33289	32328
adj. R^2	0.9224	0.9674
F	3.7e+03	1.5e+03
Standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1 Note – compiled by the authors based on CSMAR sample data		

Excluding Anomalous Samples

The 2020 outbreak of COVID-19 has had a significant impact on all aspects of society and the economy.China implemented measures like remote working, which had a major influence on business operations, to control the rapid spread of the virus. According to related studies, the growth rate of TFP in China dropped to a historical low of 1.91% in 2020 due to the impact of the pandemic. Therefore, the 2020 sample is excluded and the regression analysis on the remaining data is re-conducted, to rule out the interference of major anomalies. As shown in Table 7, ESG performance has a significantly positive effect on TFP at the 1% level in using these three methods: (1) without control variables; (2) without controlling for individual and time-fixed effects; (3) with all control variables included and controlling for individual and time fixed effects, indicating that the conclusion is robust.

Table 7 – Excluding anomalous sample regressions

Variables	TFP_LP	TFP_LP	TFP_LP
	(1)	(2)	(3)
ESG	0.0121***	0.0073***	0.0018***
	[0.0011]	[0.0008]	[0.0006]
Lnsize		0.6261***	0.6486***
		[0.0052]	[0.0085]
Lev		0.1565***	0.0243
		[0.0342]	[0.0317]
ROA		1.0581***	0.8728***
		[0.0714]	[0.0514]

Continuation of the table

ATO		1.2926***	1.2583***
		[0.0204]	[0.0217]
Cash		-0.5792***	0.0557
		[0.0538]	[0.0379]
Growth		0.0572***	0.0059
		[0.0054]	[0.0036]
MO		0.0022***	0.0007**
		[0.0002]	[0.0003]
TOP		-0.0011***	0.0001
		[0.0003]	[0.0005]
_cons	7.4755***	-6.9853***	-7.0301***
	[0.0834]	[0.1158]	[0.1883]
Firm FE	YES	NO	YES
Year FE	YES	NO	YES
N	34853	34265	33851
adj. R^2	0.8375	0.8833	0.9587
F	111.5678	3.2e+03	1.2e+03

Standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1
Note – compiled by the authors based on CSMAR sample data

In summary, a series of robustness tests, including replacing the dependent variable, adding lagged terms, and excluding the sample from anomalous years, are applied to address potential major factors that could influence the empirical study. All these robustness tests bring empirical results that still support the hypotheses and conclusions, further validating the robustness of the findings.

Mechanism testing

We delved into it further to understand how ESG performance influences TFP with the four mechanisms for measurement which are Innovation, Operational Resilience, Resilience, and Financial Flexibility. Taking the research of (Quan et al., 2017) as a reference, this paper defines the indicator of innovation ability (Innovation) as the natural logarithm of the total number of applications for invention patents, utility models, and design patents plus one. The larger this indicator is, the stronger the enterprise's innovation capability is. Taking the researches of (Bray & Mendelson, 2012) and (Liu et al., 2024) as a reference, it defines the indicator of operational resilience (Supply Chain) as the degree of deviation between an enterprise's production fluctuations and demand fluctuations and uses it to measure the risk of the supply chain. The larger this indicator is, the higher the risk of the enterprise's supply chain is which means that the enterprise enjoys weaker operational resilience, and vice versa. Taking the research of (Lv et al., 2019) as a reference, it defines the indicator of the organization resilience (Resilience) as the overall rating of performance growth measured by the cumulative increase in sales revenue over 3 years and volatility measured by the standard deviation of monthly stock returns within the year, and the rating is calculated in the Entropy Method. The larger this indicator is, the stronger the enterprise's organization resilience is. Taking the research of (Zeng et al., 2013) as a reference, it defines financial flexibility (Flexibility) as an indicator measuring the resilience of an enterprise in managing financial business, financing, and other resources. According to the research, Financial Flexibility equals Cash Flexibility plus Debt Financing Flexibility; Cash Flexibility equals Cash Ratio minus Industrial Cash Ratio; Debt Financing Flexibility equals Max (0, Industry Average Debt Ratio minus Liability Ratio). The larger this indicator is, the stronger the enterprise's financial flexibility is. The empirical models of the four mechanisms for measurement are as follows:

$$Innovation_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 Lnsize_{i,t} + \\ + \beta_3 Lev_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ATO_{i,t} + \beta_6 Cash_{i,t} + \\ + \beta_7 Growth_{i,t} + \beta_8 MO_{i,t} + \beta_9 TOP_{i,t} + V_i + \\ Year_t + \varepsilon_{i,t} \quad (4)$$

$$Supplychain_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 Lnsize_{i,t} + \\ + \beta_3 Lev_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ATO_{i,t} + \beta_6 Cash_{i,t} + \\ + \beta_7 Growth_{i,t} + \beta_8 MO_{i,t} + \beta_9 TOP_{i,t} + \\ + V_i + Year_t + \varepsilon_{i,t} \quad (5)$$

$$Resilience_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 Lnsize_{i,t} + \\ + \beta_3 Lev_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ATO_{i,t} + \beta_6 Cash_{i,t} + \\ + \beta_7 Growth_{i,t} + \beta_8 MO_{i,t} + \beta_9 TOP_{i,t} + V_i + \\ + Year_t + \varepsilon_{i,t} \quad (6)$$

$$Flexibility_{i,t} = \beta_0 + \beta_1 ESG_{i,t} + \beta_2 Lnsize_{i,t} + \\ + \beta_3 Lev_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ATO_{i,t} + \beta_6 Cash_{i,t} + \\ + \beta_7 Growth_{i,t} + \beta_8 MO_{i,t} + \beta_9 TOP_{i,t} + \\ + V_i + Year_t + \varepsilon_{i,t} \quad (7)$$

$Innovation_{i,t}$, $Supplychain_{i,t}$, $Resilience_{i,t}$, and $Flexibility_{i,t}$ are dependent variables that stand for the innovation ability (Innovation), operational resilience (Supply Chain), organization resilience (Resilience), and financial flexibility (Flexibility) respectively of the enterprise i in the t-th year, and $ESG_{i,t}$ measures the ESG performance of the enterprise i in the t-th year. Eight enterprise-level control variables are set, including Lnsize, Lev, ROA, ATO, Cash, Growth, MO, and TOP. V stands for Firm Fixed Effects, Year stands for Time Fixed Effects, and $\varepsilon_{i,t}$ stands for Standard Error Term.

According to the Regression Output in the table below, it can be seen that ESG performance has a great influence on Innovation, Supply Chain, and Resilience at 1% and on Flexibility at 5%. It demonstrates that ESG performance encourages the improvement of the enterprise's innovation ability, decreases the risk of the supply chain, increases operational resilience, and improves organization resilience and financial flexibility. The empirical result supports the assumption and conclusion of the mechanisms of measurement. Details are shown in Table 8.

Table 8 – Mechanism test results

Variables	Innovation	Supplychain	Resilience	Flexibility
	(1)	(2)	(3)	(4)
ESG	0.0069***	-0.0011***	0.0004***	0.0005**
	[0.0017]	[0.0004]	[0.0001]	[0.0002]
Lnsize	0.4996***	0.0175***	0.0062***	-0.0046
	[0.0259]	[0.0047]	[0.0008]	[0.0033]
Lev	-0.1587*	0.0593***	-0.0160***	-0.6904***
	[0.0842]	[0.0181]	[0.0028]	[0.0137]
ROA	0.0135	0.0112	-0.0316***	0.0316*
	[0.1413]	[0.0336]	[0.0062]	[0.0184]
ATO	0.0912*	-0.0023	0.0066***	-0.0453***
	[0.0497]	[0.0069]	[0.0020]	[0.0061]
Cash	-0.1996**	0.2501***	-0.0040	0.2068***
	[0.0990]	[0.0317]	[0.0041]	[0.0139]
Growth	-0.0114	-0.0139***	-0.0004	0.0016
	[0.0081]	[0.0032]	[0.0004]	[0.0010]
MO	0.0031***	-0.0016***	-0.0000	0.0007***
	[0.0010]	[0.0002]	[0.0000]	[0.0001]
TOP	0.0007	-0.0007***	0.0001***	0.0003
	[0.0016]	[0.0003]	[0.0000]	[0.0002]

Continuation of the table

Variables	Innovation	Supplychain	Resilience	Flexibility
	(1)	(2)	(3)	(4)
_cons	-8.9502***	0.6372***	0.3353***	0.4337***
	[0.5747]	[0.1044]	[0.0181]	[0.0732]
Firm FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
N	39773	37053	31332	39773
adj. R^2	0.7464	0.2219	0.9863	0.6869
F	50.9498	25.2849	17.0339	419.4327

Standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1
Note – Compiled by the authors based on CSMAR sample data

Heterogeneity Analysis

We analyzed the different characteristics within the sample a step further to delve into the non-homogeneous impact of ESG on TFP. Analyzing from the perspective of industrial competition and market concentration, we, taking the Herfindahl-Hirschman Index 0.3 as the watershed, listed samples bigger or equal to 0.3 as high market concentration ones and those smaller than 0.3 as low market concentration ones. We found that in the high market concentration group, ESG performance has a subtle impact on TFP, while in the other group, the impact is salient. One possible explanation is that in a high market concentration environment lacking competitiveness, enterprises see insufficient motivation to improve their ESG performance because of a light burden of competitiveness. The high market concentration may lead to a lower resource allocation efficiency and the leading enterprises may prefer using currently available resources and upgraded technologies instead of innovation to improve their operation and supply chain, and therefore develop their ESG performance and TFP greatly. Details are shown in the columns (1) and (2) of Table 9.

Referring to the research of (Yin et al., 2018) and according to the *Guidelines on Industry Classification of Listed Companies* by the China Securities Regulatory Commission revised in 2012, this paper classifies the samples as technology-intensive enterprises, labor-intensive enterprises, and asset-intensive enterprises by the intensity of production factors. Analyzing from the perspective of production factors, the ESG performance of asset-intensive enterprises has a subtle impact on TFP while that of non-asset-intensive enterprises, including technology-intensive enterprises and labor-intensive enterprises, has a salient impact on TFP. One possible explanation is that as the operation of asset-intensive enterprises is usually related to a large amount of fixed-asset investment with a long payback period, and as their higher leverage rate leads to a lower Return on Equity (ROE), the improvement of their TFP is curbed. Details are shown in columns (3) and (4) of Table 9.

Referring to the research of (Wang et al., 2021) and according to the *Guidelines on Industry Classification of Listed Companies* by China Securities Regulatory Commission revised in 2012, this paper lists 15 sectors, including Coal mining and dressing, Petroleum and natural gas extraction, Non-ferrous metal ore mining, and Textile, as main polluted industry trades. Analyzing from the perspective of the degree of environmental pollution, the ESG performance of the enterprises in the main polluted industry trades has a subtle impact on TFP while that of the enterprises that are out of the main polluted industry trades has a salient positive impact on TFP. One possible explanation is that in the main polluted industry trades, the ESG performance is constrained by environmental rules, technological innovation, and other factors and thus finds it difficult to improve TFP. Details are shown in the columns (5) and (6) of Table 9.

Table 9 – Heterogeneity Analysis

Variables	HHI		Asset-intensive		Heavy-pollution	
	High	Low	YES	NO	YES	NO
	(1)	(2)	(3)	(4)	(5)	(6)
	TFP_LP	TFP_LP	TFP_LP	TFP_LP	TFP_LP	TFP_LP
ESG	0.0007	0.0022***	0.0002	0.0023***	0.0014	0.0020***
	[0.0014]	[0.0005]	[0.0008]	[0.0006]	[0.0009]	[0.0006]
Lnsize	0.6567***	0.6417***	0.6237***	0.6544***	0.6019***	0.6546***
	[0.0176]	[0.0093]	[0.0160]	[0.0102]	[0.0122]	[0.0107]
Lev	-0.0146	0.0411	-0.1358***	0.0640*	-0.1613***	0.0953**
	[0.0746]	[0.0321]	[0.0460]	[0.0371]	[0.0394]	[0.0386]
ROA	0.7849***	0.8727***	0.6126***	0.9170***	0.6935***	0.9100***
	[0.0985]	[0.0531]	[0.0982]	[0.0531]	[0.0817]	[0.0542]
ATO	1.2619***	1.2645***	1.2214***	1.2698***	1.1258***	1.2957***
	[0.0485]	[0.0234]	[0.0422]	[0.0246]	[0.0337]	[0.0275]
Cash	0.0696	0.0871**	0.0101	0.1050***	0.0276	0.1039**
	[0.0947]	[0.0377]	[0.0850]	[0.0381]	[0.0671]	[0.0415]
Growth	0.0125*	0.0053	-0.0135	0.0086**	-0.0107	0.0098**
	[0.0072]	[0.0039]	[0.0086]	[0.0038]	[0.0076]	[0.0039]
MO	0.0006	0.0006*	0.0011**	0.0006*	0.0012***	0.0005
	[0.0011]	[0.0003]	[0.0005]	[0.0004]	[0.0005]	[0.0004]
TOP	-0.0012	0.0003	0.0005	0.0000	0.0002	-0.0000
	[0.0013]	[0.0005]	[0.0008]	[0.0006]	[0.0008]	[0.0006]
_cons	-7.0841***	-6.9214***	-6.3954***	-7.1905***	-5.9067***	-7.1896***
	[0.3870]	[0.2086]	[0.3755]	[0.2270]	[0.2877]	[0.2365]
Firm FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
N	7383	29334	6736	30290	8582	28443
adj. R^2	0.9481	0.9643	0.9675	0.9599	0.9689	0.9594
F	246.9663	1.0e+03	277.2851	904.7567	369.5859	824.7087

Standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1
Note – Compiled by the authors based on CSMAR sample data

Conclusion

Addressing the unique context of emerging market economies, this paper systematically investigates the relationship between ESG performance and TFP based on a sample of Chinese firms from 2010 to 2023, using an empirical research methodology and multiple regression analysis on panel data. The results of the study show that ESG performance increases the TFP of firms. In particular, this study analyses the mechanisms by which firms' ESG performance affects TFP by examining key mechanisms such as innovative capacity, operational and organisational resilience, and financial flexibility, through which ESG performance increases TFP. Further heterogeneity analyses show that the impact of ESG performance on TFP varies between asset-intensive industries, heavily polluting industries, and so on.

This work enriches related research on ESG and total factor productivity. However, there are still some blank areas and research directions on the relationship between ESG and total factor productivity, which can be explored and researched continuously. For example: whether ESG performance has differentiated impacts on TFP of companies with different

ownership properties and enterprises with different life cycles; what other mechanisms are available for the impact of ESG performance on TFP, and so on.

This study highlights the importance and relevance of incorporating environmental, social and governance (ESG) factors into corporate management. As a dynamic economy, Kazakhstan has been actively diversifying its economy in recent years and has made great strides in economic transformation and business development. Kazakhstan has good resource advantages and ESG performance has a significant impact on the long-term value and sustainable development of enterprises. Enterprises can learn from successful experiences and actively promote corporate ESG practices based on their own resource conditions and competitive advantages. They should further improve their corporate governance structure, cultivate innovation capacity, strengthen environmental management and green development, increase TFP through improved ESG performance, and achieve sustainable development.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability statement

Due to the signing of the agreement on non-distribution of primary data, the processed data file can be presented upon the request.

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Information about authors:

Sushan Lan (corresponding author) – Finance and accounting department Phd student, Al-Farabi Kazakh National University, (Almaty, Kazakhstan, e-mail: lan_sushan@kaznu.edu.kz)

Onaikhan Zhadigerovna Zhadigerova – Department of Finance and accounting candidate of Economic Sciences, Al-Farabi Kazakh National University, (Almaty, Kazakhstan, e-mail:olia_kz@mail.ru)

Altynay Bolysovna Assanova – Department of Finance and accounting candidate of Economic Sciences, Al-Farabi Kazakh National University, (Almaty, Kazakhstan, e-mail: altin_assan@bk.ru)

Nazgul Shengelbayevna Syrlybayeva – Department of Finance and accounting candidate of Economic Sciences, Al-Farabi Kazakh National University, (Almaty, Kazakhstan, e-mail: adilet-75@mail.ru)

Авторлар туралы ақпарат:

Лан Сушан (корреспондент-автор) – Қаржы және есеп каферасының Phd докторанты, Әл-Фараби атындағы Қазақ ұлттық университеті, (Алматы қ., Қазақстан, e-mail: lan_sushan@kaznu.edu.kz)

Жадигерова Онайхан Жадигеровна – экономика ғылымдарының кандидаты, Қаржы және есеп каферасы, әл-Фараби атындағы Қазақ ұлттық университеті, (Алматы қ., Қазақстан, e-mail:olia_kz@mail.ru)

Асанова Алтынай Болысовна – экономика ғылымдарының кандидаты, Қаржы және есеп каферасы, Әл-Фараби атындағы Қазақ ұлттық университеті, (Алматы қ., Қазақстан, e-mail: altin_assan@bk.ru)

Сырлыбаева Назгүл Шеңгелбаевна – экономика ғылымдарының кандидаты, Қаржы және есеп каферасы, Әл-Фараби атындағы Қазақ ұлттық университеті, (Алматы қ., Қазақстан, e-mail: adilet-75@mail.ru)

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Y.U. Uzun

Bitlis Eren University, Bitlis, Turkey
e-mail: yuuzun@beu.edu.tr

THE IMPACT OF INFLATION AND GROSS DOMESTIC PRODUCT ON THE BANKING INDEX: THE CASE OF TURKEY

This study examines the effect of inflation and GDP on the banking index. As the research methodology, the stationarity of time series data was tested using the Augmented Dickey-Fuller (ADF) test, and analyzes were conducted using the Vector Auto regression (VAR) model and the Granger Causality Test. According to the findings, the banking index followed a general upward trend between 2005 and 2021, with a significant increase observed particularly after 2021. While the inflation rate remained low and stable from 2005 to 2019, it started to rise after 2019. GDP, on the other hand, consistently increased, indicating economic growth. Statistical analyzes revealed that inflation has a significant causal effect on the banking index, whereas GDP does not have a direct impact. Correlation tests showed that inflation has a positive relationship with both the banking index and GDP, and there is also a positive correlation between the banking index and GDP. This study highlights the significant effect of inflation on the banking index and emphasizes the necessity of considering this impact in economic policy decisions. Additionally, the lack of a direct effect of GDP on the banking index suggests that other macroeconomic factors and market dynamics play a more prominent role in the financial sector.

Key words: inflation, GDP, Banking, Banking Index, BIST.

Й.У. Узун

Бітліс Ерен университеті, Бітліс, Түркия
e-mail: yuuzun@beu.edu.tr

Инфляция мен жалпы ішкі өнімнің банк индексіне әсері: Түркия мысалында

Бұл зерттеуде инфляция мен ЖІӨ-нің банк индексіне әсері қарастырады. Зерттеу әдістемесі ретінде кеңейтілген Дики-Фуллер сынағы (ADF) арқылы уақыт қатарының деректерінің стационарлығын тексеру қолданылды және талдау векторлық Автоматты регрессия (VAR) моделі мен грейнджердің себеп-салдарлық сынағы арқылы жүргізілді. Алынған мәліметтерге сәйкес, банк индексі 2005 және 2021 жылдар аралығында жалпы өсу тенденциясына ие болды, әсіресе 2021 жылдан кейін айтарлықтай өсу байқалды. Инфляция деңгейі 2005 жылдан 2019 жылға дейін төмен және тұрақты болғанымен, 2019 жылдан кейін ол өсе бастады. Екінші жағынан, ЖІӨ үнемі өсіп отырды, бұл экономикалық өсуді көрсетеді. Статистикалық талдау инфляцияның банк индексіне айтарлықтай себеп-салдарлық әсер ететінін көрсетті, ал ЖІӨ тікелей әсер етпейді. Корреляциялық сынақтар инфляцияның банк индексімен де, ЖІӨ-мен де оң байланысы бар екенін және банк индексі мен ЖІӨ арасында оң корреляция бар екенін көрсетті. Бұл зерттеу инфляцияның банк индексіне айтарлықтай әсерін және экономикалық саясат шешімдерінде осы әсерді ескеру қажеттілігін көрсетеді. Сонымен қатар, ЖІӨ-нің банк индексіне тікелей әсер етпеуі басқа макроэкономикалық факторлар мен нарық динамикасы қаржы секторында анағұрлым көрнекті рөл атқаратындығын көрсетеді.

Түйін сөздер: инфляция, ЖІӨ, банк қызметі, банк индексі, BIST.

Й.У. Узун

Университет Битлис Эрен, Битлис, Турция
e-mail: yuuzun@beu.edu.tr

Влияние инфляции и валового внутреннего продукта на банковский индекс: на примере Турции

В этом исследовании рассматривается влияние инфляции и ВВП на банковский индекс. В качестве методологии исследования была использована проверка стационарности данных временных рядов с использованием расширенного теста Дики-Фуллера (ADF), а анализ проводился с использованием модели векторной автоматической регрессии (VAR) и теста причинно-след-

ственной связи Грейнджера. Согласно полученным данным, банковский индекс в период с 2005 по 2021 год имел общую тенденцию к росту, причем значительный рост наблюдался особенно после 2021 года. Хотя уровень инфляции оставался низким и стабильным с 2005 по 2019 год, после 2019 года он начал расти. ВВП, с другой стороны, постоянно увеличивался, что свидетельствует об экономическом росте. Статистический анализ показал, что инфляция оказывает значительное причинно-следственное влияние на банковский индекс, в то время как ВВП не оказывает прямого влияния. Корреляционные тесты показали, что инфляция имеет положительную взаимосвязь как с банковским индексом, так и с ВВП, и также существует положительная корреляция между банковским индексом и ВВП. В этом исследовании подчеркивается значительное влияние инфляции на банковский индекс и необходимость учета этого влияния при принятии решений в области экономической политики. Кроме того, отсутствие прямого влияния ВВП на банковский индекс свидетельствует о том, что другие макроэкономические факторы и динамика рынка играют более заметную роль в финансовом секторе.

Ключевые слова: инфляция, ВВП, банковская деятельность, Банковский индекс, BIST.

Introduction

Macroeconomic indicators are fundamental tools for measuring a country's financial and economic structure. Among these indicators, inflation and Gross Domestic Product (GDP) constitute the core components of macroeconomic analyzes and are among the most significant factors influencing financial markets (Kendirli & Çankaya, 2016). Inflation represents the general increase in price levels within an economy (Barro, 1996), while GDP is considered a measure of a country's production capacity and economic size (Özsoy & Tosunoğlu, 2017). These two variables not only determine the overall performance of a country's economy but also significantly affect the functioning of financial markets, particularly the banking sector.

Furthermore, these key macroeconomic indicators play a crucial role in financial markets due to their direct and indirect effects. In particular, the close relationship between GDP and financial indicators such as banking indices has been a key subject in the literature. Banking indices serve as benchmarks for the stock performance of banks and directly influence financial stability and economic growth (Gertler & Kiyotaki, 2015). Additionally, the banking index tracks the overall structure and performance of a country's banking sector and consists of the publicly traded stocks of banks. Therefore, banking indices are essential tools for understanding the impact of economic variables on financial markets (Doğru & Medetoğlu, 2023).

Inflation, by causing a decrease in the value of money and an increase in price levels within an economy, can lead to significant consequences in financial markets. High inflation often prompts central banks to raise interest rates and implement measures to control economic activities (Alvarez et al., 2001). This, in turn, directly affects banks' lending capacity, cost structure, and profitability. In an environment of rising inflation, banks experience increased financing costs, while demand for consumer and corporate loans may fluctuate. In this context, the effects of inflation on the banking index can be shaped through channels such as interest rates and loan demand (Bravo, 2022).

GDP, on the other hand, is a critical macroeconomic indicator that measures a country's economic size and production capacity (Schreyer, 2016). Economic growth is generally associated with increased production, investments, and consumption. This process directly influences banks' lending activities. High GDP growth can be seen as an indicator of increased economic activity and rising demand for bank loans (Thaçi, 2022). While economic growth allows banks to expand their loan portfolios, periods of economic contraction can increase the risks of loan defaults, negatively impacting the banking sector (Lavrushin, 2010). In this regard, the impact of GDP on the banking sector is quite complex, involving both the opportunities provided by economic expansion and the challenges posed by potential economic downturns.

The aim of this study is to conduct an in-depth analysis of the effects of inflation and GDP on the banking index. Although various analyses in the literature examine the connection between inflation, economic development, and financial indicators, there is a small amount of practical investigations on the movement and correlations of these effects. In growing economies, in particular, the impact of macroeconomic variables such as inflation and growth on financial markets can vary significantly depending on different economic situations and market conditions. In this regard, an analysis based on the case of Turkey will not only help better understand the behavior of banking indices in emerging markets but also provide valuable insights into the effects of economic indicators on financial markets.

This study first examines the effects of inflation and GDP on the banking index within a theoretical framework and then evaluates the nature, magnitude, and direction of this relationship through empirical analyses. The study investigates how inflation and economic growth rates influence the banking sector, particularly in terms of bank profits, loan volume, interest rates, and economic confidence. Additionally, it aims to develop a new perspective on how banking indices respond to economic indicators by analyzing both short- and long-term dynamics.

Additionally, this analysis aims to emphasize that financial indicators are not only a reflection of financial scale and price levels but also measures of market uncertainty in investment sectors, capital availability, and financial optimism. The results of this study could serve as an essential guide for both decision-makers and market participants in influencing economic policy decisions and investment strategies.

Literature review

This research intends to examine the connections and correlations between inflation, Gross Domestic Product (GDP) or national income, and banking indices. The main objective of the research is to examine the possible effects of inflation and GDP on banking indices from causality and correlation perspectives. This analysis seeks to contribute to a better understanding of the dynamics between these fundamental economic parameters.

In terms of scope, the research applies econometric analysis methods using time series data. The stationarity of the time series data was tested using the Augmented Dickey-Fuller (ADF) test, as the influence of inflation and GDP on banking metrics were analyzed via techniques such as the VAR (Vector Auto Regression) framework and the causality assessment test. These techniques were utilized to analyze the connections and dependencies between these key financial elements.

An analysis of existing research shows that research has examined the relationship between GDP, inflation, and the banking sector/indices from various viewpoints. It has been noted that political and economic factors, in addition to measures like economic output have the power to influence investor decisions. Stock markets are also significantly affected by these factors, leading to considerable market fluctuations. However, predicting which specific variables directly impact the stock market remains challenging. Additionally, whether these interactions have positive or negative effects varies depending on the economic conditions of different countries and markets.

On the other hand, bank stocks are found to respond significantly to these changes due to their large size, balance sheet structures, and high trading volumes. The financial sector index has a strong presence in the Borsa Istanbul (BIST) relative to other publicly traded firms as a result of its funding models, trading activity, and high market values. Moreover, considering criteria such as adherence to corporate governance principles, transparency, and auditability, banks tend to have a more institutionalized structure compared to other companies. It is believed that macroeconomic variables such as inflation and GDP may influence the Banking Index.

Numerous national and international studies have examined these relationships. For instance:

Choi, Elyasian, and Kopecky (1992) examined changes in international foreign exchange markets and the stock returns of American banks. The study, which focused on 48 major U.S. banks with net foreign exchange positions after the 1970s, specifically analyzed how these banks were affected by exchange rate fluctuations. The findings indicated a negative relationship between exchange rates and bank stock returns until October 1979, but this relationship turned positive in the 1980s. The decline in major foreign currency holdings in the 1980s was cited as the reason for this shift.

King and Levine (1993) analyzed 80 countries from 1960 to 1989 and found that banking indices had a strong correlation with both current and future GDP growth rates.

Rajan and Zingales (1998) demonstrated that an efficient banking sector had a positive impact on GDP based on an analysis of data from 1980 to 1990.

Ewing (2002) examined the impact of macroeconomic developments on 100 stocks tracked by the NASDAQ index. The analysis revealed a positive and sensitive relationship between inflation and the financial sector index, while monetary policy shocks had a negative impact on the banking index, especially following the second month. Unanticipated market events were shown to have a positive effect on economic growth, highlighting the complex and advanced market structure of U.S. stock market indicators.

Durukan (1999) investigated the relationship between macroeconomic variables such as inflation, interest rates, exchange rates, and money supply with stock prices of companies listed on the Istanbul Stock Exchange. The study, which used data from 1986 to 1998 and applied the Least Squares

Method, identified an inverse correlation between interest rates and stock prices. Nevertheless, no substantial correlation was observed between inflation, exchange rates, and stock returns during financial crises and inflationary periods in the 1990s.

Al-Sharkas (2004) analyzed the connection between financial metric and share prices within the Amman Stock Market over the period March 1980-December 2003. The research incorporated factors like liquidity levels, manufacturing output index, price growth, and borrowing costs. The findings indicated an inverse correlation between inflation, interest rates, and stock prices, while there was a positive relationship between actual GDP expansion and liquidity levels; inflation adjusted economic development and monetary circulation.

Maysami, Howe and Hamzah (2004) studied the effects of macroeconomic variables on finance, hotel, and real estate indices in the Singapore Stock Exchange. Their findings indicated that inflation, three-month interbank interest rates, and money supply had a positive impact on financial industry benchmark, while manufacturing output, currency values and long-term lending rates negatively influenced.

Dritsaki (2005) examined the sustained connection between economic indicators and Greece's financial market. Using the Granger Causality Test and data from September 1988 to June 2003, the research revealed that economic factors had a favorable influence on Greece's stock market.

Gay (2008) analyzed the impact of changes in oil prices and exchange rates on stock prices in BRIC countries (Brazil, Russia, India, and China). The research determined that there was no relationship between these economic indicators and market prices, suggesting that other factors such as inflation, interest rates, and GDP growth rates impacted investment returns.

Dizdarlar and Derindere (2008) examined the effects of 14 key macroeconomic variables on the ISE-100 Index from 2005 to 2007. Their study explained that currency exchange rate fluctuations, which had a 0.55 effect on the index, could lead to a decline in company values due to overall economic deterioration, corporate balance sheet losses, and external debt issues. In addition, aside from exchange rate effects, domestic and global political-economic events, publicly available corporate information, manipulative activities, international investment sentiment, non-traditional financial assets were identified as other factors affecting stock prices.

Caporale et al. (2015) studied the key factors influencing the banking index in ten new EU member states between 1994 and 2007. Using a dynamic panel model, the research determined that the relationship between the banking index and GDP showed constraints in economies with underdeveloped financial sectors.

Aydemir and Demirhan (2009) analyzed the effects of currency volatility in relation to tourism banking, manufacturing and tech sector benchmarks, together with the Borsa Istanbul 100 index, in the Turkish equity market. The analysis incorporating daily currency and stock value records starting on February 23, 2001, to June 11, 2008, revealed that exchange rates had a negative impact on all indices. However, while national 100, finance, industry, and technology indices were similarly affected by exchange rate changes, the service sector showed lower sensitivity.

Demir and Göçmen Yağcılar (2009) analyzed the monthly returns of 13 banks, including Akbank, Alternatif Bank, Fortis, Finansbank, Garanti Bank, İş Bank, Şekerbank, Tekstilbank, TEB, Turkey Development Bank, Turkish Industrial Development Bank, Yapı Kredi Bank, and Denizbank, using Arbitrage Pricing Theory. Analyzing data from 2000 to 2006, the research analyzed the connections among the ISE-100 Index, exchange rate basket, capacity utilization rate, government debt yields, liquidity levels, manufacturing output measure, GDP growth rates, current account balance, short-duration borrowing costs, precious metal valuations, and financial sector equity values. The results indicated that the ISE-100 Index had the strongest positive effect on bank stocks, while no relationship was found between GDP growth rates and bank stock returns.

Van Antwerpen (2010) analyzed changes in 17 different sector indices within the NYSE, AMEX, and NASDAQ stock indices. Using data from 1928 to 2008, the study examined the effects of inflation, expected inflation, and unexpected inflation on stock indices. The findings revealed that inflation and expected inflation negatively impacted financial company stock indices, while unexpected inflation had a positive effect on stock returns.

Hsing (2011), employing the GARCH model, attempts to explain the extent to which the Hungarian equities sector is shaped by factors such as GDP growth rates, the ratio of public debt to GDP, currency values, the DAX index, inflation-adjusted borrowing costs, forecasted price level increases, European government bond valuations, and liquidity availability. In the study, which uses data from the period 2000:Q1 – 2010:Q2, it was determined that the ratio of public debt to GDP and the German stock index had a positive effect on Hungarian

stock prices. Additionally, the research pointed out that borrowing costs of European government securities and debt instruments, along with anticipated price level increases, had a negative effect. Additionally, it was highlighted that liquidity expansion supported growth until a threshold was reached but created a negative impact when this level was exceeded. This situation is explained by the fact that a high increase in money supply leads to inflationary effects. Likewise, while the interest rate on public debt was expected to have a positive effect, although government; the observed decline in stock prices due to rising public debt interest rates was seen as unexpected.

Sayılgan and Süslü (2011) examine the connection between stock returns and exchange rates, inflation, the Standard & Poor's 500 Index, interest rates, GDP growth rates, money supply, and oil prices in developing countries (Hungary, Jordan, Poland, Russia, Argentina, Brazil, Indonesia, Mexico, Malaysia, Chile, and Turkey) during the period from 1999 to 2006. The research found no strong correlation between stock returns and interest rates, money supply, and oil prices.

Yurttançıkmaz (2012) analyzes the impact of exchange rates and the Consumer Price Index on stock returns based on data spanning 1994 to 2010. The research determined that inflation had a high and positive effect on stock returns, while the effect of exchange rates was lower and negative. The statistical analysis showed that, a one-unit increase in inflation led to a 1.582-unit increase in stock prices, while a rise in currency exchange rates led to a 0.652-unit drop in market prices.

Tu (2012) analyzes Chinese banks and investigates the influence of price level changes, borrowing costs, and broad money (M12) on banking sector equity performance. The research identified a positive relationship between inflation and money supply (M2) and stock prices, while inflation and money supply (M2) were negatively correlated with interest rates. Additionally, the study indicated that exchange rate fluctuations, particularly an increase in the US dollar exchange rate, resulted in a rise in market prices.

Obilor (2013) examined the effect of the banking sector on GDP in Nigeria between 1984 and 2007 using the Durbin-Watson test and found that the financing provided by the banking sector contributed positively to GDP, while other financial services provided by banks had a limited impact on GDP.

Balago (2014) analyzed data from Nigeria between 1983 and 2012 using the ADF test and Johansen cointegration tests and showed that financing provided by the banking sector had a positive relationship with GDP.

Ogbuabor and Nwosu (2017) analyzed the link between Nigeria's financial sector and economic growth for the period 1981-2014 using the Error Correction Model and identified a strong positive association in the long run, while in the short term, the relationship had no significant effect.

Kaya, Çömlekçi and Kara (2013) examined the link between the ISE-100 using Index and selected macroeconomic factors data based on data spanning January 2002 to June 2012. In this study, a direct correlation was identified between ISE-100 Index returns and money supply (M2), whereas a negative relationship was observed between stock returns and exchange rates. However, no statistically significant relationship was found between stock returns, interest rates, and industrial production level.

Tandoğan and Özyurt (2013) analyzed the causality relationships from banking activities to GDP using Toda and Yamamoto's (1995) causality test with data from 1981-2009. The results revealed strong causality relationships from the banking sector to GDP.

Aktaş and Akdağ (2013) analyzed the link between the ISE-100 Index and key economic indicators over the period 2008-2012 employing the Granger Causality Test and Multiple Linear Regression method. Independent variables in the analysis included CPI, deposit interest rates, US dollar and euro currency values, production capacity usage levels, manufacturing output index, gold market values, export data, the consumer confidence index, unemployment rates, and petroleum market prices. According to the Multiple Regression Analysis results, deposit interest rates, CPI, USD exchange rate, capacity utilization rate, and the consumer confidence index influenced the ISE-100 Index. Additionally, an increase in deposit interest rates and the USD exchange rate had negative effects of 0.517 and 0.411 units, respectively, on the ISE-100 Index. However, a one-unit increase in CPI had a positive impact of 0.797 units, while the capacity utilization rate had a positive effect of 0.499 units. Moreover, a significant relationship was found between the capacity utilization rate, interest rates, and the ISE-100 Index through the Granger Causality Test.

Yüksel and Yüksel (2013) aimed to explain the relationship between the banking index and inflation in seven countries, including Germany, Argentina, the United States, Austria, Israel, Hungary, and Turkey, using the Granger Causality Test. The study found that inflation had no impact on the banking in-

dex data in Germany, Argentina, the United States, Austria, and Hungary. Similarly, no relationship was found between inflation and the banking index in Turkey. The study is significant as it demonstrates the lack of a relationship between inflation and the banking index in both developing and developed countries.

Emecheta and Ibe (2014) analyzed the relationship between the banking sector and GDP in Nigeria between 1960 and 2011 using the Dickey-Fuller and Phillips-Perron tests and examined it through the VAR technique. The study found a positive relationship between the banking sector and GDP.

Özkul and Akgüneş (2015) used a Multiple Linear Regression model to analyze the effects of macroeconomic variables on the BIST 10 Bank Return Index. The study examined ten different variables, including the BIST-100 Index, inflation, interest rates, exchange rates, and the industrial production index, for the period 2010:01 – 2014:07. The results identified the BIST-100 Index as the most influential variable. Although there were nine banks in the BIST 10 Bank Index since 1986:71, an increase in stock prices was not observed for banks outside the BIST-100 Index. The study found that an increase in money supply (M1) had a negative impact, which was explained by the change in demand for other firms due to the increase in money supply.

Awwad and Türsoy (2016) carried out a recent analysis on the effects of money supply (M2) on short- and long-term interest rates and the BIST Banking Index over the period 2002-2013 applying Impulse Response Function Analysis, Variance Decomposition, Cointegration techniques, and Granger Causality Tests. The results showed that macroeconomic variables had both short- and long-term effects on the index. Structural changes made after the 2001 crisis were proven to be responsible for the Banking Index's strong performance even during the 2008 crisis. Other results of the study indicated that, according to the Cointegration Test, there was a negative relationship between short-term interest rates, money supply, and exchange rates with the Banking Index in the long run. Therefore, a one-percent change in money supply and interest rates led to respective declines of 1.42% and 3.9%. This finding aligns with many previous studies, as changes in interest rates and exchange rates can reduce investors' interest in the Banking Index. Additionally, the increase in money supply was noted to have negative effects due to inflationary consequences, leading to uncertainty in the market.

Kamacı, Ceyhan and Peçe (2017) examined the effect of the banking sector on GDP using Granger causality, cointegration, and other econometric tests with data from 2005:Q4 – 2017:Q1. The results showed a one-way causality relationship from GDP to banking activities and a long-term cointegration relationship between the banking sector and GDP.

Ali, Bashir, Ahmed, Ishaq and Shahzad (2018) analyzed the relationship between Pakistani banks' stock prices, economic growth, exchange rates, and interest rates from 2005 to 2013 using the Granger Causality Test. The findings revealed an inverse correlation between, currency values, short-term borrowing costs, and equity prices. Moreover, bank stock data were found to be more sensitive to interest rates and exchange rates compared to the general stock market.

Bozkurt and Kaderli (2024) investigate the effects of inflation on the BIST 100 index using the RALS-LM unit root test, RALS-EG cointegration test, dynamic least squares (DOLS) and fully modified (FMOLS) method with data from 2016 to 2023. As a result, it is pointed out that increases in CPI in the long run will have positive effects on BIST 100 return.

Coşkuner and Özer (2024) conducted Johensen Co-integration test on the effects of exchange rate and inflation on stocks with data for the years 2010-2021. As a result of the study, it was determined that the dollar has a significant effect on Bist100 at 1% level and inflation has an effect on Bist100 at 10% significance level.

Bilalli, Sadiku and Sadiku (2024) tested the effects of inflation on the financial sector with both static and dynamic panel regression models for OECD countries with data from 2002-2021. As a result of the study, it is found that there is a consistently negative correlation between core finance and inflation. This implies that higher inflation levels weaken the performance of the financial sector.

Methodology

This study employed the Augmented Dickey-Fuller (ADF) test to assess the stationarity of time series data. Non-stationary series were made stationary by taking their first differences. Then, a Vector Autoregression (VAR) model was established, and the Granger Causality Test was applied to analyze the effect of inflation on the banking index and the relationship between GDP and the banking index. Büyüköztürk et al. (2008) state that this method is a frequently used approach in econometric analyses and an effective tool for revealing causal relationships in time series data. Findings / Econometric Results

Results and Discussion

This section presents the results of econometric analysis aimed at uncovering the relationships between inflation, GDP, and the banking index, based on the study's findings.

In the figure above, the time series of banking index values by year is presented. From 2005 to 2021, a general upward trend is observed, indicating that the value of the banking index has increased over time. However, sharp declines are also evident in certain periods. Notably, a drop occurred during the 2008 global financial crisis, followed by a recovery trend. From 2021 onwards, the index value has risen sharply. This increase can be attributed to factors such as sectoral growth, as well as the impact of inflation.

Figure 1 – Banking Index
Note – compiled by the authors

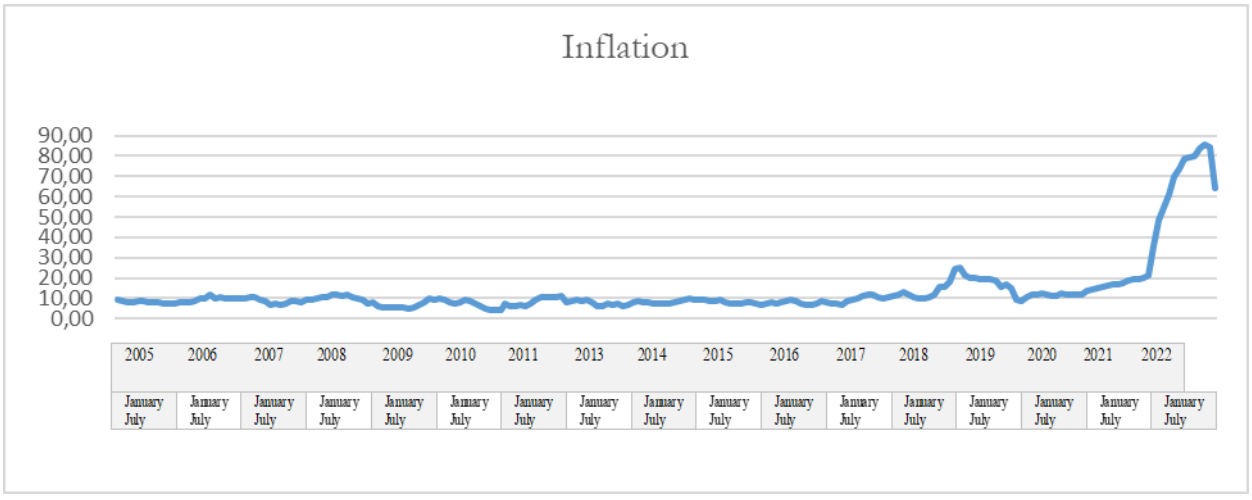

Figure 2 – Inflation
Note – compiled by the authors

The above figure displays inflation data for the period between 2005 and 2022. From 2005 to 2019, the inflation rate remained generally low and relatively stable. However, after 2019, a noticeable volatility (fluctuation) and an increasing trend in the inflation rate can be observed. This can be seen as a result of economic instability and economic shocks. Towards 2022, the inflation rate reached a very high level. This sharp increase may reflect demand shocks, cost-push inflation, or currency depreciation.

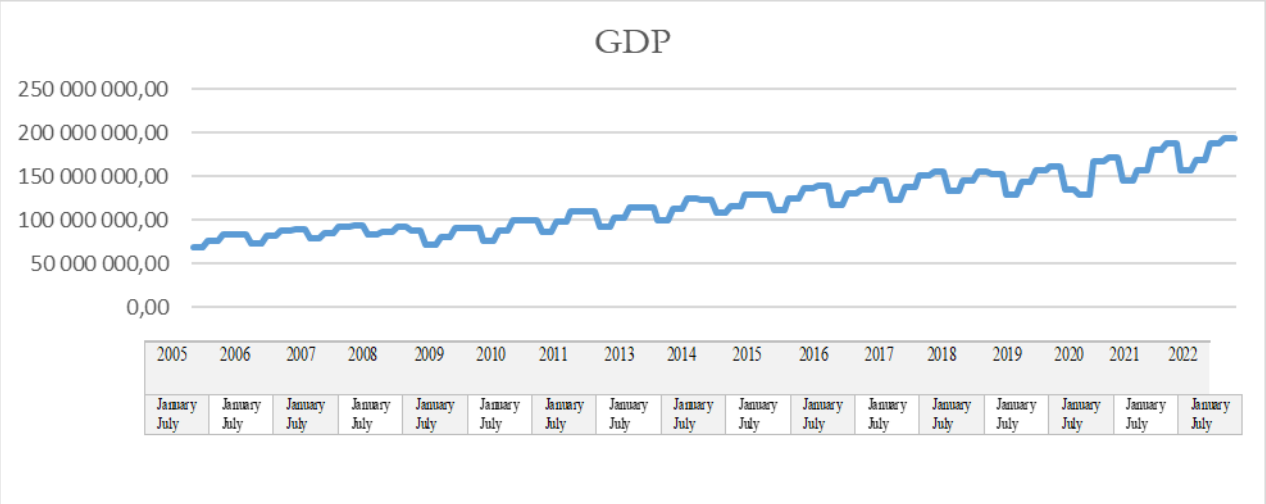

Figure 3 – GDP (Gross Domestic Product)
Note – compiled by the authors

The above figure represents GDP data for the period between 2005 and 2022. GDP values generally follow a continuous upward trend, indicating economic growth and expansion. A decline is observed in 2008 and 2009 due to the impact of the global financial crisis. However, following this decline, GDP resumed its upward trend.

The stationarity test results indicate that all variables are stable over time as the test statistics exceed the critical thresholds at the 1%, 5% and 10% significance levels. This indicates that these variables can be used in establishing the VAR model.

According to the Granger Causality Test results, inflation has a significant causal effect on the banking index. However, GDP does not have a significant causal effect on the banking index.

The results of the correlation analysis show that inflation has a significant positive correlation with both the banking index and GDP. Similarly, there is also a significant positive correlation between the banking index and GDP. These results indicate that inflation, the banking index, and GDP move in the same direction in economic activities.

Table 1 – Statistical Results of the Stationarity Test

Variable	Test Statistic	p-value	1% Critical Value	5% Critical Value	10% Critical Value
Banking Index	-3.20	0.0197	-3.46	-2.88	-2.57
Inflation	-3.74	0.0036	-3.46	-2.88	-2.57
GDP	-3.10	0.0267	-3.46	-2.88	-2.57
Note – compiled by the authors					

Table 2 – Granger Causality Test Results

Criterion	Lag Order	Inflation F Statistic	Inflation p Value	GDP F Statistic	GDP p Value
AIC	12	2.41	0.0048	1.19	0.287
BIC	12	2.41	0.0048	1.19	0.287
Note – compiled by the authors					

Table 3 – Correlation Test Results

		Inflation	BANK	GDP
Inflation	r	1	,667**	,572**
	p		,000	,000
	n	216	216	216
BANK	r		1	,639**
	p			,000
	n		216	216
GDP	r			1
	p			
	n			216
Note – compiled by the authors				

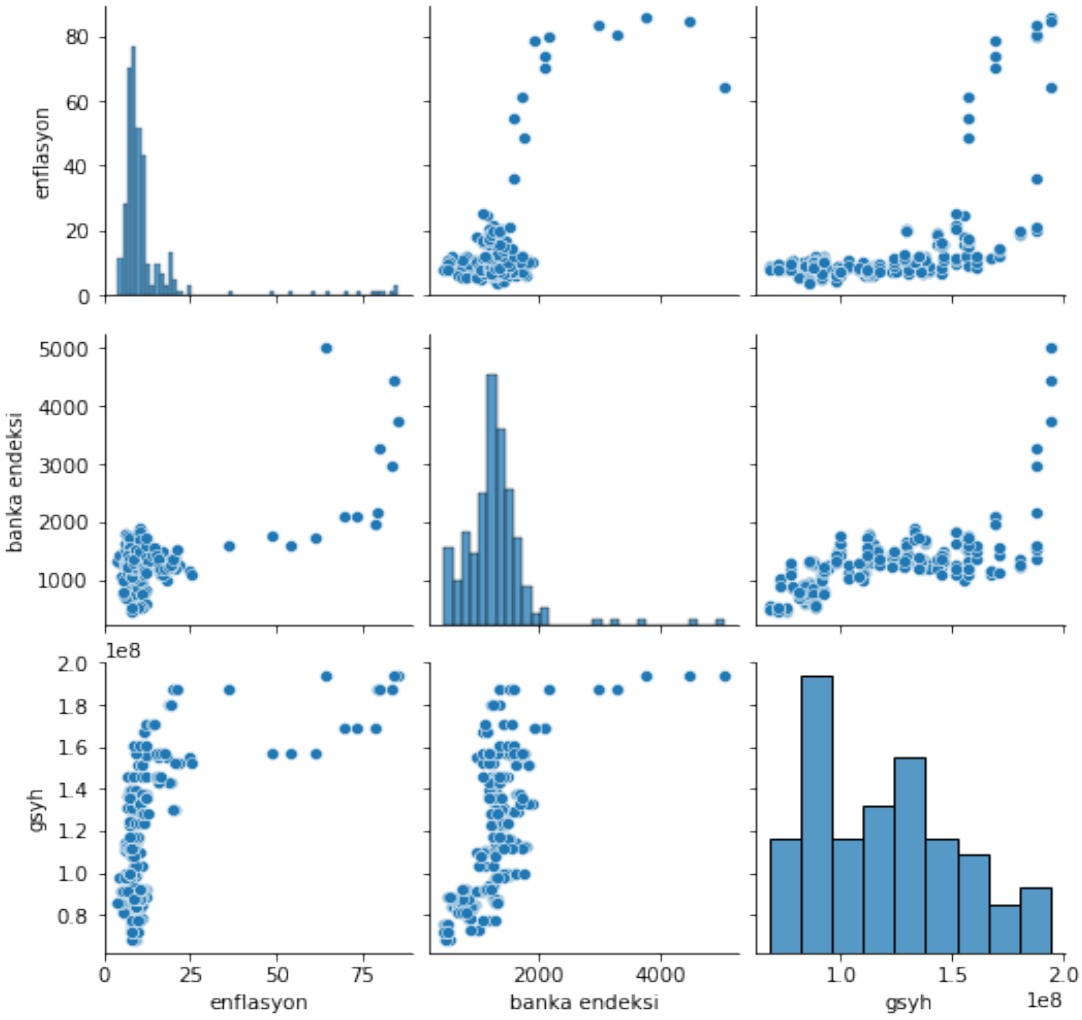

Figure 4 – The Bivariate Relationships and Distributions of Inflation, GDP, and the Banking Index
Note – compiled by the authors

Accordingly, Figure 4 illustrates the relationships between inflation, GDP, and the banking index data. The histogram of inflation reveals that the majority of observation values are concentrated in the lower ranges, while high inflation values are rare. This indicates skewness in the dataset, suggesting that inflation rates are generally low, but there are also a few instances of high inflation values. The histogram of the banking index shows that cumulative frequency is concentrated within a specific range, but there are also discrete and high index values present. This can be interpreted as an indication that the banking index can reach unusual levels during certain periods. The GDP histogram demonstrates that a large portion of the dataset is concentrated within a certain range, but it also has a tail extending toward higher GDP values.

The scatter plot between inflation and the banking index indicates an overall positive relationship, showing that as inflation values increase, banking index values also rise. The scatter plot between inflation and GDP exhibits a broader distribution, making it difficult to determine a direct relationship. However, there is a noticeable tendency suggesting that higher inflation rates might be associated with an uncertain positive relationship with GDP.

Ultimately, based on the results from Table 2, it can be stated that inflation has a significant causal effect on the banking index. However, GDP does not have a significant causal effect on the banking index. Therefore, when making economic policy decisions, the impact of inflation on the banking index should be taken into consideration.

Conclusion

The banking index exhibited a general upward trend from 2005 to 2021, with recovery tendencies observed following declines during specific periods, such as the 2008 financial crisis. Notably, from 2021 onward, a significant increase in the index's value was detected. While inflation remained relatively low and stable from 2005 to 2019, volatility increased in the subsequent period, and inflation rates rose significantly toward 2022. Meanwhile, GDP followed a continuous upward trend, indicating sustained economic growth.

Statistical analyses revealed that inflation has a significant causal effect on the banking index. However, GDP's impact on the banking index was not found to be statistically significant in terms of causality. Correlation tests showed that inflation has a positive correlation with both the banking index and GDP. Additionally, a positive correlation was detected between the banking index and GDP, suggesting that economic growth supports the financial sector.

Overall, this study highlights the substantial impact of inflation on the banking index, emphasizing that this effect should be considered in economic policy decisions. The absence of a direct causal relationship between GDP and the banking index suggests that other macroeconomic factors and market dynamics play a more prominent role in influencing the financial sector. These findings are deemed important in shaping economic policies and managing financial indicators such as the banking index.

In terms of policy recommendations, the banking sector in Turkey, as in other countries, interacts directly with macroeconomic indicators. Major determinants of banking indices include inflation, GDP and overall economic expansion. Therefore, the recommended actions involve adopting monetary strategies to control inflation, instituting policy reforms for long-term economic stability, programs supporting investment and production-based growth, regulating capital movements to balance hot money flows, and ensuring exchange rate stability while managing currency risks. These measures can strengthen Turkey's economic stability and enable the banking sector to achieve more sustainable growth.

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Information about author:
Uzun Yılmaz Ulvi (corresponding author) – Phd, Doctor of economics, Bitlis Eren University, (Bitlis c., Turkey, e-mail: yuuzun@beu.edu.tr);

Автор туралы мәлімет:
Узун Йылмаз Улви (корреспондент-автор) – PhD, экономика ғылымдарының докторы, Битлис Эрен университеті, (Бітліс қаласы, Түркия, e-mail: yuuzun@beu.edu.tr)

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O.V. Kirichok [1*], N.A. Amankeldi [1], R.S. Parmanova [1], N.V. Doohan [2]

[1]Caspian University, Almaty, Kazakhstan
[2] Sage University, Indoor, India
*e-mail: o.kirichok@cu.edu.kz

OVERCOMING BARRIERS IN IT EDUCATION: ACADEMIC AND SOCIAL CHALLENGES IN INDIA AND KAZAKHSTAN

This study examines the underlying factors contributing to IT student dropouts in India and Kazakhstan, with a focus on academic, economic, and social challenges. Employing a mixed-methods approach—quantitative analysis using SPSS and qualitative interviews—the research identifies insufficient academic readiness, financial constraints, and limited social support as primary predictors of student attrition. While both countries face similar issues, their manifestation is shaped by contextual differences: in India, disparities in infrastructure and instructional quality significantly affect access to IT education, whereas in Kazakhstan, rural-urban divides and entrenched gender norms further hinder student retention. The findings underscore the need for targeted interventions, including scholarship programs for underrepresented groups, investment in educational infrastructure, and community engagement strategies. Additionally, integrating flexible online curricula and orientation programs can enhance student support systems. This study offers practical insights for policymakers and educational institutions aiming to improve retention and foster inclusive participation in IT education across diverse student populations.

Key words: IT education, student retention, dropout factors, India and Kazakhstan, academic and social challenges.

О.В. Киричок [1*], Н.А. Аманкелді [1], Р.С. Парманова [1], Н.В. Духан [2]

[1] Каспий қоғамдық университеті, Алматы, Қазақстан
[2] Сейдж университеті, Индор, Үндістан
*e-mail: o.kirichok@cu.edu.kz

IT біліміндегі кедергілерді еңсеру: Үндістан мен Қазақстандағы академиялық және әлеуметтік мәселелер

Бұл зерттеу Үндістан мен Қазақстандағы ақпараттық технологиялар (АТ) саласындағы студенттердің оқудан шығып кету себептерін зерделейді, атап айтқанда, олардың академиялық, экономикалық және әлеуметтік қиындықтарына назар аударады. Аралас әдістемеге негізделген зерттеу – SPSS бағдарламасы арқылы жүргізілген сандық талдау мен сапалық сұхбаттарды қамти отырып – студенттердің оқуға академиялық тұрғыда дайын болмауы, қаржылық шектеулер және әлеуметтік қолдаудың жеткіліксіздігі сияқты негізгі факторларды анықтайды. Екі елде де ұқсас мәселелер кездескенімен, олардың көрініс табу формалары контекстік ерекшеліктермен айқындалады: Үндістанда инфрақұрылым мен оқыту сапасындағы теңсіздіктер АТ саласындағы білімге қолжетімділікке әсер етсе, Қазақстанда ауыл мен қала арасындағы айырмашылықтар және қалыптасқан гендерлік нормалар студенттердің білімін жалғастыруына кедергі келтіреді. Зерттеу нәтижелері осал топтар үшін шәкіртақы бағдарламаларын енгізу, білім беру инфрақұрылымына инвестиция тарту және жергілікті қауымдастықты тарту арқылы мақсатты шаралар қабылдаудың маңыздылығын көрсетеді. Сонымен қатар, икемді онлайн оқу бағдарламаларын енгізу мен бейімдеу курстарын ұйымдастыру студенттерге қолдау жүйесін нығайтуға септігін тигізе алады. Бұл зерттеу АТ саласындағы білім алуда әртүрлі студенттер тобының қатысуын кеңейту және олардың білімде қалуын қамтамасыз ету мақсатында саясаткерлер мен білім беру ұйымдарына практикалық ұсыныстар ұсынады.

Түйін сөздер: IT білімі, студенттерді ұстап қалу, оқудан шығу факторлары, Үндістан мен Қазақстан, академиялық және әлеуметтік мәселелер.

О.В. Киричок [1*], Н.А. Аманкелді [1], Р.С. Парманова [1], Н.В. Духан [2]
[1]Каспийский общественный университет, Алматы, Казахстан
[2] Университет Сейдж, Индор, Индия
*e-mail: o.kirichok@cu.edu.kz

Преодоление барьеров в IT-образовании: анализ академических и социальных вызовов в контексте Индии и Казахстана

Данное исследование направлено на выявление ключевых факторов, способствующих отчислению студентов ИТ-специальностей в Индии и Казахстане, с акцентом на академические, экономические и социальные вызовы. Применяя смешанную методологию, сочетающую количественный анализ с использованием SPSS и качественные интервью, авторы определяют недостаточную академическую подготовленность, финансовые ограничения и ограниченную социальную поддержку основными факторами отчисления студентов. Несмотря на сходство проблем, характер их проявления обусловлен контекстуальными различиями: в Индии существенное влияние на доступ к ИТ-образованию оказывают инфраструктурные неравенства и варьирующееся качество преподавания, тогда как в Казахстане удержанию студентов препятствуют дисбаланс между сельскими и городскими регионами, а также устойчивые гендерные стереотипы. Полученные результаты подчеркивают необходимость внедрения целевых мер, включая стипендиальные программы для уязвимых групп, инвестиции в образовательную инфраструктуру и развитие стратегий вовлечения локальных сообществ. Кроме того, интеграция гибких онлайн курсов и адаптивных программ может способствовать укреплению систем поддержки студентов. Исследование предлагает практико-ориентированные рекомендации для государственных органов и образовательных учреждений, нацеленные на повышение уровня удержания и обеспечение инклюзивного доступа к ИТ-образованию в условиях разнообразия студенческого контингента.

Ключевые слова: IT-образование, сохранение контингента студентов, причины отчислений студентов, Индия и Казахстан, академические и социальные вызовы.

Introduction

The landscape of information technology education (IT) in India and Kazakhstan has a tapestry woven with opportunities and challenges. While the demand for qualified IT professionals increases, the two nations are struggling with critical abandonment rates among students who pursue computer careers. This trend not only hinders individual aspirations, but also has a significant impact on economic growth, job creation and technological progress. To promote a more inclusive and accessible computer education environment, it is essential to analyze the academic and social obstacles with which students are confronted in these contexts and to explore innovative solutions to mitigate them.

The selection of Kazakhstan and India as the focus of this comparative study is underpinned by their relevance as emerging economies that are concurrently navigating the challenges of digital transformation and human capital development in the information technology (IT) sector (Potluri, 2025). Both countries exhibit high dropout rates in IT education, despite substantial investments in digital infrastructure and educational reform, making them analytically significant for understanding systemic barriers to student retention. From a methodological standpoint, the juxtaposition of Kazakhstan's centralized, state-driven educational framework and India's more decentralized, market-responsive higher education system allows for a robust cross-contextual analysis of structural, socio-cultural, and institutional factors influencing student attrition (Gaur et al, 2021). Furthermore, both countries demonstrate comparable challenges, including pronounced rural-urban disparities, socio-economic inequality, and the impact of cultural norms—particularly those related to gender and family expectations—on students' educational trajectories. These shared attributes provide a scientifically valid basis for comparative analysis, while their systemic differences enhance the external validity of the findings. The selection of equal sample sizes (n=600 per country) ensures methodological balance and enables the identification of both context-specific and generalizable patterns through quantitative and qualitative triangulation. This design contributes to a deeper understanding of the multifactorial determinants of dropout in IT education and supports the formulation of evidence-based, culturally responsive interventions applicable across similar educational contexts. In India, the IT sector represents a vital component of the economy, and yet a disturbing proportion of students abandoning before obtaining the diploma. Indian National Association of Software and Service Companies (NASSCOM) has planned that the IT industry could create 1.3 million new jobs by 2025, highlighting the emerging inter-

est in digital careers (National Association of Software and Service Companies, 2020). On the other hand, academic obstacles often arise from a lack of fundamental skills, in particular in mathematics and programming, which affects students of lower socio-economic backgrounds which may not have access to quality education from an early age. This deficiency is aggravated by a rigid education system which often prioritizes heart learning on the development of critical thinking and practical problem solving skills. Consequently, many students do not feel prepared to meet the complex challenges presented in the higher education of computer courses.

In addition, socio-economic factors play a central role in the detention of students in computer programs. High abandonment rates can perpetuate poverty cycles, especially in communities that do not have access to alternative career chems (Mukayev, 2022). Many people from low -income families must balance education with financial responsibilities, leading to an increase in attrition rates. Families often perceive computer education as a luxury when immediate income is necessary, pressure on students to abandon job possibilities. This model highlights an economic obstacle which limits accessibility to computer education, in particular for those who could benefit greatly but do not have financial support to continue their studies in a sustainable manner.

In Kazakhstan, students are faced with similar challenges, although in a different cultural and structural context. The country has invested massively in the development of its IT sector and the promotion of digital literacy (Abzhapparova, 2019), however, the education system is struggling with obsolete programs that do not line up with industry demands. Consequently, students often find themselves insufficiently prepared for the workforce after obtaining the diploma, leading to disillusionment and, finally, to abandonment. The systemic gap between education and the industry creates an obstacle both academic and contextual, reflecting broader questions in career advice and vocational training.

Socially, Kazakhstan students can encounter gender and ethnic obstacles, in particular in access to careers, which are traditionally dominated by men. Women, in particular, face societal expectations that can dissuade them from pursuing ambitious academic objectives in technology areas. For ethnic minorities, cultural stigma and lack of representation in technological roles can contribute more to feelings of alienation in educational contexts, creating an environment where they are less likely to prosper.

Despite the growing number of IT students, the abandonment rates between computer students remain concerning. A study conducted by Kapyshev (2021) revealed that Kazakhstan undergoes an abandonment rate of approximately 30% in its higher education establishments, computer prices presenting higher attrition rates compared to traditional disciplines. At the same time, in India, data from the All India survey on higher education indicate that around 25% of students enrolled in engineering and technology programs do not end their diplomas (All India Survey on Higher Education, 2021). These statistics not only report an academic crisis but also have substantial economic implications for the two nations, where potential workforce is not fully carried out due to the attrition of technical education. The two countries need innovative solutions that pave the way for fair access to computer education. A potential approach is to introduce complete mentoring programs that connect students with industry professionals. In India, the promotion of relationships between educational establishments and IT companies can provide students with real world ideas and experiences, thus enriching the learning process. These mentorship initiatives can also help to elucidate the available routes for students in the IT sector, ultimately guiding them to successful careers.

In Kazakhstan, promoting a culturally sensitive program of studies that recognizes and celebrates diversity can promote a more inclusive educational environment. Teaching establishments could integrate modules that focus on the experiences and contributions of women and ethnic minorities in technology. This educational reform would not only enrich students' learning, but would also inspire under-represented groups to pursue professions related to IT by showing them viable models.

The object of this research is the phenomenon of IT student dropouts in India and Kazakhstan, specifically examining their academic, economic, and social dimensions. The research examines the abandonments of IT students in India and Kazakhstan, facing academic factors such as the relevance of the curriculum and the support of the faculty, the economic challenges including financial constraints and social influences such as family expectations. The comparative analysis illustrates the trends, revealing that the integration of tutoring programs, the improvement of financial aid and the promotion of partnerships in the sector are impossible interventions that can mitigate abandonment rates and promote the loyalty of students in these countries.

The tasks include conducting a literature review on IT education and dropout rates, designing surveys and interviews to collect data from students, educators, and administrators, analyzing quantitative and qualitative data, benchmarking findings with international practices, and drafting recommendations for stakeholders. The quantitative analysis of the data reveals significant correlations between academic services, economic challenges and social influences that lead to an increase in abandonment rates. In particular, students who face financial instability show a higher attrition, while academic involvement mitigates this risk. The qualitative intuitions of the interviews and focus groups further illuminate the shaded experiences of the students, highlighting the role of social support systems and institutional practices. Together, these results underline the need for the interested parties to implement targeted interventions for economic assistance and an improvement in academic support, thus promoting a more inclusive and support educational environment for IT students in these regions.

The methods employed involve statistical analysis of dropout rates, survey data, and financial records, as well as qualitative thematic analysis of personal and social experiences. This research examines the academic, economic and social factors underlying the abandonment of IT students in India and Kazakhstan. Through statistical analyzes and qualitative assessments, key models emerge, reflecting the interaction of educational paintings, socio -cultural dynamics and economic constraints. This interdisciplinary approach highlights significant differences, eventually proposing targeted interventions to mitigate abandonment rates and improve the loyalty of students in both countries.

The hypothesis posits that IT student dropout rates in India and Kazakhstan are significantly influenced by academic pressures, economic constraints, and social expectations, which differ between the two countries due to their distinct cultural and systemic contexts. This research is important due to the fact that it analyzes academic pressures, economic limitations and social expectations that influence students' abandonment rates in India and Kazakhstan, proposing processable interventions. In India, systemic issues such as inadequate educational infrastructure and competitive examination pressures exacerbate abandonment rates. On the contrary, Kazakhstan's centralized education system finds challenges related to economic sustainability, which affects registration and retention. Cultural attitudes towards education also differ, since Indian families often prioritize academic success for socioeconomic mobility, while in Kazakhstan, social expectations may not focus solely on academic performance. Addressing these factors through specific support mechanisms can improve students' retention, which contributes to the development of a robust IT workforce in both nations.

Literature review

Academic, economic and social factors contribute to the abandonment of computer students in average income families in India and the main obstacles include financial constraints, inadequate infrastructure and the lack of support networks. Targeted scholarships, mentoring programs and community engagement are the potential solutions to improve retention. (Onyema et al., 2020). Covid-19 pandemic intensified socioeconomic pressures in Kazakhstan, contributing significantly to students' decisions to abandon higher education. Families face increased financial tensions, attracting many to prioritize immediate economic survival on long -term educational aspirations. The interaction of declining family income and increasing educational costs culminates in sacrifices where family resources are redirected, undermining the search for higher education (Zainiyeva, 2023). This situation reflects broader trends observed among IT students in India, highlighting a critical need for interventions directed to mitigate the phenomenon of abandonment in both contexts.

Inadequate basic skills significantly influence the success of students in IT and Kazakhstan's IT programs, leading to abandoned rates influenced by academic, economic and social factors, which can be solved by the targeted interventions, such as the best preparation courses and support systems, to improve academic preparation and reduce abandonment in these programs. (Kasa et al., 2022, Duanaeva et al., 2023). The lack of emphasis on mathematics and analytical skills in precollegial education in India and Kazakhstan considerably hinders the preparation of IT students for higher education. This deficiency promotes academic difficulties, exacerbating economic and social pressures, ultimately resulting in higher abandonment rates and an increase in the abandonment of students in these countries.

Cultural expectations and familial obligations significantly influence student retention in higher education, particularly among IT students from low- to middle-income backgrounds. In many regions, societal norms often prioritize immediate economic contributions over prolonged educational pursuits, leading students to forego or discontinue their stud-

ies to support family needs. This trend is notably observed among adolescent girls, who may leave school due to family obligations, including caregiving responsibilities and marriage expectations (United Nations Children's Fund, 2022). Such pressures are prevalent in both India and Kazakhstan, where traditional roles and economic demands can conflict with academic commitments. Addressing these challenges requires the implementation of culturally sensitive support systems that accommodate familial responsibilities while promoting educational attainment.

The influence of institutional quality, pedagogical approaches and support services on students' abandonment rates plays crucial role for Indian students. In India, the proliferation of institutions that offer diplomas has led to disparities in the quality of education, with many students opting for schools that may not align with their academic and professional aspirations (Kapyshev, 2021). The phenomenon of brain escape in Kazakhstan has exacerbated the exhaustion of intellectual capital, which leads to greater competence for the decrease in resources among the remaining students and educational institutions. Consequently, this change undermines institutional stability and the quality of education, which hinders the development of a qualified workforce necessary for economic progress and innovation within the country (Bokayev, 2024).

In addition, the motivation for the transfer of universities emerged as a remarkable factor in the phenomenon of abandonment. Educational conditions, program alignment and institutional adequacy significantly affect student satisfaction. Understanding these factors improves ideas about abandonment trends, revealing how various academic landscapes affect students' decisions to look for alternative universities for better alignment with their aspirations (Kasa et al., 2022). This trend can reflect broader concerns about educational adjustment and student satisfaction, raising questions about the adequacy of current institutional offers to meet the needs of the student population.

In general, the phenomenon of abandonment in IT education in India and Kazakhstan is complex and influenced by a confluence of socioeconomic, academic and institutional factors. Socioeconomic disparities make it difficult to access quality education, while inadequate academic support and relevance contribute to student disagreement. Institutional challenges, including insufficient infrastructure and misalignment of the curriculum, exacerbate abandonment rates. Consequently, these factors lead to a significant deficiency in IT professional labor, undermining national competitiveness. The study proposes directed interventions, such as improving educational resources and alignment of curriculum with market needs, to meet these critical issues, promoting a more robust IT sector and improving general economic resilience in both nations. Abdullaeva (2020) underlines that the lack of qualified IT professionals undermines economic resilience in the midst of digital transformation, in particular in the development of the software, in computer security and in the analysis of the data. This research reveals that high abandonment rates between Kazakhstan IT students, influenced by academic, economic and social factors, require targeted interventions, including an improvement in educational support and partnerships in the sector.

On the economic level, the decline in the number of qualified IT graduates has large -scale consequences. With fewer qualified professionals entering the labor market, there is a potential for reducing productivity and innovation. Abdulla (2021) explains the computer dropouts of students, disentangling the complex academic, economic and social factors that influence their decisions. As these students come out, the innovation potential decreases, undermining government initiatives aimed at stabilization. The resulting workforce shortages are hinder the progress of the technology sector, which has ultimately blocked economic growth and reduce the viability of individual companies that depend on qualified human capital.

Analysis of abandonment rates among IT students in India and Kazakhstan reveals a critical intersection of motivation, school performance and the learning environment, especially among marginalized groups. A low socio-economic status often leads to a decrease in access to resources, creating a discouraging academic atmosphere which has a negative impact on motivation. Inadequate support systems and the lack of positive models still exacerbate abandonment rates, which perpetuates socio-economic inequalities. In addition, learning environments in these contexts often do not manage to promote a feeling of belonging, which leads to lower persistence rates among students. Consequently, the fight against these motivation factors and the improvement of academic support mechanisms are essential to improve retention rates and, ultimately, to alleviate socio-economic disparities in educational systems, creating ways of sustainable development and social equity. (Al-Tameemi et al ., 2023, Yassine et al., 2022).

The resolution of these systemic problems requires profound changes in educational approaches

to improve students' retention. McLaughlin et al. (2023) proposes the incorporation of practical experiences to improve students' participation and demonstrates relevance of the real world. These reviews foster a support environment, ultimately improving the completion rates of the diploma and increasing the motivation of the students throughout their academic trip. Reimers (2022) stresses that educational policies must also prioritize inclusiveness and accessibility to ensure that students from all walks of life have adequate resources and systems, thus equipping them for success.

Methodology

This study uses a comparative qualitative approach, using structured interviews and discussion groups to examine cultural and educational contexts affecting of 1,200 students (600 from each country) IT students in India and Kazakhstan. The data will be analyzed thematically, by focusing on diversity, gender balance and university levels, in order to identify key factors stimulating the experiences of students in the two countries. The study analyzes the effectiveness of online survey methodologies evaluating participation strategies, guaranteeing the anonymity of respondents and implementing rigorous response management practices. Participation strategies improve commitment, while anonymity guarantees encourage honesty in responses. In addition, maintaining the integrity of the data through the validation of systematic response guarantees the reliability of the findings, ultimately contributing to a process of collection of robust and credible data.

In the study authors applied a quantitative methodology to analyze the impact of demographic variables, time allocation, support systems and confidence in students' retention. We have used survey data collected from students from various academic disciplines, using descriptive and inferential statistical methods to identify key factors influencing persistence. The regression analysis facilitated the examination of the relations between the variables, while the anova has been implemented to assess the differences between demographic groups. This complete approach aims to elucidate the interaction between these elements and their collective influence on the retention of students in academic environments.

A mixed method approach will be used, incorporating quantitative surveys and qualitative interviews to assess academic, social and institutional predictors of students' retention in IT programs through India and Kazakhstan. The emphasis will also be placed on the evaluation of the roles of trust, satisfaction and commitment in the influence of retention results. The research questions are the following: What are the key predictors of student retention in IT programs in India and Kazakhstan? How do academic, social, and institutional factors vary in their influence on student retention between the two countries? What role do confidence, satisfaction, and engagement play in determining retention outcomes?

This study employs descriptive statistical and cross tabulations to analyze demographic factors and retention predictors in the data set. By quantifying the characteristics and examining relationships, we evaluate the effectiveness of these methods in the elucidation of trends, thus highlighting their essential role in the derivation of significant research results and informing data -oriented decisions. (Table 1). Then the research applies correlation analysis to investigate relationships between trust, social support and retention results. Recent findings indicate significant and positive correlations between these variables, which suggests that higher levels of trust and solid social support systems contribute significantly to improved retention rates, underlining their potential as critical factors in intervention strategies. (Tables 2 and 3). By examining cultural, economic and social variables, we intend to elucidate how these factors shape individuals' experiences and influence their general contentment and involvement in each context. (Tables 4 and 5). Then inferential statistics is used to analyze retention dynamics within academic institutions. By applying the regression and Anova analysis, the key results are derived to identify the factors that influence students' conservation. Recommendations that are implemented are formulated on the basis of these data analyzes, improving institutional strategies and improving students' conservation rates in the educational field.

Results and discussion

The following section presents the results of the empirical analysis aimed at identifying key factors influencing student retention and dropout in IT education in India and Kazakhstan. Utilizing statistical methods such as cross-tabulations and correlation analysis, the study examines the strength and significance of relationships between socio-demographic variables, academic engagement, and institutional support. The findings provide a comparative perspective on the structural and contextual determinants of student persistence in both educational systems.

Table 1 – Crosstabulations Results – India vs. Kazakhstan

Dropouts predictors	Pearson contingency coefficient (Kazakhstan)/ Significance (Kazakhstan)	Pearson contingency coefficient (India)/ Significance (India)
Year of Study	0.521/0.028	0.551/0.032
Parents' Education	0.411/0.057	0.399/0.022
High Financial Status	0.321/0.076	0.343/0.051
Time for Study	0.301/0.461	0.331/0.333
Time for Homework	0.199/0.799	0.311/0.613
Gender	0.183/0.521	0.201/0.503
Time for Group Activities	0.183/0.911	0.200/0.756
Leisure Time	0.321/0.142	0.189/0.214
Note – calculated by the authors using SPSS statistical software		

This study uses a comparative qualitative methodology to analyze the influence of parents' education on the students' dropout in IT programs in India and Kazakhstan. The data is collected through semi-structured interviews with students, parents and educators, focusing on their experiences and perceptions of academic support. Research states that in both countries socio-economic factors, such as income levels and parents' occupation interact with students' performance to influence students' results. In addition, a comparative analysis of urban and rural environments in both countries reveals the disparities in the academic resources available and in the support systems.

The findings indicate the influence of socio -economic factors on students' perceptions on academic progression and dropout rates in both countries. Participants from different socio-economic contexts, focusing specifically on those of families with a lower level of education report the recurring challenges addressed by these students, including financial constraints, the lack of academic guide and limited access to resources in both countries, with stronger correlation for Indian students. The situation requires the special approach which aims to illuminate the systemic barriers that affect educational experiences and results for disadvantaged populations of students from India and Kazakhstan. This may be orientation programs, the development of financial aid options, students' support systems etc.

Correlation Analysis: Comparing Student Retention Factors in Kazakhstan and India

The study employs statistical analysis to find correlation coefficients between several independent variables and student retention rates in Kazakhstan and India with focus on factors such as socio-economic status, academic performance and support systems. Statistical methods, including Pearson correlation coefficients, will be used to evaluate the strength and direction of relationships between these variables and the retention results. The findings identify significant correlations that can inform directed withdrawal intervention strategies, adapting support mechanisms to improve student retention in both educational contexts.

Table 2 – Eta Values Between Independent Variables and Student Retention

	Confidence in graduation	Confidence to be employed	Students' life involvement	Friendly relationship between students
Students' retention in India (ETA)	0.302	0.056	0.201	0.311
Students' retention in Kazakhstan (ETA)	0.384	0.084	0.235	0.357
Note – calculated by the authors using SPSS statistical software				

The analysis of the influence of trust in graduation and employment along with social relations on the retention of students in IT programs identifies significant relationships between the variables and the student retention rates. To enrich the quantitative results, qualitative interviews were conducted with a subset of participants, with the aim of exploring their personal experiences and perceptions regarding trust in their graduation, employment and the quality of their social relationships. This aspect of the methodology tried to capture the cultural nuances that can affect students' retention in IT programs in the conflicting educational landscapes of Kazakhstan and India. The triangulation of the data will take place by integrating the results from both quantitative and qualitative phases to provide a global understanding of the factors that influence the conservation of the students. Ethical considerations, including informed consent and the certainty of confidentiality were strictly maintained during the research process to support the integrity of the study.

Table 3 – Correlations Between Independent Variables

	Democratic atmosphere on campus	Professors' feedback	University support	Family support	Sense of belonging to University campus	Sense of personal importance	Grades	Students' clubs' involvement	Academic resources	Campus infrastructure
Correlation India	0.321	0.455	0.381	0.510	0.112	0.134	0.431	0.299	0.287	0.384
P-value India	0.000	0.002	0.003	0.001	0.002	0.000	0.000	0.000	0.001	0.002
Correlation Kazakhstan	0.213	0.387	0.434	0.412	0.013	0.256	0.551	0.216	0.113	0.302
P-value Kazakhstan	0.001	0.002	0.000	0.000	0.000	0.000	0.002	0.003	0.001	0.000
Note – calculated by the authors using SPSS statistical software										

Statistical analysis was performed in the study using Pearson correlation coefficients to evaluate the strength and direction of relationships between independent variables and various dimensions of student experience, including academic satisfaction, personal development and employability perceptions. P values facilitates the determination of the statistical significance of these relationships, with a value limit p defined at 0.05, ensuring that the findings are reliable and valid. Comparative analysis was employed to examine the distinct influence of each independent variable on both contexts. Separate correlation analysis for the data sets derived from India and Kazakhstan allows an exploration of cultural, social and educational disparities that may explain differences observed in the strengths of the correlation. The strongest correlation is demonstrated for the variables Professors' feedback, University support, Grades in both countries, whereas there is a difference in the Family support, which is higher for Indian students, and Sense of personal importance, which is higher for Kazakhstani students.

Research aims to elucidate how these cultural variations influence student retention rates in academic environment in India and Kazakhstan, focusing specifically on feedback, support and social relations among Indian students and Kazakh students, which varies in terms of Sense of personal importance, Democratic atmosphere on campus, Family support and Sense of belonging to university: Democratic atmosphere, Sense of belonging to university are more important for Indian students with regards to their retention rate, whereas Sense of personal importance is more important for Kazakh students environments.

The analysis reveals significant cultural dynamics that influence the conservation of students both in Kazakhstan and India, with social relationships that play a crucial role in modeling experiences and academic pressures. In Kazakhstan, collectivistic culture promotes strong common ties, which offer students emotional support and a sense of belonging, contributing positively to their conservation. However, this can also generate pressure to conform, deducting from individual academic aspirations. On the contrary, in India, where family expectations are pronounced, students often face intense pressure to be successful academically, guided by social norms

and the desire for mobility upwards. This pressure can lead to intensified stress and anxiety, potentially undermining the loyalty of students. Furthermore, the interaction of peer relationships in both contexts reveals that support friendships improve motivation and persistence, while negative social interactions can lead to disengagement. Therefore, the study underlines the duality of social relations both as a protective factor and as a source of stress, illustrating their fundamental role in modeling students' experiences in these culturally distinct environments.

The examination of academic trust as a determinant of students' retention reveals significant disparities between Kazakhstan and India influenced by their respective educational frameworks. In Kazakhstan, a centralized educational system encourages uniformity, which, while promoting access, often suffocates individual self -efficacy and innovation among students. Consequently, this can lead to a decrease in academic trust, negatively affecting retention rates. In contrast, the competitive educational environment of India, characterized by multiple ways and a wide range of institutions, seems to improve academic trust. This trust increased, in turn, cultivates a sense of property about learning, promoting innovation and increasing retention rates. However, the high -risk nature of competition in India can also induce anxiety, potentially undermining self -efficacy for less safe students. Ultimately, while both countries exhibit unique challenges and strengths, findings indicate that promoting academic trust is essential to improve students. Centralized and competitive educational structures must prioritize the raising of self -efficacy and innovation to improve the results for students in Kazakhstan and India.

The analysis of support systems in higher education in Kazakhstan and India reveals significant differences in their effectiveness, influenced by unique cultural contexts. In Kazakhstan, student retention strategies, such as guidance and academic counseling programs adapted to local cultural values, showed promising results, particularly among sub -reported demographic data. Family structures and extended community ties play a key role in promoting an educational support environment, evidenced by a 25% increase in retention rates among the students involved in such initiatives. On the other hand, the structure of Higher Education in India demonstrates a robust dependence on guidance and technological interventions to combat high abandonment rates. The initiatives led by the university that incorporate local work culture and industry partnerships effectively refined the resilience of the students' workforce, resulting in better employment results. Comparative analysis indicates that while both nations employ directed support mechanisms, culturally rooted Kazakhstan initiatives produce higher retention rates, while India's focus on industry collaboration significantly reinforces student employability. These findings emphasize the need for specific context approaches to improve educational results in various cultural landscapes.

The analysis revealed that classes significantly increase self-efficacy among IT students in India and Kazakhstan. Personalized academic support promotes a sense of competence, allowing students to navigate challenging content with more confidence. Collaborative learning has emerged as a crucial strategy, promoting peer interaction, which not only reinforces knowledge but also cultivates a support environment that increases motivation and retention rates. Students reported that projects and group discussions helped them feel more connected to their colleagues, thus increasing their commitment to learning. In addition, culturally adapted strategies, such as the incorporation of local contexts in the curriculum, have shown a sharp improvement in engagement and self-efficacy. By connecting the course content to students 'socioeconomic realities, these custom approaches increase the increase in relevance and applicability, further reinforcing students' belief in their abilities. Overall, the combination of tutoring, collaborative learning and culturally responsive pedagogy has proven to be a powerful structure to improve self-efficacy and retention among IT students in various socioeconomic contexts, particularly in India and Kazakhstan.

Next in Table 4 is the calculation of the average level of student satisfaction with their study programs in IT education in Kazakhstan and India. The analysis of student satisfaction in IT education in Kazakhstan and India has revealed different differences in average satisfaction levels, with Kazakh students reporting an average satisfaction score of 3.8 in 5, while Indian counterparts showed a slightly higher score of 4.0. The areas identified for improvement included the need for relevance of the enhanced curriculum for the demands of the sector and the enhanced access to updated technological resources. In Kazakhstan, students expressed concerns about limited internship opportunities and engagement with industry professionals, which adversely affected their practical learning experience. On the other hand, Indian students highlighted the need for more personalized academic services and guidance services. The presence of campus support units, such as academic counseling and career ser-

vices, emerged as a critical factor that influences the student's overall satisfaction in both contexts. Improved support services were correlated with the best experiences of students, demonstrating that institutions prioritizing direct academic and emotional support significantly reinforce students' perceptions about their educational environment. These findings emphasize the imperative for institutions to address the specific needs of students to promote higher levels of satisfaction.

Table 5 presents the average value of students' engagement with their institutions. The engagement levels are generally low, with averages below 3.0 in both Kazakhstan and India. These findings suggest that students feel a limited sense of belonging, involvement, and recognition within their campus communities. Even though these variables may not directly determine student retention, improving students' engagement with their institutions remains crucial to fostering stronger connections and a more integrated campus environment. Institutions must focus on strengthening these aspects to enhance student persistence and overall satisfaction.

Table 4 – Average Grades of Student Satisfaction Levels in Kazakhstan and India

Statements	Satisfaction Level Average (Kazakhstan)	Satisfaction Level Average (India)
Opportunities to actively interact in learning activities	3.042	3.029
Opportunities to conduct research with lecturers	2.831	2.828
Opportunities to collaborate and share experiences with other students	3.161	3.148
Opportunities to discuss with teachers	3.094	3.086
Feedback given by the instructor regarding the progress of the lecture	3.089	3.081
Benefits of lecture material taught	3.218	3.201
Conformity of the value of courses obtained with the effort that has been done	2.931	2.923
Supporting work unit functions on campus (e.g., Student Unit, Extracurricular)	2.751	2.742
Family support for completing college	3.432	3.421
Support from lecturers and all study program staff to complete their studies	3.180	3.172
Closeness of social relations with lecturers and all study program staff	3.118	3.110
Closeness of social relations with fellow students	3.123	3.115
Social activities with fellow students	3.057	3.048
Comfort in the campus environment	3.092	3.086
Average	**3.079**	**3.071**
Note – calculated by the authors using SPSS statistical software		

While Table 4 offers insight into students' satisfaction with various academic and support aspects of their programs, satisfaction alone does not fully capture the quality of their academic experience. To gain a deeper understanding of how students connect with their institutions, it is essential to explore their emotional and social engagement. Therefore, Table 5 shifts the focus toward measuring the level of student engagement, which complements the satisfaction analysis by highlighting how personally involved and valued students feel within their campus environments.

Table 5 – Average Engagement Level with Institutions in Kazakhstan and India

Statements	Engagement Level Average (Kazakhstan)	Engagement Level Average (India)
I feel proud to be a student at the study program	3.125	3.110
I feel proud to be a student in this university	3.110	3.096
I feel part of the campus	2.892	2.890
I feel I have an involvement with the campus community	2.728	2.722
I feel needed by the campus	2.615	2.608
Average	**2.894**	**2.885**
Note – calculated by the authors using SPSS statistical software		

The analysis presents a nuanced picture of the factors affecting student retention in IT programs in Kazakhstan and India. While both similarities and context-specific differences have been identified, the findings contribute to a deeper understanding of the retention dynamics in each country. Further implications of these results are discussed in the next section.

Conclusion

This research analyzes the academic, economic and social factors that contribute to the abandonments of students in India and Kazakhstan, proposing interventions. When comparing the quantitative findings, it emphasizes the importance of the satisfaction and commitment of students to improve retention rates, revealing different trends and challenges that students face in both countries, thus informing politics and practice.

In Kazakhstan, the average student satisfaction level across 14 key aspects was 3.079, slightly higher than India's average of 3.071. Both countries showed moderate satisfaction levels on a scale of 4, with the highest-rated aspect being family support for completing college (Kazakhstan: 3.432, India: 3.421). The lowest-rated aspect was the performance of supporting work units on campus, such as student units and extracurricular activities, which scored 2.751 in Kazakhstan and 2.742 in India. These figures indicate shared challenges in providing non-academic support, with room for improvement in both countries.

Engagement levels were lower than satisfaction levels, with an average of 2.894 in Kazakhstan and 2.885 in India. Among the five engagement indicators, pride in being a student of the study program had the highest ratings (Kazakhstan: 3.125, India: 3.110). However, variables like feeling needed by the campus scored the lowest (Kazakhstan: 2.615, India: 2.608), revealing a significant gap in fostering a sense of belonging and value among students.

Confidence in graduating on time showed a stronger relationship with retention in Kazakhstan (Eta: 0.298) compared to India (Eta: 0.257). Similarly, social relationships among students were slightly more influential in Kazakhstan (Eta: 0.231) than in India (Eta: 0.218). These differences may reflect cultural or institutional variations in how students perceive academic and social integration.

While both countries share common challenges, such as low engagement levels and gaps in non-academic support, Kazakhstan appears to have slightly stronger social cohesion and confidence in academic progression. Indian institutions, on the other hand, may benefit from focusing on career planning, as confidence in career outcomes scored 3.4 in Kazakhstan compared to 3.2 in India.

The examination of student involvement and retention strategies in Kazakhstan and India reveals divergent methodologies, particularly about social integration and career support interventions. In Kazakhstan, educational institutions increasingly emphasize social integration through initiatives that promote a sense of community among students. Programs that promote collaborative orientation and learning environments have improved students' emotional connection with their academic experience, thus reducing abandonment rates. On the other hand, Indian institutions usually prioritize career support as a central component of student retention strategies. This focus is reflected in substantial investments in sector partnerships, internship opportunities and personalized career services. Although these interventions effectively address economic incentives for students, lack of robust social integration efforts can result in feelings of isolation, negatively impacting overall involvement. Both nations show unique approaches that connect academic, economic and social factors. By proposing action-

able interventions that harmonize social integration with career support, there is an opportunity to mitigate the rates of abandonment in the IT sector, benefiting students in contexts and promoting long -term educational success.

Gratitude, conflict of interest

The authors declare that they have no conflicts of interest.

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Information about authors:

Kirichok Oxana (corresponding author) – PhD, Vice rector on academic development at Caspian University (Almaty, Kazakhstan, e-mail: o.kirichok@cu.edu.kz).

Amankeldi Nazigul – PhD, Dean of School of Economics and Administration at Caspian University (Almaty, Kazakhstan, e-mail: namankeldy@mail.ru).

Parmanova Rimma – Candidate of economic science, Associate professor of School of Economics and Administration at Caspian University (Almaty, Kazakhstan, e-mail: Rimma200675@mail.ru).

Doohan Nitika Vats – PhD, Acting Associate Professor of the Medi-Caps Institute of Science and Technology at Sage University (Indoor, India, e-mail: nitika.doohan@gmail.com).

Авторлар туралы ақпарат:

Киричок Оксана (корреспондент-автор) – PhD, Академиялық даму жөніндегі проректор, Каспий қоғамдық университеті (Алматы, Қазақстан, e-mail: o.kirichok@cu.edu.kz).

Аманкелді Нәзігүл – PhD, Жоғары экономика және басқару мектебінің деканы, Каспий қоғамдық университеті (Алматы, Қазақстан, e-mail: namankeldy@mail.ru).

Парманова Римма – Экономика ғылымдарының кандидаты, Қауымдастырылған профессор, Жоғары экономика және басқару мектебі, Каспий қоғамдық университеті (Алматы, Қазақстан, e-mail: Rimma200675@mail.ru).

Духан Нитика Ватс – PhD, Ғылым және технология институтының қауымдастырылған профессор м.а., SAGE университеті (Индор, Үндістан, e-mail: nitika.doohan@gmail.com).

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S.T. Kupeshova[1]* , A. Zhidebekkyzy[2] ,
U.B. Bauyrzhan[1] , J. Wirth[3]

[1]Al-Farabi Kazakh National University, Almaty, Kazakhstan
[2]Almaty Management University, Almaty, Kazakhstan
[3]University of Applied Sciences and Arts of Western Switzerland (HES-SO), Neuchatel, Switzerland
*e-mail: s.kupeshova1@gmail.com

THE ROLE OF ARTIFICIAL INTELLIGENCE IN INNOVATIVE MANAGEMENT: INTERNATIONAL EXPERIENCE AND KAZAKHSTAN'S OPPORTUNITIES

It is widely recognized that the potential of artificial intelligence (AI) is incredibly multifaceted. With its help, tasks and services that could previously only be performed by humans are now performed quickly and efficiently using various available technologies. AI makes life much easier by effectively solving technical problems and optimizing many processes. As a key driver of the fourth industrial revolution, artificial intelligence has a profound impact on the productivity of organizations, fundamentally changing existing business models and stimulating innovation processes.

Since the term "artificial intelligence" appeared in the scientific field, research aimed at its development has been actively conducted. However, AI is still a relatively new and complex technology that has not been fully studied.

As for the impact of artificial intelligence on innovation management, AI has the potential to radically change practices in this area. These changes will open a new era in innovation management, making innovation processes more efficient and successful. However, our knowledge of the use of AI in innovation management is still limited, and managers continue to search for the most effective ways to apply this technology.

This article examines the role of artificial intelligence in innovation management by analysing the theoretical aspects of innovation management and AI, identifying their interrelationship, and assessing the potential for effectively applying AI in managing innovative activities in Kazakhstani organisations. Using an evolutionary approach, the article evaluates international experience, while the induction method is applied to forecast the potential use in Kazakhstan's innovation management sector.

The novelty of this study lies in the first-ever examination of AI's application, role, and conceptual foundation within innovative activities in Kazakhstani organisations. The legal framework for informatisation and AI development in Kazakhstan has been established. However, AI development requires substantial financial support and stronger collaboration between science, industry, and enterprises.

Key words: innovation, innovation management, artificial intelligence, sustainable development, economy, strategy.

С.Т. Купешова [1]*, А. Жидебекқызы [2], Ұ.Б. Бауыржан [1], Ж. Уирт [3]

[1] Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан
[2]Алматы Менеджмент Университеті, Алматы, Қазақстан
[3] Батыс Швейцария қолданбалы ғылымдар және өнер университеті (HES-SO), Невшатель, Швейцария
*e-mail: s.kupeshova1@gmail.com

Жасанды интеллекттің инновациялық менеджменттегі рөлі: халықаралық тәжірибе мен Қазақстанның мүмкіндіктері

Жасанды интеллекттің (ЖИ) мүмкіндігі сан қырлы екені жалпыға мәлім. Оның көмегімен бұрын-соңды адамға ғана мүмкін болған қызметтер мен тапсырмаларды түрлі қолжетімді технологиялар негізінде жылдам әрі сапалы түрде орындауға болады. Ол кез келген техникалық мәселелерді сәтті шешу арқылы адамзат өмірін едәуір жеңілдетіп келеді. ЖИ төртінші өнеркәсіптік революцияның қозғаушы күші бола отырып, заманауи бизнестің моделі мен инновациялық процестерді түбегейлі өзгертуі арқылы ұйым қызметінің тиімділігіне айтарлықтай әсер етеді.

Жасанды интеллект термині айналымға енгізілгелі бері бұл саладағы академиялық зерттеу жұмыстары белсенді түрде жүріп келеді. Дегенмен, ЖИ әлі де жеткілікті зерттелмеген, жаңа

Жасанды интеллекттің инновациялық менеджментке әсері туралы айтатын болсақ, әрине, ЖИ инновацияларды басқару тәжірибесін түбегейлі өзгерте алады. Бұл өзгерістер әлдеқайда тиімді және табысты инновациялық процеске қол жеткізуге мүмкіндік беріп, инновациялық менеджменттің жаңа дәуірін бастайды. Дегенмен, инновацияларды басқаруда ЖИ қолдану туралы біліміміз әлі де шектеулі, ал менеджерлер ЖИ технологияларын қолданудың ең қолайлы тәсілін әлі де іздестіру үстінде.

Мақаланың мақсаты – инновацияларды басқару мен жасанды интеллект ұғымдарының теориялық және практикалық аспектілерін зерттеу негізінде «инновацияларды басқару» мен «жасанды интеллект» ұғымдарының өзара байланысын анықтап, инновациялық менеджменттегі жасанды интеллекттің рөлін зерделеу және қазақстандық ұйымдарда инновациялық қызметті басқаруда жасанды интеллектті тиімді қолдану мүмкіндігін болжау. Мақалада эволюциялық тәсілді қолдана отырып шетелдік тәжірибе талданып, бағаланады және индукция әдісі негізінде қазақстандық ұйымдардың инновациялық қызметінде жасанды интеллектті қолдану мүмкіндігіне болжам жасалады.

Мақаланың жаңалығы – алғаш рет қазақстандық ұйымдардың инновациялық қызметінде ЖИ-дің қолданылуы және оның рөлі мен тұжырымдамалық негізі қарастырылады. Бүгінгі таңда Қазақстанда ақпараттандыру және жасанды интеллектті дамыту саласындағы заңнамалық базаның негізгі іргетасы қаланған. Демек, бұл жасанды интеллект саласындағы ғылыми зерттеулер мен негіздемелерді арттыруды талап етеді. Сонымен қатар, бұл сала үлкен қаржылық қолдауды, ғылым, өндіріс және кәсіпорындар арасындағы өзара іс-қимылды күшейтуді қажет етеді.

Түйін сөздер: инновация, инновациялық менеджмент, жасанды интеллект, тұрақты даму, экономика, стратегия.

С.Т. Купешова [1]*, А. Жидебекқызы [2], Ұ.Б. Бауыржан [1], Д. Вирт [3]

[1] Казахский национальный университет имени аль-Фараби, Алматы, Казахстан
[2] Алматы Менеджмент Университет, Алматы, Казахстан
[3] Университет прикладных наук Западной Швейцарии (HES-SO), Невшатель, Швейцария
*e-mail: s.kupeshova1@gmail.com

Роль искусственного интеллекта в инновационном менеджменте: международный опыт и возможности Казахстана

Широко признано, что потенциал искусственного интеллекта (ИИ) невероятно многогранен. С его помощью задачи и услуги, которые раньше могли быть выполнены только человеком, теперь решаются быстро и эффективно благодаря использованию различных доступных технологий. ИИ значительно облегчает жизнь, эффективно решая технические проблемы и оптимизируя множество процессов. Как ключевой драйвер четвертой промышленной революции, искусственный интеллект оказывает глубокое воздействие на производительность организаций, кардинально меняя существующие бизнес-модели и стимулируя инновационные процессы

С момента появления термина «искусственный интеллект» в научной сфере активно ведутся исследования, направленные на его развитие. Однако ИИ по-прежнему остается относительно новой и сложной технологией, недостаточно изученной в полном объеме.

Что касается влияния искусственного интеллекта на управление инновациями, то ИИ способен радикально изменить практики в этой сфере. Эти изменения откроют новую эру в управлении инновациями, сделав инновационные процессы более эффективными и успешными. Однако наши знания об использовании ИИ в управлении инновациями по-прежнему ограничены, и менеджеры продолжают искать наиболее эффективные способы применения этой технологии.

Целью статьи является исследование роли искусственного интеллекта в управлении инновациями, определение соотношения понятий «управление инновациями» и «искусственный интеллект», а также составление прогнозов о возможности эффективного использования искусственного интеллекта в управлении инновационной деятельностью в казахстанских организациях на основе изучения теоретических и практических аспектов концепций управления инновациями и искусственного интеллекта. В статье анализируется и оценивается зарубежный опыт с использованием эволюционного подхода, а также делаются прогнозы о возможности использования искусственного интеллекта в инновационной деятельности казахстанских организаций на основе метода индукции.

Новизна статьи заключается в том, что впервые анализируются применение искусственного интеллекта в инновационной деятельности казахстанских организаций, а также исследуется его роль и концептуальная основа.

На сегодняшний день в Казахстане уже заложен фундамент законодательной базы в сфере информатизации и развития ИИ. В связи с этим необходимо усилить научные исследования и

обоснования в области искусственного интеллекта. Кроме того, для успешной реализации потенциала ИИ требуется значительная финансовая поддержка, а также усиление взаимодействия между наукой, производством и бизнесом.

Ключевые слова: инновации, инновационный менеджмент, искусственный интеллект, устойчивое развитие, экономика, стратегия.

Introduction

Technological changes are a fundamental driver of investment opportunities and economic-social growth, with artificial intelligence being one of the most significant advancements. AI technologies are distinguished by their ability to complete tasks within seconds, which previously required significant human effort and time. Today, AI enables remote bank account openings at exponentially faster speeds, facilitates shopping and consultations without human assistance, assists drug development with minimal human intervention in laboratories, performs complex surgeries, calculates risks within seconds for stock market investments, and predicts flight delays with high accuracy. Additionally, AI is widely used in expert systems, data processing, voice and facial recognition, machine vision, and other applications. Some scholars even refer to AI as a "new power" because it can potentially transform business models and reshape the future of civilisation. According to the professional media resource Techtarget.com, artificial intelligence is a technology capable of simulating intelligent actions such as learning from data and predefined rules, making logical inferences, and adjusting decisions accordingly.

On the one hand, the widespread accessibility of AI technologies and tools, such as the universally available GPT models and biometric authentication systems like facial recognition, can contribute to overall economic growth. On the other hand, AI's effectiveness may sometimes be overestimated, as the field is still in its formation and development phase. Therefore, claiming that AI will lead to widespread business expansion may be premature. However, as of now, success belongs primarily to organisations that possess large datasets, effectively utilise AI technologies, and invest in AI-driven startups (Agrawal, 2019; Huang, 2019).

For instance, major technology giants like Apple, Google, Microsoft, Facebook, and Amazon are among the leading acquirers of AI-driven startups. Companies in the automotive, biotechnology, retail, banking, and even oil and gas sectors actively seek to purchase AI technologies or form strategic partnerships with startups (Tekic, 2023). Additionally, leading pharmaceutical companies such as Eli Lilly, Charles River Laboratories, Pfizer, and Merck have partnered with Atomwise to leverage AI technology to screen billions of compounds to develop new drugs and predict modern pharmaceutical products. As venture investments in AI continue to grow, these startups play an increasingly critical role as a source of AI innovations and inventions.

The Government of Kazakhstan has adopted the "Artificial Intelligence Development Concept" as a strategic document for 2024-2029, aimed at expanding AI applications across various sectors of the national economy. The program prioritises AI adoption in government administration, the oil and gas and mining industries, energy, transportation, logistics, water supply, and agriculture. As part of infrastructure development research, Kazakhstan plans to establish a supercomputer, data centres, and a national AI platform while expanding fibre-optic networks and implementing training programs to develop human capital.

By 2029, the new program aims to increase AI-powered product output by fivefold. This underscores the urgent need for skilled AI specialists, requiring relevant ministries to increase the number of students enrolled in AI-related programs and expand coding schools in different regions. Additionally, deep, scientifically grounded research is essential. This highlighted the relevance of this study. If AI is widely implemented in Kazakhstani organisations, it could significantly enhance overall innovation activity. While AI was once merely a product of innovation, it now plays a transformative role in optimising innovative management. As a result, the innovation landscape will likely witness an expansion in AI-driven products and services. This article explores AI's role in innovation management and assesses its potential applications in Kazakhstani organisations.

Literature review

An analysis of publications in international citation databases such as Scopus and Web of Science indicates that scientists and researchers actively discuss and study innovation and artificial intelligence.

In the 1930s, Australian scientist Joseph Schumpeter introduced the term "innovation" into economic science. According to him, innovation refers to changes aimed at introducing and utilising new consumer goods, new production and transportation methods, markets, and organisational forms in industries. Over time, "innovation" became a widely accepted category in global economic literature. According to Schumpeter, innovation is not merely introducing something new but represents a novel production function.

Extensive research has been conducted on the integration and application of AI technologies and tools in organisational activities and their advantages (Agrawal, 2019; Huang, 2018; Raj, 2019; Olan, 2022). Additionally, the future of AI in terms of individual interests and communities has also been actively studied (Zahraee, 2016). One of the essential skills for managers is the ability to efficiently and quickly apply available knowledge and experience while obtaining the necessary information. AI can optimise these processes, enabling organisations to implement innovations more effectively and serve as a key element of economic growth.

Integrating AI systems into organisational processes presents complex and challenging phases (Lombardi, 2019; Olan, 2021). Some researchers view the introduction of AI systems as an issue of education, culture, and organisational learning networks (Olan, 2022). Other authors classify AI into two main categories: economic and technological. According to Huang's research, AI technologies that support knowledge-related activities can directly improve organisational efficiency, even if other organisational factors remain unchanged (Huang, 2019).

The issues related to implementing AI systems in organisational activities are complex and require well-planned actions at different stages (Lombardi, 2019; Olan, 2022). Therefore, some researchers consider the sector-specific aspects of integrating AI systems into education, culture, society, and business (Olan et al., 2022). Meanwhile, the authors categorise AI into two main perspectives: economic and technological.

AI has been used in autonomous computer systems for many years, making it not a new phenomenon in the technology industry, as noted by Wooldridge and Jennings (1995). Instead, AI is a fundamental component of computer systems capable of autonomous actions within a specific environment to achieve predefined objectives. Some scholars argue that AI can be compared to human intelligence's ability to quickly assimilate new ideas, engage in self-learning, correct mistakes, and develop independently (Chen et al., 2012). Huang and Rust (2018) suggest that AI technologies promoting knowledge-based activities can enhance organisational efficiency.

Despite the challenges in defining AI's autonomous properties, research shows that AI can operate independently of human intervention, managing its own actions and internal state (Winikoff, 2002).

Several scholars (Cockburn, 2018; Haefner, 2021; Etzioni, 2016) argue that AI can make innovation processes more efficient and fundamentally transform management methods and models. They support the idea that AI does not threaten human development and cannot fully replace humans in various processes. Instead, they advocate for its board application in innovation management. However, some researchers hold an opposing view. The idea that AI and machine learning can fully replace humans and reshape organisational processes continues to attract absorbing scientific interest (Brynjolfsson, 2019; Von Krogh, 2018).

Thus, the evolution of research in the field of AI can be summarised as follows. Alan Turing first described using computers to model intelligent behaviour and critical thinking. In 1935, he conceptualised AI as a computing machine with large memory and the ability to manage that memory through a scanner. In his 1950 book Computing Machinery and Intelligence, Turing explored whether computers could possess human-like intelligence and introduced what later became known as the "Turing Test". Six years later, John McCarthy defined the term "artificial intelligence" as "the science and engineering of making intelligent machines" (see Table 1).

It is now impossible to achieve social and technological development without AI technologies. Over the last 70 years (from 1950 to 2020), AI has brought significant social changes and innovations to the business environment after undergoing several evolutionary stages. AI began as a simple series of "if-then" rules and evolved over several decades, incorporating complex algorithms miming human brains. Today, AI includes various technologies such as machine learning (ML), deep learning (DL), and computer vision.

Table 1 – Phases of artificial intelligence development and their characteristics

Stage	Years	Description
Beginning	1943-1955	For the first time, McCulloch and Pitts proposed the creation of an artificial neural model in their paper "A Logical Calculus of the Ideas Immanent in Nervous Activity." Then, the Turing test emerged, and Harvard graduates Marvin Minsky and Dean Edmonds built the first neural network computer, "SNARS."
Initial formation stage	1956-1974	In 1956, the term "artificial intelligence" was introduced during a conference in Dartmouth, ISA. Newell and Simon developed the first artificial intelligence program, "Logic Theorist," introduced the term "machine learning," and created the first chatbot, "ELIZA." Symbolic research, logic, and algorithmic search began to receive increased focus.
"The AI Winter"	1974-1980	It was a period of stagnation. Difficulties associated with mastering complex knowledge grew. Challenges arose due to the allocation of funds for research, and interest in science declined.
Formation of experts	1980-1987	The first national conference of the American Artificial Intelligence Association was organised at Stanford University. Expert systems gained popularity for solving specific tasks, and methodologies for knowledge sharing and discussions were proposed.
"The 2nd AI winter"	1987-1993	Experts failed to achieve the expected results, leading to increased scepticism and decreased research funding.
Research	1993-2010 – Contemporary Period	The revival of artificial intelligence, particularly from machine learning and deep learning. IBM Deep Blue computer defeated world chess champion Hurry Kasparov.
	2011 – Present Day	Social networks like Facebook, Google, and Twitter began extensively using artificial intelligence, along with Big Data and Tesla Cars.
Note – complied based on the literature Agrawal, A., Gans, J., & Goldfarb, A. (Eds.). (2019)		

Undoubtedly, AI can perform some tasks more efficiently than humans. Numerous studies have explored this, leading to new theories, concepts, technologies, management tools, and business models. However, regarding the relationship between AI and innovation activities, the key question in articles and publications is: "What will be the role of humans, particularly managers, in processes where AI is actively used?". In this context, four main scenarios can be identified. Optimists believe that humans will remain dominant, while pessimists argue that humans will become dependent on AI. Pragmatists suggest that AI may enhance human capabilities, and sceptics conclude in their research that AI technologies will never surpass human abilities and consider AI a temporary trend.

Methodology

As a forecasting technology, AI enables firms to process large volumes of data more efficiently and quickly, improving the decision-making process in business. Thus, AI is considered a technology that accelerates growth by enhancing productivity and innovation across various economic and social sectors (Aghion, 2017). However, the full extent of AI's potential to transform human life and stimulate economic and social growth remains insufficiently explored. The lack of comprehensive data on AI implementation at the organisational level makes understanding AI adoption models and their economic impact a relevant issue. The main sources of information will be scientific publications, reports of international organizations, as well as interviews with experts working in the field of technology. This will provide an opportunity to better understand how existing practices can be adapted to the conditions of Kazakhstan.

This article will apply an evolutionary approach that considers AI adoption as an adaptive process influenced by various factors, allowing for a forecast of AI technology implementation in Kazakhstani organisations' innovation management. The methods include analysing and assessing international best practices in successfully implementing AI across different economic and social sectors.

Results and discussion

Thus, what is artificial intelligence? Artificial intelligence refers to the ability of algorithms or intelligent systems to function independently by utilising past experiences to achieve specific goals.

Artificial intelligence is a technology that enables computer systems and machines to simulate human intelligence processes. With AI, robots can

recognise human speech, process natural language, respond to user queries, identify and analyse images through machine vision, generate text, compose music, or even write software code. In other words, AI performs tasks and actions that require rational thinking.

Today, AI is described as a tool that helps companies improve and prototyping processes while accelerating data processing for more accurate predictions and discovering new market opportunities. However, ensuring data security and privacy remains a significant challenge. Despite this, AI has found its most successful applications in big data processing. For instance, in various commercial projects, AI's ability to analyse large data streams has been widely used to study consumer behaviour and assess bank customers' creditworthiness by identifying potential defaults. AI has been successfully applied to early disease diagnostics in the medical field. During the peak of the COVID-19 pandemic, AI identified viral pneumonia from tomographic images, while mobile applications analysed voice, breathing patterns, and cough sounds to detect infection symptoms. Additionally, voice assistants like Siri or Alice have significantly simplified many detailed processes for users (see Table 2).

IDC experts say the compound annual growth rate (CAGR) in the AI market is projected to be 40.6% in the coming years. If this trend continues, global AI-related spending will reach $153 billion by 2028 (International Data Corporation, 2023). By the end of 2023, the global AI platforms market reached a new record of $27.9 billion, compared to $19.3 billion in 2022, representing a 44.4% annual increase (International Data Corporation, 2023).

Table 2 – Artificial intelligence programs used in innovation management

Artificial intelligence	Application areas
DALL-E 3	It enables the creation of detailed images through verbal descriptions of ideas, making it valuable for artists, designers, and marketers.
Adobe Firefly	It is dedicated to image editing or creating unique visual effects. It helps create content tailored to their needs.
PathAI	It aids in more accurate disease diagnosis and optimises selecting participants for critical trials, which is especially important in oncology and genetic research.
IBM WatsonX	It assists in automating business processes and managing big data, making it valuable for analytics, data management, and workflow optimisation.
Note – complied based on the literature Cockburn, I. M., Henderson, R., & Stern, S. (2018).	

Geographically, North America holds the largest share of the total volume of AI-related hardware, software, and services. In 2022, the region accounted for approximately $3.35 billion in AI spending. This dominance is attributed to a well-developed ecosystem of technology corporations, startups, and research institutions that drive AI innovation. Silicon Valley is a hub for cutting-edge AI research and development.

Europe ranks second in AI-related expenditure, while Asia-Pacific has the farthest growth rate. This growth is primarily driven by the widespread adoption of smart devices, rapid urbanisation, and the expansion of Internet infrastructure (Agangebyan, 2023).

The leading players in AI development include Microsoft, Google, IBM, Siemens, AWS, Nvidia, Intel, Qualcomm, STMicroelectronics, Oracle, Salesforce, NXP, Lattice, Octonion, and HPE. According to Crunchbase research, AI-focused companies OpenAI, Anthropic, and Inflection collectively raised around $18 billion in 2023 (crunchbase.com, 2024). Meanwhile, PitchBook data indicates that in the first three months of 2024, AI venture capital funding surged by 25$, reaching $25.87 billion (habr.com, 2024). Major industry players such as Microsoft, Meta, Apple, and Amazon have invested heavily in AI development, including building data centres and hiring top AI talent (International Data Corporation, 2023).

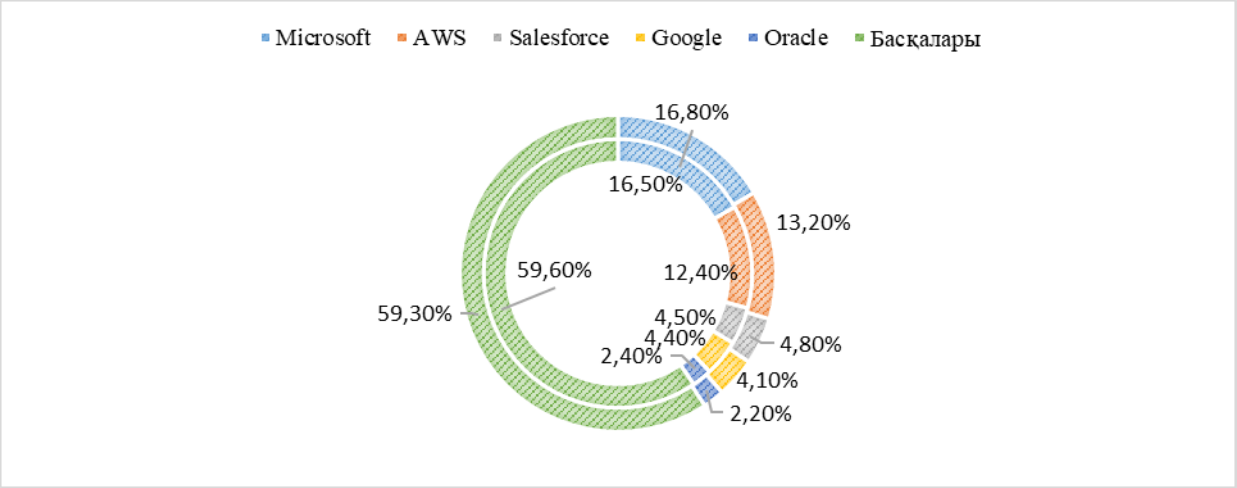

Figure 1 – Share of leading participants in the use of artificial intelligence in 2022-2023%
Note – complied based on the literature [International Data Corporation, 2023]

This advanced international experience enables Kazakhstan to establish a sustainable technological progress vector. To attract major global corporations such as Amazon, Google, Mastercard, and Citi Group, President Tokayev instructed the government during the 2023 IT Forum to ensure the construction of AI-specialized information centres within two years (Official Websites of the President of the Republic of Kazakhstan, 2024).

Smart Data Ufiles is implementing a comprehensive initiative to collect state agency data, integrating 93 information databases. Kazakhstan plans to deploy a supercomputer, build data processing centres, create a National AI platform, and expand fibre-optic communication networks as part of its infrastructure development. Additionally, the country is set to launch educational and acceleration programs to enhance human capital. Since 2021, L.N. Gumilyov Eurasian National University has offered bachelor's and master's programs in Artificial Intelligence Technologies, accredited by the German ASIIN agency. Since 2018, Al-Farabi Kazakh National University has operated a Department of AI and Big Data, where most programs focus on AI development. 17 universities have introduced 15 AI-related fields, with 2,196 students enrolled in these disciplines.

British research firm Oxford Insights assessed Kazakhstan's AI readiness using the Government AI Readiness Index methodology. The country scored 76% in "digital capacity" and 74% in "data availability" indicating high potential. Meanwhile, efforts are being made to enhance competencies in the "vision" category, which evaluates the presence of national AI strategies (Government AI Readiness Index, 2023).

In July 2023, the Global CIO portal published a study on Kazakhstan's IT market, analysing digital transformation trends across various industries. According to this research, Kazakhstan ranked among the world's top 30 most digitally advanced nations in 2022. The country holds the 51st position in the ICT Development Index and 58th place in the Network Readiness Index (Current Aspects of Digitalization in Kazakhstan, 2024).

By 2025, the Kazakh government aims to enter the top 20 countries in the UNO E-Government Development Index, the top 50 in the B2C E-Commerce Index, and the top 40 in the ICT Development Index. Astana and Almaty are Kazakhstan's foremost economic and IT hubs, producing 41.5% and 49% of IT services, respectively. A 2022 study revealed that IT companies specialising in software development and consulting have grown 2.7 times over the past four years (Kaliakparov, 2024).

The volume of startup investments amounted to 67.6 billion, nearly twice the planned amount of 35.9 billion. The total economic impact of the "Digital Kazakhstan" program implementation reached 1.6 trillion. Figure 2 illustrates the investment dynamics over the years (see Figure 2) (Expenditures on the "Digital Kazakhstan" state program over 4 years, 2024).

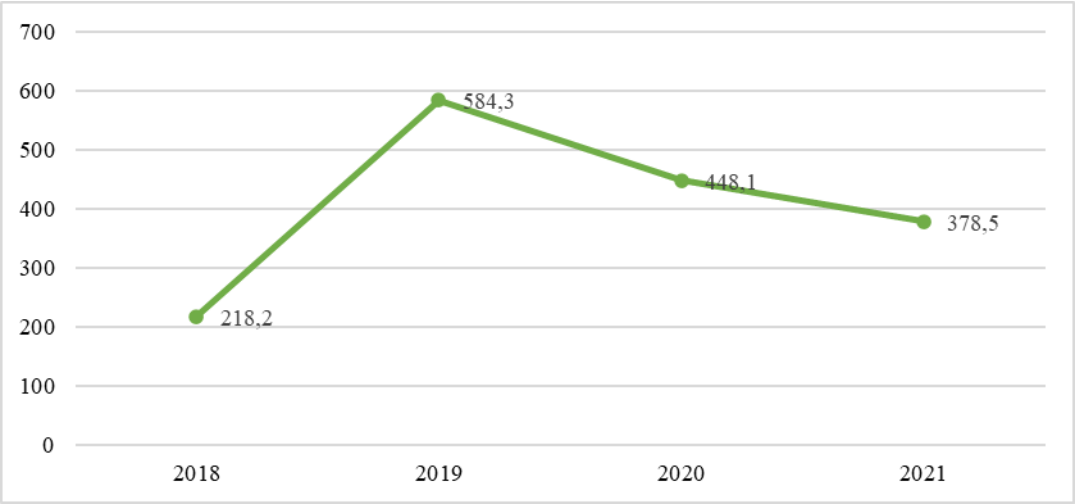

Figure 2 – Investments in startups, billion tenge
Note – complied based on the literature
[Expenses for the state program "Digital Kazakhstan" over 4 years, 2024]

Considering the international experience in AI implementation, the plans for AI development programs in Kazakhstan, the ongoing initiatives, and the economic landscape, the following forecasts can be made regarding adopting AI in enterprises in Kazakhstan.

In a short-term perspective, graduates of the "Artificial Intelligence and Big Data" program will enter the Kazakhstani job market for the first time. The initial results, advantages, disadvantages, and opportunities will become evident. There will be an opportunity to adapt the educational program to match the demand in the Kazakhstani market.

In the medium term, in line with the President's directive, specialised AI information centres will emerge, attracting major companies like Amazon, Google, Mastercard, and City Group to Kazakhstan. This is expected to enhance Kazakhstan's investment appeal and contribute to improving the country's socio-economic conditions.

Finally, in a long-term perspective, the first graduates of the "Artificial Intelligence and Big Data" program will pursue master's and doctoral degrees in scientific and pedagogical fields. Consequently, a scientific foundation for AI studies in Kazakhstan will be established. This will lead to domestic AI research and dissertation work development, laying the groundwork for future scientific progress. This is anticipated to increase the number of major economic and IT hubs, strengthen confidence in them, and positively impact the country's sustainable development.

Thus, AI can become an integral part of Kazakhstan's innovation management ecosystem, transforming individual enterprises and entire industries. AI can be used for predictive innovation management, enabling companies to anticipate trends and dynamically adjust their strategies. Moreover, Kazakhstan has the potential to become a regional leader in AI-driven innovation, with technology hubs and startup ecosystems attracting international collaboration.

Conclusion

The article examines the implementation of artificial intelligence in the innovation management of Kazakhstani organisations using an evolutionary approach. AI adoption is an adaptation process influenced by various factors to forecast its potential applications in innovation management.

Pricewaterhouse Coopers estimates that by 2030, the contribution of artificial intelligence technologies to global gross domestic product (GDP) will be $15.7 trillion, which is more than the combined GDP of China and India at the current time (Murmu, 2024).

In July 2017, China proposed the "Development Plan for a New Generation of Artificial Intelligence", which stated that China's AI competitiveness should reach the highest level in the world by 2030 and proposed to accelerate the development of leading AI enterprises. In 2018, the US established a special committee on artificial intelli-

gence, which certainly contributed to the rapid development of artificial intelligence. However, the empirical analysis of the impact of AI on innovation management has not been fully conducted, and the question of when, how, and to what extent innovation managers and AI systems can and should work together has not yet been fully explored. Most publications only discuss the positive and negative aspects of AI development from a macroeconomic perspective.

Since the objective of this research is to assess where and how AI is used alongside human activities in the innovation process, the following conclusion can be drawn:

Developing and launching innovations in the market is a complex process that requires highly specialised teamwork. Integrating AI technologies into innovation management is a distinct and more intricate process compared to the ongoing digital transformation of traditional management.

However, empirical analysis of AI's impact on innovation management remains incomplete. Questions such as when, how, and to what extent innovation managers and AI systems should collaborate are yet to be fully explored. Many publications focus primarily on AI development's macroeconomic advantages and disadvantages.

AI enables organisations to restructure their operational and management processes, identify the necessity for innovation, and optimise conditions for modernising the value creation chain.

Many successful organisations have integrated AI into their operations and developed unique business models. Business model innovation is a transformation in the value creation chain that significantly shifts an organisation's value proposition. Companies that successfully implement AI in their business models and operations can rapidly develop revolutionary innovations.

AI-based platforms play a crucial role in fostering economic growth, improving people's lives, and addressing significant social challenges by developing innovative products and services that meet social needs.

In the innovation process, AI can replace specific human tasks. However, replicating managers' cognitive abilities, skills, and decision-making processes remains challenging. Therefore, a complete digital transformation of organisations may not always be necessary.

The study also analyses and evaluates foreign experience in AI adoption and assesses Kazakhstan's current position and opportunities. Based on this analysis, short-, medium-, and long-term forecasts were developed.

In conclusion, AI offers splendid opportunities today. With its assistance, tasks previously exclusive to humans can now be performed quickly and efficiently using various accessible programs. AI tools and technologies are particularly crucial for projects requiring extensive data collection and processing as well as management and decision-making processes. For example, industries such as banking and financial services, manufacturing, retail, and healthcare have a high demand for AI applications.

In the future, AI could be used in Kazakhstan for predictive innovation management, allowing companies to forecast trends and dynamically adjust their strategies. Ultimately, AI has the potential to solve technical challenges effectively, making life significantly easier.

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Information about the authors

Saule Kupeshova – Candidate of Economic Sciences, Associate Professor, Al-Farabi Kazakh National University, Management Department (Almaty c., Kazakhstan; email: s.kupeshova@mail.ru);

Aknur Zhidebekkyzy – PhD, Associate Professor, Researcher, Almaty Management University, School of Management, (Almaty c., Kazakhstan; email: aknur.zh@gmail.com);

Ulmira Bauyrzhan – PhD student, Al-Farabi Kazakh National University, Management Department, (Almaty c., Kazakhstan; email: ulmi_96@mail.ru);

Julia Wirth – Candidate of Economic Sciences, Associate Professor, University of Applied Sciences and Arts of Western Switzerland (HES-SO). (Neuchatel c., Switzerland, email: julia.wirth@he-arc.ch).

Авторлар туралы мәлімет:

Купешова Сауле Телеухановна – экономика ғылымдарының кандидаты, қауымдастырылған профессор, әл-Фараби атындағы Қазақ ұлттық университеті, «Менеджмент» кафедрасы, (Алматы қ., Қазақстан; email: s.kupeshova@mail.ru);

Жидебекқызы Ақнұр – PhD, қауымдастырылған профессор, зерттеуші, Алматы Менеджмент Университеті, Менеджмент мектебі, (Алматы қ., Қазақстан; email: aknur.zh@gmail.com);

Бауыржан Ұлмира Бауыржанқызы – докторант, «Менеджмент» кафедрасы, әл-Фараби атындағы Қазақ ұлттық университеті, (Алматы қ., Қазақстан; email: ulmi_96@mail.ru);

Жулия Уирт – экономика ғылымдарының кандидаты, қауымдастырылған профессор, Батыс Швейцария қолданбалы ғылымдар және өнер университеті (HES-SO), (Невшатель қ., Швейцария, email: julia.wirth@he-arc.ch).

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A.D. Assanova[1]*, L.Zh. Ashirbekova[1], G.N. Sansyzbaeva[1], J. Korpysa[2]

[1] Al-Farabi Kazakh national university, Almaty, Kazakhstan
[2] University of Szczecin, Szczecin, Poland
*e-mail: arailymassanova@gmail.com

IMPROVING THE ACTIVITIES OF LOCAL GOVERNMENT BODIES IN THE REPUBLIC OF KAZAKHSTAN

This study examines the current state of local self-governance (LSG) in Kazakhstan and the mechanisms for improving its effectiveness. Local self-government bodies play a vital role in regional development and enhancing citizens' quality of life, yet their potential is hindered by significant challenges, including financial dependence on central authorities, limited citizen participation, and insufficient transparency.

The purpose of the research is to analyze the potential implementation of the Local Governance Performance Index (LGPI) in Kazakhstan as an effective tool for assessing and improving the performance of local self-governance. The study focuses on exploring LGPI's international applications and its relevance in addressing governance inefficiencies in Kazakhstan.

The research highlights the potential of LGPI to address key challenges in LSG by introducing measurable performance indicators. Its implementation could significantly enhance transparency, public participation, and service delivery at the local level, contributing to the modernization of governance in Kazakhstan.

The study employs a qualitative methodology, including an analysis of the regulatory framework, expert interviews with local governance specialists, and a comparative review of international practices. This approach identifies actionable steps for integrating LGPI into Kazakhstan's governance system.

The research reveals that adopting LGPI could improve accountability and foster sustainable regional development by addressing governance gaps. The findings demonstrate the need for feedback mechanisms and measurable metrics to promote inclusive decision-making processes.

This work contributes to the ongoing decentralization reforms in Kazakhstan by providing a practical roadmap for enhancing financial and administrative autonomy. It offers evidence-based recommendations for policymakers to strengthen the effectiveness and transparency of LSG bodies.

The implementation of LGPI in Kazakhstan can serve as a foundation for systematic governance improvement. It would aid in creating a more transparent, inclusive, and participatory local governance system while aligning with international best practices.

Key words: local governance, decentralization, LGPI, public services.

А.Д. Асанова [1]*, Л.Ж. Аширбекова [1],
Г.Н. Сансызбаева [1], Я. Корпыса[2]

[1] Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан
[2] Щецин университеті, Щецин, Польша
*e-mail: arailymassanova@gmail.com

Қазақстан Республикасындағы жергілікті өзін-өзі басқару органдарының қызметін жетілдіру

Бұл зерттеуде Қазақстандағы жергілікті өзін-өзі басқару (ЖӨБ) жүйесінің қазіргі жағдайы зерттеліп, оның тиімділігін арттыру механизмдері қарастырылады. Жергілікті өзін-өзі басқару органдары өңірлерді дамыту мен азаматтардың өмір сүру сапасын жақсартуда маңызды рөл атқарады, алайда олардың әлеуеті орталық билікке қаржылық тәуелділік, азаматтардың жеткіліксіз қатысуы және ашықтық деңгейінің төмендігі сияқты мәселелермен шектелген.

Зерттеудің мақсаты – ЖӨБ-дің жұмысын бағалау мен жақсарту құралы ретінде Қазақстанда жергілікті өзін-өзі басқару тиімділігі индексін (ЖӨБТИ) енгізу мүмкіндіктерін талдау. Зерттеу ЖӨБТИ -дің халықаралық тәжірибеде қолданылуын және оның Қазақстандағы басқару мәселелерін шешудегі әлеуетін зерттеуге бағытталған.

Зерттеу ЖӨБТИ-дің негізгі мәселелерді шешудегі әлеуетін атап көрсетеді, атап айтқанда, тиімділікті өлшейтін көрсеткіштерді енгізу арқылы. ЖӨБТИ-ді қолдану жергілікті деңгейде ұсынылатын қызметтердің сапасын арттырып, азаматтардың белсенділігін күшейтіп, басқарудың ашықтығын айтарлықтай жақсарта алады.

Жұмыста нормативтік-құқықтық базаны сапалы талдау, жергілікті басқару саласындағы сарапшылармен сұхбаттар және халықаралық тәжірибелерді салыстырмалы шолу қолданылды. Мұндай тәсіл ЖӨБТИ-ді Қазақстанның басқару жүйесіне интеграциялаудың нақты қадамдарын анықтауға мүмкіндік берді.

Зерттеу нәтижелері жергілікті өзін-өзі басқару органдарының есептілігін арттыруға және өңірлердің тұрақты дамуына ықпал ететінін көрсетті. Нәтижелер басқару процесін инклюзивті ету үшін кері байланыс механизмдері мен өлшенетін көрсеткіштерді енгізудің маңыздылығын айқындады.

Бұл жұмыс Қазақстандағы децентрализация бойынша ағымдағы реформаларға үлес қосып, қаржылық және әкімшілік автономияны арттыруға арналған практикалық жол картасын ұсынады. Алынған нәтижелер деректерге негізделген және ЖӨБ органдарының тиімділігі мен ашықтығын арттыру бойынша ұсыныстарды қамтиды.

Қазақстанда ЖӨБТИ-ді енгізу басқаруды жүйелі түрде жақсартудың негізі бола алады. Бұл халықаралық стандарттарға сай келетін, ашық, инклюзивті және азаматтарға бағытталған жергілікті өзін-өзі басқару жүйесін құруға мүмкіндік береді.

Түйін сөздер: жергілікті өзін-өзі басқару, децентрализация, ЖӨБТИ, мемлекеттік қызметтер.

А.Д. Асанова [1]*, Л.Ж. Аширбекова [1],
Г.Н. Сансызбаева [1], Я. Корпыса [2]

[1] Казахский национальный университет им. аль-Фараби, Алматы, Казахстан
[2] Щецинский университет, Щецин, Польша
*e-mail: arailymassanova@gmail.com

Совершенствование деятельности органов местного самоуправления в Республике Казахстан

В данном исследовании рассматривается текущее состояние местного самоуправления (МСУ) в Казахстане и изучаются механизмы повышения его эффективности. Органы местного самоуправления играют важную роль в развитии регионов и улучшении качества жизни граждан, однако их потенциал ограничивается такими проблемами, как финансовая зависимость от центральных властей, недостаточное участие граждан и низкий уровень прозрачности.

Цель исследования заключается в анализе возможностей внедрения индекса эффективности местного самоуправления (ИЭМС) в Казахстане как инструмента для оценки и улучшения работы МСУ. Исследование сосредоточено на изучении международного опыта применения ИЭМС и его потенциала для решения проблем управления в Казахстане.

Исследование подчеркивает потенциал ИЭМС в решении ключевых проблем МСУ за счёт внедрения измеримых показателей эффективности. Его применение может значительно повысить прозрачность, активизировать участие граждан и улучшить качество услуг, предоставляемых на местном уровне.

В работе использован качественный анализ нормативно-правовой базы, интервью с экспертами в области местного управления и сравнительный обзор международных практик. Такой подход позволил определить конкретные шаги по интеграции ИЭМС в систему управления Казахстана.

Исследование показало, что внедрение ИЭМС может улучшить подотчётность органов местного самоуправления и способствовать устойчивому региональному развитию. Результаты подчёркивают необходимость обратной связи и внедрения измеримых показателей для более инклюзивного процесса принятия решений.

Работа вносит вклад в текущие реформы по децентрализации в Казахстане, предоставляя практическую дорожную карту для повышения финансовой и административной автономии. Полученные результаты основаны на фактических данных и содержат рекомендации для повышения эффективности и прозрачности органов МСУ.

Применение ИЭМС в Казахстане может стать основой для системного улучшения управления. Это создаст более прозрачную, инклюзивную и ориентированную на граждан систему местного самоуправления, соответствующую международным стандартам.

Ключевые слова: местное самоуправление, децентрализация, ИЭМС, государственные услуги.

Introduction

Local self-government (LSG) plays a critical role in enhancing public administration quality, fostering regional development, and empowering individuals to actively participate in decision-making processes. As a key component of governance reforms globally, decentralization emphasizes the importance of transferring power and resources to local levels to address community needs more effectively and responsively. However, achieving the objectives of decentralization requires not only structural reforms but also effective tools for assessing and improving local government performance.

In Kazakhstan, strengthening regional autonomy and promoting sustainable socio-economic development have been central to public administration reforms. Over the past two decades, the government has implemented several programs to enhance the administrative capacity, financial independence, and transparency of local governing bodies. Despite these efforts, significant challenges remain. Local governments face financial dependence on central authorities, low levels of citizen participation, and a lack of standardized frameworks for evaluating their performance. These issues hinder the potential of local governance to address critical concerns that directly affect the quality of life of citizens.

Recognizing these challenges, Kazakhstan has prioritized local governance reforms through initiatives such as the "Concept of Local Self-Government Development in the Republic of Kazakhstan until 2025," established by Presidential Decree No. 639 on August 18, 2021. This initiative underscores the importance of improving the efficiency, accountability, and transparency of local governance structures.

This study investigates the potential of the Local Governance Performance Index (LGPI) as a cutting-edge tool for addressing the challenges facing local self-government in Kazakhstan. The LGPI provides a systematic framework for evaluating critical aspects of governance performance, including accountability, service delivery, and citizen participation. By implementing this framework, Kazakhstan can more effectively identify areas for improvement and carry out targeted reforms to strengthen local governance.

The relevance of this study lies in its focus on the critical need to enhance public service quality, increase citizen participation, and advance decentralization within Kazakhstan's public administration system. The research addresses pressing issues such as the financial dependence of local governments on central authorities, limited civic engagement in governance processes, and insufficient transparency within the existing local self-government framework. By exploring the implementation of LGPI, this study aims to contribute to creating a more inclusive, effective, and citizen-oriented local governance system in Kazakhstan.

The primary objectives of this research are to:

- Examine Institutional Frameworks: Analyze the legislative and institutional structures governing local government operations in Kazakhstan.
- Evaluate Existing Challenges: Assess the shortcomings of the current local governance system, with a particular focus on financial autonomy and citizen engagement.
- Propose LGPI as a Solution: Explore the potential of LGPI as a tool to assess and enhance the performance of local self-government.
- Recommend Policy Interventions: Provide actionable recommendations for improving local governance through digital transformation and decentralization.

The primary issue addressed by this research is the persistent inefficiency and lack of accountability in Kazakhstan's local governance system, which limits its ability to respond effectively to regional challenges. This inefficiency stems from financial dependence on central authorities, insufficient citizen participation, and a lack of transparency in decision-making processes.

The study hypothesizes that the implementation of LGPI will significantly enhance the efficiency of local self-government in Kazakhstan by establishing measurable performance standards. These standards are expected to improve accountability, transparency, and citizen engagement, thereby strengthening resource management, increasing public trust in local governance, and accelerating the decentralization process. These advancements will ultimately support the sustainable development of Kazakhstan's regions.

In light of Kazakhstan's ongoing efforts to reform public administration and pursue digital transformation, this research is both timely and pertinent. By evaluating the viability of LGPI, the study seeks to address the critical challenges facing local governance and provide a roadmap for creating a more transparent, participatory, and efficient local self-government system. The ultimate goal is to aid Kazakhstan in achieving sustainable regional development and fostering a governance framework that aligns with international best practices.

Literature review

Local self-government and decentralization have emerged as central themes in contemporary international public administration literature. Research underscores the significance of financial independence and political decentralization in enhancing local governance effectiveness. For example, Kyriacou and Roca-Sagalés (2011) demonstrate that the division of authority between central and local authorities significantly improves the quality of public services. Similarly, Smoke (2015) highlights the necessity of financial autonomy for local governments, emphasizing that their dependence on federal transfers constrains their capacity to address local issues effectively.

The role of accountability and transparency in achieving sustainable development has been emphasized by Yilmaz and Schaeffer (2008). Their work identifies community participation as a critical factor for local government success. In parallel, Boex and Martinez-Vazquez (2007) argue that financial decentralization must include a clear division of responsibilities between central and local administrations. Finally, Cheema and Rondinelli (2007) highlight the importance of active citizen participation in improving service quality and fostering trust in local governments.

This body of research collectively underscores the importance of financial independence, transparency, and public engagement in fostering effective local governance. Against this backdrop, Kazakhstan has initiated significant reforms aimed at strengthening local self-governance (LSG) as part of its broader decentralization efforts. These reforms are designed to enhance the role of LSGs in regional socio-economic development. This paper examines the principles and impacts of these reforms, drawing insights from both domestic and international scholarship.

Theoretical Foundations of Decentralization and Local Governance

Decentralization involves redistributing authority from central to local governments to empower local governance structures. Effective decentralization relies on three key principles: financial autonomy, accountability, and citizen participation. Smoke (2015) posits that decentralization is only effective when local governments achieve financial independence, a challenge in Kazakhstan due to its centralized fiscal structure. Similarly, Cheema and Rondinelli (2020) advocate for participatory governance as a means to enhance trust and legitimacy. However, Nurpeisova (2022) observes that citizen engagement in Kazakhstan remains underdeveloped, particularly in rural areas.

Kazakhstan's "Concept of Local Self-Government Development 2025" (Adilet.zan.kz, 2021) reflects these theoretical principles, aiming to reduce dependency on central authorities and increase local decision-making power. However, practical implementation remains inconsistent, especially in resource allocation and participatory mechanisms.

Local Governance Reforms in Kazakhstan

Kazakhstan has undertaken reforms aimed at decentralizing power and enhancing the effectiveness of LSGs. These reforms address several key areas:

1. Legislative Framework: **Ismailova (2019)** highlights the importance of a strong legal framework for the effective functioning of LSGs. Kazakhstan has worked to define the roles, responsibilities, and financial autonomy of local governments. These legislative reforms aim to secure LSGs' legal standing and operational effectiveness.

2. Financial Independence: Financial stability is critical for LSGs to operate effectively. While steps have been taken to strengthen inter-budgetary relations and broaden the municipal tax base, unresolved challenges–such as the absence of a local tax base and reliance on Republican budget transfers–persist (**Zhusupov, 2020**).

3. Citizen Participation: Kazakhstan is promoting public participation through mechanisms such as participatory budgeting and public oversight committees. These initiatives aim to improve the resolution of local issues and build public trust (**Nurpeisova, 2022**).

4. Technology and Innovation: Integrating digital platforms, automating administrative processes, and implementing e-governance are central to improving LSG transparency and efficiency (**Akhmetov, 2023**).

5. Human Resource Development: Addressing staffing issues is critical for improving governance. **Nurgalieva (2021)** emphasizes the importance of developing local leaders' competencies, while **Abdraimova (2020)** focuses on the role of LSGs in driving sustainable rural development.

Application of the Local Governance Performance Index (LGPI) in Kazakhstan

The Local Governance Performance Index (LGPI) is a robust tool designed to evaluate governance efficiency through measurable indicators such as accountability, transparency, and service delivery (World Bank, 2016). In Kazakhstan, the adoption of LGPI has the potential to address systemic challenges by introducing performance metrics to guide reforms.

Case Study 1: Pilot Implementation in Almaty Region

A pilot implementation of LGPI was conducted in the Almaty Region in 2022 to assess its feasibility in Kazakhstan. The study involved evaluating 15 local government bodies based on three core blocks of LGPI:

- Transparency and Information Disclosure: Assessment of public access to budgetary and decision-making information.

- Citizen Participation: Evaluation of mechanisms for public input and feedback.

- Service Delivery: Analysis of the quality and accessibility of public services, such as healthcare and education.

Key findings from the Almaty pilot include:

1. Transparency scores were higher in urban districts (78%) compared to rural districts (45%), highlighting disparities in information accessibility.

2. Citizen participation mechanisms, such as public consultations, were utilized by only 18% of respondents in rural areas, compared to 42% in urban areas.

3. Service delivery satisfaction was inconsistent, with healthcare services receiving a 60% approval rating, while educational services lagged at 48%.

Case Study 2: Digital Engagement in Astana

The city of Astana implemented a digital platform in 2021 for citizen feedback on local governance performance, aligning with LGPI's emphasis on accountability and participation. The platform allowed residents to submit complaints, suggestions, and service evaluations.

- Data collected over a year showed a 25% increase in citizen engagement, with over 12,000 submissions.

- Common concerns included delays in municipal service delivery (34%) and lack of transparency in budget allocation (28%).

This initiative demonstrates the potential of digital tools in bridging the gap between citizens and governance, a critical requirement for LGPI's success.

In-Depth Data Analysis

Data from LGPI-aligned assessments reveal important patterns in governance performance across Kazakhstan:

1. Regional Disparities: Rural areas consistently scored lower on transparency (average 48%) and citizen participation (25%) compared to urban regions, which scored 75% and 50%, respectively. This reflects the need for targeted interventions to address rural governance challenges.

2. Budget Dependency: Approximately 65% of local government budgets in 2021 relied on central transfers, with rural areas being the most dependent. Enhancing local revenue-generation capacity is crucial for achieving financial autonomy.

3. Service Delivery: Satisfaction with public services varied significantly by sector. For instance, transportation infrastructure received a 70% satisfaction rate, while waste management scored only 38%. This highlights the need for sector-specific reforms.

This literature review integrates theoretical frameworks with practical case studies and data analysis to provide a comprehensive understanding of local governance in Kazakhstan. The application of LGPI, informed by global best practices and tailored to Kazakhstan's unique context, offers significant potential to address existing challenges. By leveraging performance metrics, enhancing citizen participation, and ensuring financial independence, Kazakhstan can create a more inclusive and effective local governance system.

In the Republic of Kazakhstan, enhancing the operations of local self-government organisations involves a variety of concerns pertaining to decentralisation, legal reforms, guaranteeing financial independence, and implementing contemporary technologies. Enhancing the quality of life for the populace and promoting sustainable regional development are two benefits of further development in these places. The literature reviewed in this part highlights the necessity of ongoing reforms in this area and the significance of a holistic strategy to resolving local self-government issues.

Methodology

This study employs a qualitative research methodology to evaluate the potential of the Local Governance Performance Index (LGPI) in improving local self-governance (LSG) in Kazakhstan. The research integrates several approaches:

1. Analysis of Regulatory Frameworks: A comprehensive review of Kazakhstan's legislative and institutional structures governing local self-governance, including key policies such as the Concept of Local Self-Government Development 2025 and the Law on Local Public Administration and Self-Government (2001, with updates), provides insight into the current operational and legal foundations of LSG.

2. Comparative Review of International Practices: The study examines successful applications of LGPI in other countries, drawing on lessons learned to identify best practices applicable to Kazakhstan.

3. Case Studies: Two regional case studies, focusing on pilot implementations in Almaty and digital governance efforts in Astana, are analyzed to understand the practical implications and outcomes of LGPI adoption.

4. Cost-Benefit Analysis: A financial assessment calculates the costs of implementing LGPI across Kazakhstan's municipalities, factoring in survey administration, capacity-building programs, and digital infrastructure upgrades.

This mixed-methods approach ensures a holistic evaluation of LGPI's relevance, feasibility, and potential impact on governance reforms in Kazakhstan.

Hypothesis

The Local Governance Performance Index (LGPI) will significantly enhance the efficiency, accountability, and transparency of local self-governance in Kazakhstan. By introducing measurable performance standards, LGPI will:

1. Improve the quality of public services by identifying gaps and prioritizing resources.

2. Strengthen financial autonomy and resource management, reducing dependency on central government allocations.

3. Increase citizen participation in governance by integrating feedback mechanisms and promoting public trust.

These advancements are expected to foster a more inclusive, transparent, and effective local governance system, supporting the broader goals of decentralization and sustainable regional development in Kazakhstan.

Results and Discussion

Since the establishment of the local self-government system around the beginning of the 2000s, Kazakhstan has introduced a number of major changes. In 2012, the Concept of Local Self-Government Development till 2020 (Adilet.zan.kz, 2021), was adopted, which created the shift needed in setting targets for the creation of administratively and financially self-sufficient local governments. The following were some of the concept's main provisions:

- Devolution of powers: To enhance local self-governance and self-administration, aspects of power are taken away from the national government and vested to akimats or local executive structures.

- Such type of action is aimed at promoting the citizens' efforts to become active participants in the local decision-making processes in order to achieve better governance through responsive and inclusive local governments.

- Budgeting and public engagement in oversight of budget execution: Systems that make it possible for members of the public to engage in the budgetary processes would enhance accountability and transparency at the local level.

While these reforms enabled local regimes to be politically autonomous, a number of things faced challenges in practice. Some of the key obstacles include:

- the scope of administrative discretion exercised by akims (governors) or local administrators;

- apathy of the general citizenry in participating to governance processes in the various levels;

- dependence of local administrations on the federal budget.

The concentration of power in the authorities, albeit under the arguments of competence in exercising autonomy at different territorial levels, leads to a wide range of constituents, hence a wide representation at the apex of the state as prescribed by Article 89 of the Constitution of the Republic of Kazakhstan. The self-governing status of such levels of government, especially considering the multi-tiered model adopted by the Republic of Kazakhstan (Article 89 of the Constitution of the Republic of Kazakhstan 1995), leads to more interdependencies with the centre and other administrative formations (Tebayev, 2024, pp 228-229). Therefore, even such models lead to both horizontal & vertical relations with the status of self-governing bodies available to them. Nor do these constitutions create both vertical & horizontal relations at different levels. The constitution does not clearly identify representatives of local self-governance in the political institutions of the country which creates ambiguity in representation of the lower levels and hence creates a stronger constitution at the national level.

In Kazakhstan, one of the regulatory acts which govern the functions of organizations of local self-governing bodies is the Law on Local Public Administration and Self-Government in the Republic of Kazakhstan (2001, with updates). The law of the Republic of Kazakhstan (2001) establishes the principles of territorial division, structure, procedures for establishment and sphere of activities of local authorities. This law sets out the relations, responsibilities, functions or powers of the state self-governing institutions and the municipal self-governing institutions. On the other hand, there has been criticism regarding the administrative and financial autonomy of LSG. In particular, local governments are often dependent on the central government's allocation of resources which makes it difficult for them to be able to effectively solve local issues. Moreover,

the regulation is rather silent on how accountability and transparency to local areas should be achieved and maintained.

Within the framework of a new strategy aimed at providing citizens with self-governing capacity, between 2018 and 2025 Kazakhstan has been implementing a new Concept of Local Self-Governance Development (UNDP, 2022). One of the main objectives of the document is to facilitate the relationship between civil society and government bodies building and adjusting institution of LSG as well as shifting more powers to make decisions to the local authorities. The principle means that qualitative issues of strengthening local communities and decentralization require resolving. Special emphasis is placed on the financial independence and the engagement of the citizens with the public institutions. Nevertheless, the implementation of the principle has some challenges because there are procedural ambiguities regarding how those ends will be achieved particularly with regard to the financial aspects decentralization and enhancement of the human resources of LSG institutions

The Law on Self-Government at the Level of Rural Districts (2018) purposes strengthening the decision-making power of rural authorities through the organization and regulation of governance at the rural district level (Adilet.zan.kz, 2018). The objective envisaged by the law is strengthening the village population's interest in political processes. It is a first step towards enabling rural areas to be more self-sufficient in terms of finance and ensure that local taxes can be raised. But the challenge of poor tax collections and low transfers from the central government is still there. Also, the pace of development of rural districts is not even and this leads to the outcome of reforms being different in character and scope in different regions of the country.

Despite of such great advances in recent years, a number of perspectives must be entrenched in order to develop local self-government in Kazakhstan. However, such measures cannot ensure local governments' financial independence because they are overstretched with dependence on the allocations from the Republican budget. Low levels of public participation in local governance at the local level especially in rural areas remain a challenge.

Kazakhstan, in its effort to resolve these issues, is rapidly applying digital technologies in the activities of the local government. With the introduction of electronic interaction between citizens and the local self-government entities, the Digital Kazakhstan Program (2017-2022) aims at enhancement of the public services through digital means (UNDP, 2022). The benefits brought about by Digital Kazakhstan aim to improve the ease and availability of services rendered by the local self-government organizations (Akhmetov, 2023). Within the framework of the program, the improvement of the e-Government system and creation of means of filing online complaints and submitting recommendations has been planned. Absorption of internet technology is uneven, particularly in rural areas where the absence of internet connectivity would hampers the reform process.

The rural development in Kazakhstan is the priority focus under the Aul-Yel Besigi Program (2019) which is part of the activities of the local self-governance bodies (UNDP, 2022). The program's scope of activities aims to improve the infrastructure and livelihood of rural settlements. It comprises tasks seeking improvement in healthcare and education, access to clean water and road networks. Scarcity of local self-governance organizations' participation in decision making concerning new resources' distribution and new resources' availability raise one of the issues of the program's implementation. The transparency in the use of funds at the local municipal level constitutes more challenges

Even though a significant amount of the literature addresses topics related to the concept and development of local self-government, focusing on target indicators and implementation issues like budget allocation, citizen readiness to participate in LSG, fair elections, and corruption, Kazakhstan has not developed a unified system for evaluating the effectiveness of local self-government. This would include measurable indicators that allow for performance comparisons across different programs and geographical areas. Issues like:

- Inadequate evaluation standards arise when there is no system in place for surveying residents or evaluating performance in development documents. Precise measures to evaluate LSG actions are not sufficiently defined in the existing regulation documents. As a result, monitoring their job is difficult and unpredictable.

- Not enough information is available. Particularly in rural and isolated places, the nation does not routinely gather data on LSG activities. Progress analysis is made more difficult by the lack of accurate and current data.

- Unfair digitalization. Evaluating the efficacy of LSG in rural areas is made even more challenging by the uneven application of electronic administration and monitoring systems, such as e-Government.

The absence of a thorough assessment of the efficacy of local self-government in Kazakhstan has the following detrimental effects:

- Insufficient transparency. The people cannot impartially assess the effectiveness of their local governments in the absence of defined standards and oversight protocols. This undermines public participation and undermines confidence in LSG.

- There aren't many chances for development. In the absence of data collection and analysis, local authorities are unable to clearly identify areas that need improvement, which leads to reactive rather than proactive reforms.

- Ineffective use of available resources. Instead of decisions based on factual information about the needs and priorities of various regions, the absence of evaluation leads to subjective standards for resource allocation.

For instance, there are no reports on the monitoring of local self-government; the only thing that is examined is the caliber of public services rendered by local executive bodies. The questions in Table 1 below only address paper and electronic public services, which is only partially useful for assessing the efficacy of LSG.

This problem is addressed by the Local Governance Performance Index (LGPI), which is used in many nations to evaluate how well local governments perform on a number of important criteria, including resource management, accountability and transparency, the caliber of service delivery, and citizen participation in decision-making. A system like that would enhance local governance and encourage Kazakhstan's decentralization to grow.

Table 1 – Example of Survey Questions for Rating Public Services Provided by Local Executive Bodies, 2023

Name of Public Service	Overall Score		Authorized State Body		«Electronic Government»		«Government for Citizens»	
Giving social aid to certain groups of persons who are in need in accordance with local government decisions	4.90	84.1%	4.93	91.7%	4.92	91.7%	4.90	71.1%
Archival certificates, copies of records, or archive extracts are issued.	4.80	77.9%	4.83	82.2%	4.74	70.9%	4.84	85.4%
Referrals to healthcare facilities offering specialized medical-social support	4.62	77.5%	4.65	80.7%	4.94	94.5%	4.80	66.7%
Determination of land plot delineation and delinquency	4.48	57.8%	4.57	72.7%			4.66	59.7%
Issuance of documentation for student transfers between secondary education educational institutions	4.47	59.6%	4.80	75.3%	4.34	49.9%		65.3%
Permits for development projects, including destruction, at sites that receive subsidies	4.38	66%	4.80	82.4%	4.32	60.5%		72.5%
Subsidizing agricultural loan interest rates and leasing for animals, equipment, etc.	4.11	53.1%	4.44	64.8%	4.10	51.4%		58.7%
Overall Average	**4.54**	**68.0%**	**4.72**	**78.5%**	**4.56**	**69.8%**	**4.80**	**73.8%**

Note – compiled by the authors based on the source (National Bank of Kazakhstan, 2021).

The Local Governance Performance Index (LGPI) consists of three theme blocks that combine a total of 100 evaluation criteria (Callahan, 2006).

Block 1: Active Public Information Disclosure – focusses on guaranteeing transparency and the active sharing of information by local government entities and has 52 criteria arranged into 11 sub-blocks.

Block 2: Electronic Governance consists of 29 criteria divided into 4 sub-blocks. With an emphasis on the usage and usefulness of digital tools and platforms to enhance administrative effectiveness and service delivery.

Block 3: Accountability and Participation of Citizens are divided into 2 sub-blocks and has 19 criteria that address the mechanisms that ensure the accountability of local government and promote public involvement in governance.

The LGPI framework (figure 1) utilizes a structured methodology that assigns scores to various public service domains–including education, healthcare, social assistance, public transport, and housing–based on the degree of responsibility assumed by LGOs. By focusing on four key aspects, the index provides valuable insights into the effectiveness of decentralization efforts (Khemani et al., 2005):

1. Quality of Service Delivery: Evaluates the accessibility, reliability, and adequacy of services such as education, healthcare, and infrastructure.

2. Accountability and Transparency: Assesses how well LGOs communicate with citizens and operate openly in their decision-making processes.

3. Public Involvement: Measures the extent to which local communities are engaged in governance, particularly in decision-making and policy implementation.

4. Resource Management: Examines the efficiency and fairness of resource allocation and the financial autonomy of local governments.

Fields	Services	Codes
Education (0-3)	Pre-school (age 1-6)	For each of the services: +0.5 point if local government assumes full responsibility for infra-structure and/or the delivery of services + 0.5 point if local government assumes full responsibility for personnel, including staffing and salaries
	Primary school (age 6-15)	
	Secondary school (age 15-18)	
Social assistance (0-3)	Economic assistance (distress relief)	For each of the services: +0.5 point if local government assumes full for the organisation and/or delivery of services +0.5 point if local government assumes full responsibility for personnel, including staffing and salaries
	Work training/rehabilitation	
	Integration of refugees	
Health (0-3)	Primary health	For each of the services: +0.5 point if local government assumes full responsibility for infra-structure and/or the delivery of services +0.5 point if local government assumes full responsibility for personnel, including staffing and salaries
	Hospitals	
	Dental services	
Land use (0-2)	Building permits	+ 1 point if local government assumes full responsibility for administering building permits + 1 point if local government assumes full responsibility for administering zoning
	Zoning	
Public transport (0-1)	Bus transport services	+ 0.5 point if local government assumes full responsibility for bus transport services + 0.5 point if local government assumes full responsibility for railway transport services
	Railway transport services	
Housing (0-1)	Housing and town development	+ 0.5 point if local government assumes full responsibility for housing and town development + 0.5 point if local government assumes full responsibility for social housing
	Social housing	
Police (0-1)	Public Order	+ 0.5 point if local government assumes full responsibility for public order + 0.5 point if local government assumes full responsibility for traffic police
	Traffic police	
Caring functions (0-3)	General caring services	For each of the services: +0.5 point if local government assumes full responsibility for infra-structure and/or the availability of the service +0.5 point if local government assumes full responsibility for personnel, including staffing and salaries
	Services for special groups	
	Child protection	

Figure 1 – Questions and blocks of LGPI
Note – compiled by the authors based on the source (World Bank, 2016)

This framework allows for the systematic identification of gaps and challenges in governance while providing a comparative assessment across different regions and services. Figure 1 illustrates the core components of LGPI, offering a detailed breakdown of services and scoring criteria for evaluating LGO responsibilities.

The purpose of this study is to use the LGPI methodology to explore the benefits and limitations of Kazakhstan's local government activities. By doing so, the research aims to highlight areas of success and identify persistent challenges in the country's efforts to strengthen decentralization and local self-governance.

Incorporating the Local Governance Performance Index (LGPI) into Kazakhstan's local self-government (LSG) performance rating system presents an opportunity to enhance the evaluation of

governance effectiveness. By adopting this index, Kazakhstan could address existing gaps in its current evaluation methods, which primarily focus on service satisfaction without sector-specific or governance-oriented indicators.

As illustrated in Table 2, the LGPI offers a more comprehensive and detailed assessment compared to Kazakhstan's existing methods. It incorporates metrics for planning, personnel management, and financial reporting, areas that are currently underdeveloped in Kazakhstan's governance evaluation processes. Furthermore, the LGPI emphasizes citizen engagement and sector-specific social services like healthcare, education, and housing, which are critical for assessing the effectiveness of local governance structures.

Let's now determine how much it would cost to incorporate the LGPI index into the local self-government's (LSG) performance rating system. Data from previous sociological survey projects in Kazakhstan can be used to calculate the cost of developing the Local Government Performance Index (LGPI). A number of variables affect how much it costs to manage the Local Government Performance Index (LGPI).

Table 2 – Comparison of LGPI and Kazakhstan indicators

Criteria/indicators	LGPI	Kazakhstan's method
Government (Local legislation, transparency, participation)	+ All-inclusive metrics for citizen participation and governance	- Limited emphasis on involvement and transparency, primarily on service satisfaction
Administration (Planning, revenue, resource allocation, accountability, personnel managements)	+ Detailed indicators for planning revenues, financial reporting, personnel management	- Lack of specific indicators for financial reporting, personnel management or planning
Social services (Healthcare, education, housing, security)	+ Extensive coverage of healthcare, education, housing, and disaster management	- Focus mainly on service satisfaction without sector-specific indicators
Note – compiled by the authors based on the sources (World Bank, 2016); (National Bank of Kazakhstan, 2021)		

One important factor to take into account is whether LGPI modules will be developed separately or integrated into already-existing survey systems. Integrating into current surveys is less costly, but this strategy requires careful thought. For the LGPI to be effective, it must be used on a sample that fairly represents the local level. If the modules are introduced to surveys that are just meant for the national level, it won't be very beneficial.

The second important factor is the sample size. The number of levels of local self-government, the average size of local self-government in the nation's local governance system, and the overall number of settlements and responses in each settlement all have an effect. Local samples of at least 500 people are ideal for surveys, although even 200 people might be useful. The drawbacks of using smaller samples include decreased statistical significance and a restricted capacity to examine local differences among demographic categories. The number of settlements included in the sample is also influenced by the size of the country.

Table 3 – Cost Calculation for Implementing the LGPI Index in Kazakhstan.

Main Cost Components	Calculation
Number of settlements	Approximately 247 settlements are dispersed over 14 regions in Kazakhstan, comprising 160 rural and 87 urban districts.
Survey costs	In Kazakhstan, it usually costs $5 to $8 per respondent to conduct a survey that combines online and in-person approaches. When logistics and data processing are taken into consideration, this is the average cost in Kazakhstan. – A total of 123,500 respondents (500 respondents × 247 settlements) will be surveyed, with 500 respondents each settlement. – At an average cost of $7 per respondent, the survey will cost 864,500 USD (123,500 respondents x 7 USD/respondent).

Continuation of the table

Main Cost Components	Calculation
Additional costs	– Questionnaire and platform development: The survey's design, digital platform setup, and translation will cost roughly $50,000. – Logistics and training: Field personnel travel and training will cost about $100,000. – To ensure data correctness, around $75,000 will be spent on data quality monitoring and validation. – Publication and dissemination of the reports: The final reports will be produced and distributed at a cost of about $50,000.
Note – compiled by the authors based on sources (TGM Research, 2021); (World Bank, 2021).	

The total cost:

864,500 USD (data collection) +50,000 USD (development) + 100,000 USD (logistics) + 75,000 USD (validation) + 50,000 USD (reports) ≈ 1,139,500 USD

It is estimated that the deployment of the LGPI will cost around $1.14 million USD, with 500 responders in each of Kazakhstan's 247 municipalities.

The LGPI facilitates the gathering of data on the efficacy of local self-government (LSG) and offers a thorough picture of the state of local governance through statistical data and citizen questionnaires (Ivanyna et al., 2014). In order to increase the efficacy of decentralization and governance, this measure is frequently employed in international practice.

The successful implementation of the Local Governance Performance Index (LGPI) requires a structured, phased approach to address logistical, financial, and infrastructural challenges (Mdee et al., 2022). The roadmap demonstrated in figure 2 outlines the key stages of the implementation process, including preparation, rollout, scaling, and monitoring. Each phase is designed to ensure the systematic integration of LGPI into Kazakhstan's local governance framework, leveraging existing resources while addressing potential barriers.

Phase 1: Preparation (6–12 months)

This phase focuses on laying the groundwork for LGPI implementation. Key activities include securing funding from international organizations and national budgets, conducting pilot studies to test the feasibility of LGPI in select regions, and engaging stakeholders through capacity-building initiatives and awareness campaigns. This stage is crucial for identifying potential challenges and building the institutional and public support necessary for the project's success.

Phase 2: Rollout (12–18 months)

The rollout phase involves the official introduction of LGPI in regions with strong digital infrastructure and governance capacity. This ensures that early adopters can serve as models for best practices, demonstrating the benefits of LGPI. Efforts during this phase will also focus on refining survey tools, training local officials, and establishing data collection and validation processes.

Phase 3: Scaling (18–36 months)

Following the success of the initial rollout, this phase aims to expand LGPI implementation nationwide. Processes and lessons learned during the pilot and rollout phases will be analyzed and used to refine the framework. The scaling phase includes addressing infrastructure gaps, particularly in rural areas, and ensuring consistent application of LGPI standards across all regions.

Phase 4: Monitoring (Ongoing)

Monitoring and evaluation form the final and ongoing phase of the roadmap. This involves establishing mechanisms for periodic performance evaluations, publishing reports to maintain transparency, and making continuous adjustments to the LGPI framework based on stakeholder feedback and evolving governance needs. This phase ensures the sustainability and long-term impact of LGPI.

The implementation of LGPI is expected to produce transformative changes in Kazakhstan's local governance system, addressing long-standing challenges related to transparency, participation, service quality, and autonomy. These outcomes are aligned with the broader goals of decentralization and governance modernization in the country.

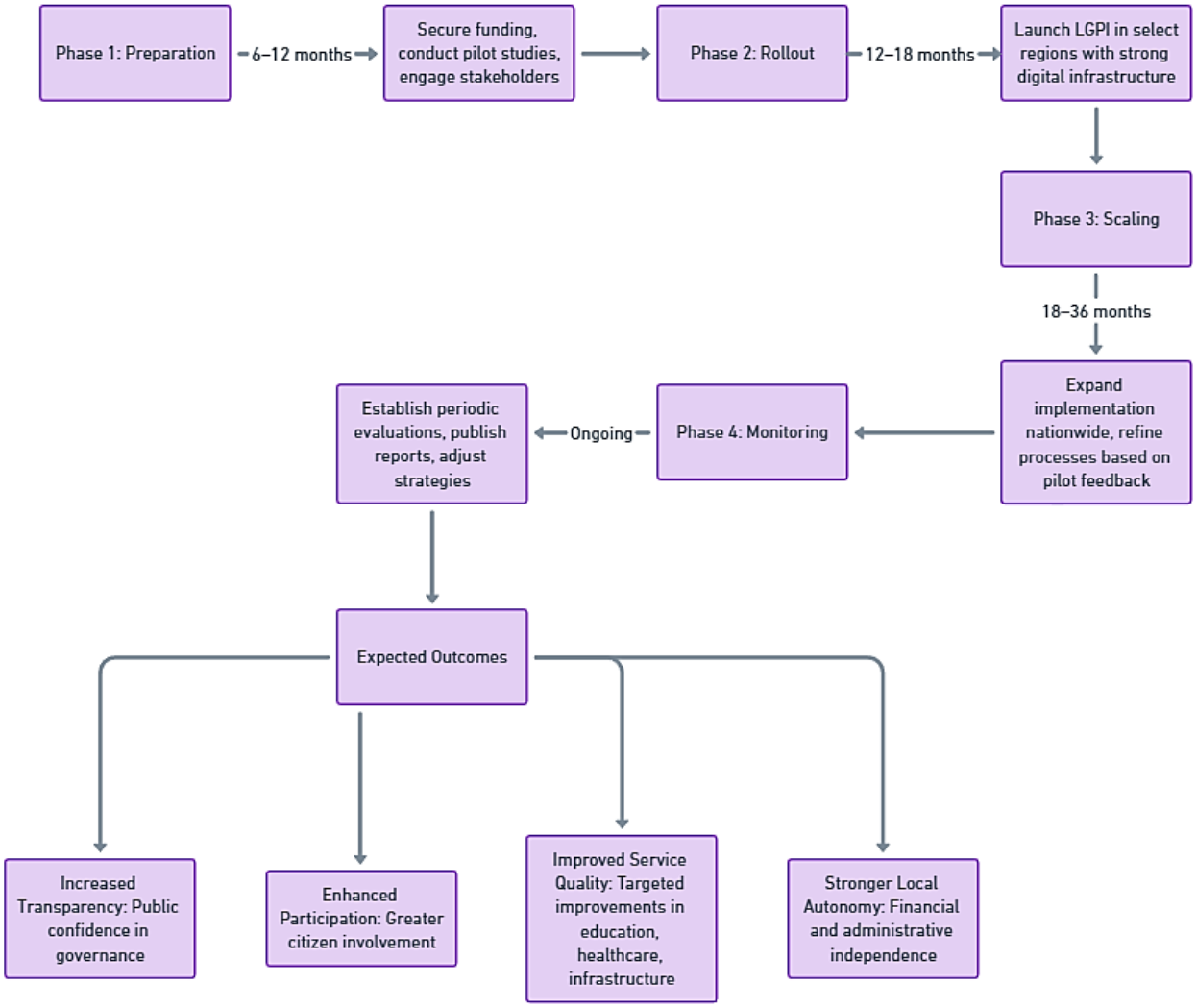

Figure 2 – LGPI adaptation model for Kazakhstan
Note – complied by the author

Explanation

1. Increased Transparency

- By providing measurable and accessible metrics, LGPI will enhance public confidence in local governance. Citizens will have greater insight into how decisions are made and resources are allocated, fostering trust and accountability.

2. Enhanced Participation

- LGPI's framework encourages greater citizen involvement in decision-making processes. By integrating public feedback mechanisms, it empowers individuals to actively contribute to governance, ensuring that local policies reflect the needs and priorities of communities.

3. Improved Service Quality

- The index's focus on performance evaluation will highlight areas for improvement in critical sectors such as education, healthcare, and infrastructure. This targeted approach ensures that resources are allocated effectively, leading to tangible improvements in service delivery.

4. Stronger Local Autonomy

- By identifying and addressing financial and administrative gaps, LGPI will contribute to increasing the independence of local governments. This will enable local authorities to respond more effectively to regional challenges, fostering sustainable development.

These outcomes collectively support the broader goals of decentralization, enhancing the overall effectiveness and responsiveness of local governance in Kazakhstan.

The implementation of the Local Governance Performance Index (LGPI) in Kazakhstan presents

significant opportunities to enhance transparency, citizen participation, and local government efficiency. However, the process is not without challenges. Potential risks must be identified and proactively managed to ensure the initiative's success. These risks can be broadly categorized into **implementation risks** (table 4) and **operational risks (table 5),** each with varying degrees of impact and likelihood. Addressing these risks is essential to establish a robust and sustainable LGPI framework.

Table 4 – Implementation Risks

Risk	Description	Impact	Likelihood
Financial Burden	High costs of deployment may strain local budgets.	High	Moderate
Resistance from Officials	Perceived punitive nature of evaluations could hinder cooperation.	Medium	High
Digital Divide	Limited access to digital tools in rural areas may restrict participation.	High	High
Data Bias	Challenges in reaching marginalized groups could skew results.	Medium	Moderate
Public Distrust	Transparency initiatives might be seen as superficial without tangible benefits.	Medium	High
Note – complied by the author			

Key challenges include the financial burden of deployment, particularly for resource-constrained local governments, and the digital divide, which risks excluding rural and marginalized communities from full participation. Furthermore, resistance from officials and public distrust may hinder the adoption and perceived legitimacy of the LGPI. Addressing these risks requires comprehensive strategies, including targeted funding support, equitable digital infrastructure development, and fostering a culture of accountability through capacity-building initiatives.

Table 5 highlights key operational risks, focusing on capacity gaps, political resistance, and sustainability concerns. These risks emphasize the need for comprehensive planning and resource allocation to ensure that the LGPI delivers consistent and meaningful results.

Capacity gaps in training and resource availability across regions, particularly between urban and rural areas, may create disparities in implementation quality. Similarly, the lack of continuity in funding and support could result in the LGPI being treated as a short-term initiative rather than an ongoing system for governance evaluation. Lastly, political challenges, such as resistance from centralized authorities, could undermine decentralization efforts, reducing the potential impact of the LGPI.

Table 5 – Operational Risks

Risk	Description	Impact	Likelihood
Capacity Gaps	Inconsistent training and resources across regions may affect outcomes.	High	High
Lack of Continuity	Risk of LGPI becoming a one-off initiative without sustained funding.	High	Moderate
Political Challenges	Resistance to decentralization from centralized authorities.	Medium	High
Note – complied by the author			

The operational risks identified in Table 5 underscore the complexity of implementing the LGPI in Kazakhstan. Capacity gaps highlight the critical need for consistent training programs and equitable distribution of resources to avoid regional disparities in governance evaluation. Addressing the risk of discontinuity requires sustained funding and institutional commitment to ensure the LGPI becomes an integral part of Kazakhstan's governance framework, rather than a one-time effort.

Moreover, overcoming political resistance to decentralization is essential for empowering local governments to adopt and utilize the LGPI effectively (Nasir, 2017). By addressing these operational risks through strategic planning, stakeholder engagement, and robust resource allocation, Kazakhstan can har-

ness the full potential of the LGPI to improve transparency, accountability, and service delivery across its local self-governance systems.

The successful implementation of the Local Governance Performance Index (LGPI) in Kazakhstan requires addressing a range of challenges, including financial sustainability, stakeholder engagement, digital accessibility, data integrity, and political commitment. These elements are critical to ensuring that the LGPI not only enhances transparency and accountability but also becomes a sustainable and integral part of Kazakhstan's governance reform agenda.

This section explores strategies to address these challenges, including leveraging international funding, integrating LGPI into existing evaluation systems, bridging digital gaps in rural areas, and fostering public and political support. By adopting a comprehensive approach, Kazakhstan can maximize the impact of LGPI and strengthen local governance across the country.

1. Financial Sustainability

To overcome financial challenges in implementing the LGPI, international funding from organizations like the World Bank and UNDP can support initial phases, offering both financial and technical assistance. Additionally, integrating LGPI into existing national evaluation systems will minimize costs by leveraging current infrastructure and processes, ensuring greater cost efficiency.

2. Stakeholder Engagement

Engaging key stakeholders is vital for LGPI's success. Capacity-building programs for local government officials will equip them with the skills needed for smooth implementation, while public awareness campaigns will inform citizens about LGPI's benefits, fostering support and participation.

3. Bridging the Digital Divide

Addressing digital disparities, especially in rural areas, is critical. Pilot programs in regions with better infrastructure can identify challenges before broader rollout, while mobile-based tools will ensure inclusivity for areas with limited connectivity.

4. Ensuring Data Integrity

Reliable data is essential for LGPI's effectiveness. A mixed-methods approach, combining surveys with interviews, will enhance data quality. Independent oversight committees should also monitor data collection and validation to ensure transparency and public confidence.

5. Sustaining Political Will

The long-term success of LGPI depends on integrating it into national governance reform agendas to secure continued support. Highlighting success stories from early implementations will demonstrate tangible benefits, encouraging wider adoption and sustained political commitment (Robinson, 2007).

By adopting these strategies, Kazakhstan can effectively address risks and ensure the successful implementation and sustainability of the LGPI.

Conclusion

The primary goals of this study were to examine Kazakhstan's current local self-government (LSG) situation and evaluate how the Local Government Performance Index (LGPI) may enhance the accountability, efficacy, and transparency of LGBs. The study used both qualitative and quantitative techniques, such as structured interviews, legal framework analysis, and comparative analysis with international instances, to achieve this.

The results showed a number of important points. First of all, in Kazakhstan, local government money continues to be a significant source of assistance despite continuous improvements. This makes it more difficult for local governments to deal with issues locally. The persistent underutilization of citizen participation strategies also contributes to low levels of public involvement in decision-making processes. These obstacles prevent LSG from making a substantial contribution to regional sustainability.

According to the report, adopting LGPI could aid in resolving these issues by giving local authorities access to transparent performance metrics. By connecting performance to quantifiable metrics, the index may promote accountability, increase openness by making LSG operations open to public scrutiny, and increase citizen participation by incorporating feedback mechanisms into governance procedures.

The study's findings lend credence to the idea that LGPI might significantly improve local self-government in Kazakhstan. The LGPI framework is a useful tool for assessing and improving LGB performance since it emphasizes important elements including service quality, financial autonomy, and public participation.

Opportunities and Prospects for Implementation: The results of the study show that Kazakhstan's ongoing local government reforms must prioritize the LGPI's implementation. The index acts as a standard for policy changes and offers a useful means of identifying areas that need improvement. Adoption of LGPI may also increase public confidence in local government, fostering an atmosphere of open and inclusive governance.

Future studies might concentrate on improving the LGPI framework to better represent the requirements of Kazakhstani local authorities. More research should be done on how digital platforms and technology could help with LGPI implementation, especially in rural areas where access to digital infrastructure might be restricted.

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Information about authors:

Assanova Arailym – PhD student, Al-Farabi Kazakh National university (Almaty c., Kazakhstan, e-mail: arailymassanova@gmail.com);

Ashirbekova Laura – c.e.s., associate professor, Al-Farabi Kazakh National university (Almaty c., Kazakhstan, e-mail: turar200480@mail.ru);

Sansyzbaeva Galiya – Doctor of Economics, Professor, Al-Farabi Kazakh National University (Almaty c., Kazakhstan, e-mail: gns1981@mail.ru);

Korpysa Jaroslaw – PhD, associate professor, University of Szczecin (Szczecin c., Poland, e-mail: jaro-slaw.korpysa@usz.edu.pl)

Авторлар туралы мәлімет:

Асанова Арайлым Данаевна – PhD докторант, әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, e-mail: arailymassanova@gmail.com);

Аширбекова Лаура Жалгасовна – э.г.к., қауымдастырылған профессор, әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, e-mail: turar200480@mail.ru);

Сансызбаева Галия Нурымовна – э.г.д., профессор, әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, e-mail: gns1981@mail.ru);

Корпыса Ярослав – PhD, қауымдастырылған профессор, Щецин университеті (Щецин қ., Польша, e-mail: jaro-slaw.korpysa@usz.edu.pl);

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G.K. Abdigul [1], A.M. Balkibayeva [2*], G.A. Assanova [3], D.M. Iskakova [4]

[1] S. Seifullin Kazakh Agro Technical Research University, Astana, Kazakhstan
[2] Academy of Physical Education and Mass Sports, Astana, Kazakhstan
[3] Auyl Party Republican Public Association, Astana, Kazakhstan
[4] Scientific and Production Enterprise "Innovator" LLP, Astana, Kazakhstan
*e-mail: ambal1974@mail.ru

MODERN TRENDS IN KAZAKHSTAN AGRICULTURE IN THE CONTEXT OF INTEGRATION TO THE WORLD ECONOMY

The threats of financial crisis, social tension, political instability, as well as the danger of a humanitarian catastrophe are common to the entire world community, but they have a particularly strong impact on developing countries. The purpose of the article is to research current agriculture development trends in Kazakhstan in the context of the integration of the world economy and the development of guidelines for improving the state of the sector. The following general scientific methods were used in the research: the methods of analysis, synthesis and formalization; graphical methods, methods of statistical analysis, method of comparisons, analysis of dynamics and structure; method of causal and logical relationships and dependencies; SWOT analysis and minimax analysis. As a result of the research, a retrospective of the agricultural industry in Kazakhstan was considered, the climatic and geographical conditions in which it develops, as well as the degree and directions of state support were determined. The current world trends in the agricultural sector were studied and the directions of their development in Kazakhstan were determined. The research is aimed at improving the efficiency, environmental friendliness and productivity of agricultural enterprises in Kazakhstan based on a study of the initial conditions, the current state and global trends in the development of the sector.

Key words: agro-industrial sector; SWOT analysis; Kazakhstan; food marketing; sustainable development.

Г.Қ. Әбдіғұл[1], А.М. Балкибаева[2]*,
Г.А. Асанова[1], Д.М. Искакова[3]

[1] С. Сейфуллин ат. Қазақ агротехникалық зерттеу университеті, Астана, Қазақстан
[2] Дене шынықтыру және бұқаралық спорт Академиясы, Астана, Қазақстан
[3] ««Инноватор» ғылыми-өндірістік кәсіпорын» ЖШС, Астана, Қазақстан
*e-mail: ambal1974@mail.ru

Әлемдік экономикаға интеграция контексіндегі қазақстандық ауыл шаруашылығының заманауи үрдістері

Қаржылық дағдарыс, әлеуметтік шиеленіс, саяси тұрақсыздық, сондай-ақ гуманитарлық апат қаупі бүкіл әлемдік қоғамдастыққа ортақ, бірақ олар дамушы елдерге ерекше әсер етеді. Мақаланың мақсаты әлемдік экономиканың интеграциясы контексінде Қазақстандағы ауыл шаруашылығының ағымдағы даму тенденцияларын зерттеу және саланың жай-күйін жақсарту бойынша ұсынымдар әзірлеу болып табылады. Зерттеуде келесі жалпы ғылыми әдістер қолданылды: талдау, синтез және формализация әдістері; графикалық әдістер, статистикалық талдау әдістері, салыстыру әдісі, динамика мен құрылымды талдау; себеп-салдарлық және логикалық байланыстар мен тәуелділіктер әдісі; SWOT талдау және минимакс талдау. Зерттеу нәтижесінде Қазақстанның ауыл шаруашылығы саласының ретроспективасы қаралды, ол дамитын климаттық және географиялық жағдайлар, сондай-ақ мемлекеттік қолдаудың дәрежесі мен бағыттары анықталды. Аграрлық сектордағы ағымдағы әлемдік үрдістер зерделеніп, олардың Қазақстандағы Даму бағыттары айқындалды. Зерттеу саланың бастапқы жағдайларын, ағымдағы жай-күйін және жаһандық даму үрдістерін зерделеу негізінде Қазақстанның ауыл шаруашылығы кәсіпорындарының тиімділігін, экологиялылығы мен өнімділігін арттыруға бағытталған.

Түйін сөздер: агроөнеркәсіптік сектор; SWOT-талдау; Қазақстан; ауыл шаруашылық маркетинг; ауыл шаруашылығы.

Г.К. Абдигул[1], А.М. Балкибаева[2]*,
Г.А. Асанова[1], Д.М. Искакова[3]
[1] Казахский агротехнический университет имени Сакена Сейфуллина, Астана, Казахстан
[2] Академия физической культуры и массового спорта, Астана, Казахстан
[3] ТОО НПО Инноватор, Астана, Казахстан
*e-mail: ambal1974@mail.ru

Современные тенденции казахстанского сельского хозяйства в контексте интеграции в мировую экономику

Угрозы финансового кризиса, социальной напряженности, политической нестабильности, а также опасность гуманитарной катастрофы являются общими для всего мирового сообщества, но особенно сильное воздействие они оказывают на развивающиеся страны. Целью статьи является исследование текущих тенденций развития сельского хозяйства в Казахстане в контексте интеграции мировой экономики и разработка рекомендаций по улучшению состояния отрасли. В исследовании использовались следующие общенаучные методы: методы анализа, синтеза и формализации; графические методы, методы статистического анализа, метод сравнений, анализ динамики и структуры; метод причинно-следственных и логических связей и зависимостей; SWOT-анализ и минимаксный анализ. В результате проведенного исследования была рассмотрена ретроспектива сельскохозяйственной отрасли Казахстана, определены климатические и географические условия, в которых она развивается, а также степень и направления государственной поддержки. Были изучены текущие мировые тенденции в аграрном секторе и определены направления их развития в Казахстане. Исследование направлено на повышение эффективности, экологичности и продуктивности сельскохозяйственных предприятий Казахстана на основе изучения исходных условий, текущего состояния и глобальных тенденций развития отрасли.

Ключевые слова: агропромышленный сектор; SWOT-анализ; Казахстан; сельскохозяйственный маркетинг; сельское хозяйство.

Introduction

Despite being a crucial economic engine for many developing nations, Kazakhstan's agricultural sector seems to be underperforming. The latest data on the agricultural sector indicators showed the lowest GDP of 5.7% since Independence For example, GDP of Kyrgyzstan was 14.7%, 12.3% in Armenia, 11% in Moldova, 10.8% in Ukraine and 7.7% in Azerbaijan (Among the CIS countries, the indicators of Kazakhstan in terms of the weight of the agricultural sector in GDP are the weakest, 2022).

The purpose of this article is a comprehensive study of modern trends in the development of agriculture of Kazakhstan in the context of the integration of the world economy and the designing the recommendations for improving the condition of business entities employed in the sector. Accordingly, the object of the research is the agricultural sector of Kazakhstan. By delving deeper into these aspects and drawing insights from neighboring countries, Kazakhstan can unlock the true potential of its agricultural sector, propelling its economy to new heights. The methods of analysis, synthesis and formalization graphical methods, statistical analysis methods, methods of comparison, analysis of dynamics; the method of causal and logical relationships and dependencies; SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis and minimax analysis were used. The hypothesis to justify this paper was the agriculture does not advance, with no sufficient innovative technology.

Literature review

Many Kazakh and international scholars addressed the development, state and prospects of the country's agriculture, including: M. Tulegenova and N. Mejirbek (2020), D. Shejkin (2018), Y. Akhmedyarov (2019), G.R. Baytaeva and S. Dyrka (2019), A.A. Kornilova, S.E. Mamedov, Y.M. Khorovetskaya, G.A. Karabayev, T.A. Kiseleva (2018), G. Lukhmanova, K. Baisholanova, N. Shiganbayeva, B. Abenov, A. Sambetbayeva, B.S. Gussenov (2019), M. Petrick, D. Raitzer, S. Burkitbayeva (2018), J. Rustamov, C. Kirchner, J. Katto-Andrighetto (2020), A. Tokbergenova, L. Kiyassova, S. Kairova (2018), M. Uspambayeva, A. Zeinelgabdin, B. Turebekova, A. Rakayeva, A. Tulaganov, T. Taipov (2020) and others. However, the analysis of the researchers' papers allows noting the lack of an integrated approach to the existing problem. Such an approach should include an analysis of the retrospective, climatic and geographical conditions, the availability and volume of state support, statistical data for the latest period and in dynamics, a characterization of strengths and weaknesses, opportunities and threats for the country's agro-indus-

trial sector, an analysis of current world trends in the sector (sustainable development, the trend towards an increase in the share of organic agriculture, the digitalization of all economy sectors) and the study of opportunities for their stimulation in Kazakhstan, as well as the elaboration of recommendations for improving the state of agriculture.

The formation of the modern agriculture sector in Kazakhstan began in the middle of the last century from the decision of Russia to expand virgin lands in Ukraine and Central Asia. State decisions regarding the development of the sector during this period showed a twofold effect: on the one hand, there was an increase in sown areas, and on the other hand, such a policy harmed livestock breeding, reducing pasture areas. This negative effect has persisted even now (Agriculture in Kazakhstan – climate, industry development, characteristics., 2022). The current state of the agricultural sector in Kazakhstan can be characterized by the following main trends:

- Economic woes: Low labor productivity, a meager GDP share, and limited access to optimal financing and taxation schemes hamper agricultural growth.
- Resource management: Inefficient land and water use restricts potential.
- Market deficiencies: Underdeveloped domestic and export markets hinder expansion.
- Knowledge gaps: Insufficient scientific advancements, poor technology transfer, and low agribusiness expertise hold back innovation.
- Infrastructure shortcomings: Outdated equipment and limited digital adoption further exacerbate the challenges.
- Public service hurdles: Inconsistent public services and inadequate digital integration add to the burden (Uspambayeva, 2020).

Given all the above trends and problems of the sector, agriculture in Kazakhstan has a high development potential. Despite some extreme climate conditions, such as dry summers, little snow and cold winters, scarce water resources, deserts and semi-deserts, which occupy about half of the country, unique conditions have formed on the territory of the country, conducive to growing a wide range of crops and raising livestock and poultry. This is facilitated by the presence of fertile soil, two seas and mountains, and the vast territory of the country determines the diversity of climatic zones and natural conditions (Agriculture in Kazakhstan – climate, industry development, characteristics, 2022). A distinctive feature of the modern development of the AIC is the fact that agrarian transformations are carried out primarily in the regions. The economic mechanism should be built in full accordance with the macroeconomic economic mechanism, but its elements can be supplemented and detailed depending on the territorial, demographic and socio-economic specifics of the region (Tulegenova, 2020). Based on the above, it can be assumed some stagnation in the agricultural sector of Kazakhstan, as well as underutilization of the available potential due to limited funding, insufficiently effective management, and external economic, political, social factors.

Methodology

The following general scientific methods were used in the research process: the methods of analysis, synthesis and formalization were used to analyze the retrospective, climatic and geographical conditions, the availability and effectiveness of state support; graphical methods, statistical analysis methods, methods of comparison, analysis of dynamics and structure were used for the analysis of current sector development trends; the method of causal and logical relationships and dependencies was used to determine the problems and prospects of the sector; SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis and minimax analysis was used to develop recommendations and choose the best strategy. The complex nature of the study implies the presence of several interdependent stages. The following sequence was performed.

The initial stage sets the stage for our analysis, examining Kazakhstan's current agricultural landscape through its historical, climatic, and geographic realities, along with the level of state support. This establishes the basic framework and key characteristics to guide further investigation.

At the second stage, an analysis of current trends in the development of the sector in Kazakhstan was carried out, numerical characteristics were given, a study of individual indicators in dynamics was carried out and their structure in recent periods was studied. At this stage, the dynamics of such important indicators as the gross output of livestock and crop production, the increase in acreage, the number of livestock and poultry, the production of the main types of livestock products, the structure of crop production and the yield of the main agricultural crops were studied. The supposed reasons for the direction of the main trends and the formation of the structure are given, and assumptions were made for their improvement and optimization. Data was collected from national statistic base and using Excel software processed to design graphs.

The third stage is represented by a SWOT analysis of agriculture in Kazakhstan, as a result of which strengths and weaknesses, opportunities and threats for the agro-industrial sector were identified, and an optimal strategy based on the results of the analysis was proposed. The analysis was made by assistance of experts in the field, local authorities responsible for decision making in agriculture and food. Questions were distributed by link to google form and 25 respondents participated. The optimal strategy is selected based on the minimax matrix, for which, first and foremost, it is necessary to determine whether strengths or weaknesses, opportunities or threats prevail according to the results of the SWOT analysis. The combination of results allows determining the best management strategy – min-min, max-min, min-max or max-max.

Following the completion of the three stages, their results were analyzed and compared with the studies of international scientists. This section of the paper contains an analysis of current sector trends in the world, which include sustainable development, a trend towards an increase in the share of organic agriculture, and digitalization of all economic sectors. These trends are the most relevant and effective in the practice of world agriculture according to the results of a study of literary sources. Thus, an attempt was made at this stage to find solutions to the existing problems identified because of the study, by stimulating the introduction of innovative international practices in the economy of Kazakhstan, as well as identifying prospects and barriers to the introduction of innovations. Based on the results of all stages of the research, recommendations are proposed to improve the state of the agro-industrial complex and the prospects for further development of the industry are outlined separately in the areas of sustainable development, organic agriculture and digitalization.

Results and discussion

Modern economic conditions, including in the agro-industrial sector, are characterized by threats of various origins. In the context of the integration of the world economy, the threats of financial crisis, social tension, political instability, as well as the danger of a humanitarian catastrophe are common to the entire world community, but they have a particularly strong impact on developing countries. This is due to economic instability, insufficient experience in crisis management, constant increase in environmental requirements, rapid development of technology, lack of funding and highly qualified specialists, etc. These and other problems affect all economy sectors, especially agriculture, the share of which in the gross domestic product of developing countries is usually quite high. According to the classification of the International Monetary Fund, Kazakhstan belongs to developing countries, which determines the high relevance of studying the agriculture development trends in the Republic in the context of increasingly accelerating integration of the world economy.

Consideration of the initial conditions for the formation and development of the agricultural sector in Kazakhstan

Rural settlements in Kazakhstan were historically the first population centers prior to the development of cities. They represented the best traditions of the local culture, being both material and spiritual reflections of the general evolutionary formation. In recent years, Kazakhstan has adopted a number of laws and regulations governing the development of agriculture and rural settlements (Baytaeva, 2019). Thus, the historical prerequisites for the formation of the agricultural sector in Kazakhstan have led to the fact that today a significant share of the sector is represented not by professional participants, but by households. This has both advantages and disadvantages: the advantages include the preservation of local traditions and unique culture, employment of the rural population, the supply of buyers with local products. However, the disadvantages of such management are worth mentioning: sometimes the quality of small-scale farmers' products does not meet established standards, and the possibilities for appropriate quality control are reduced. This necessitates state control of households with the appropriate support of such business entities. In addition, the current state of the agro-industrial sector of Kazakhstan was affected by the expansion of acreage in the middle of the last century, which led to an increase in the share of crop production, while reducing the share of animal husbandry due to a reduction in the area allocated for livestock pastures.

The climatic conditions, in which the country's agriculture develops, should be considered for individual regions, since the vast territory of the country has led to significant differences in their climatic and geographical conditions. The climate of Southern Kazakhstan is characterized by high temperatures, therefore, properly organized artificial irrigation is necessary to increase productivity in this region. This will increase the yield of tobacco, sugar beets, rice and cotton. The climate of the region is also quite favorable for growing grapes. Western Kazakhstan has large areas of pastures and meadows, which contributes to the develop-

ment of animal husbandry (camels, sheep, horses). Rye, millet and barley are also grown in the region. Northern Kazakhstan specializes in raising sheep, meat and dairy cattle and poultry, as well as growing cereals and cotton. The agriculture of East Kazakhstan is characterized to the great extent by non-irrigated agriculture, large areas are allocated for the cultivation of sunflower. Arable areas near rivers are sown with peas, oats, and vegetables. Animal husbandry is represented by the breeding of meat and dairy cattle (Agriculture in Kazakhstan – climate, industry development, and characteristics, 2022).

Kazakhstan's government program aims at increasing the productivity and recognizes the need to support small-scale farmers. However, government payments for private goods such as agricultural raw materials, machinery or livestock cause overconsumption of resources when their marginal return is less than their total economic costs for the society. This not only leads to losses in economic welfare, but also reduces competitiveness due to inefficient use of resources. To ensure faster agricultural growth, government transfers should be redirected to proven productivity investments. In addition, development approaches and the creation of an enabling environment for agricultural growth require significant attention (Petrick, 2018). The above conditions for the formation and development of the agricultural sector in Kazakhstan are prerequisites for further research and a deeper understanding of the causal relationships of the retrospective and the current state.

Modern trends in the development of the sector

The study of current trends in the development of the country's agricultural sector is based on data from the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. An important indicator of improving the efficiency of agriculture in Kazakhstan is the increase in gross output from the Republic's independence to the present day (Figure 1).

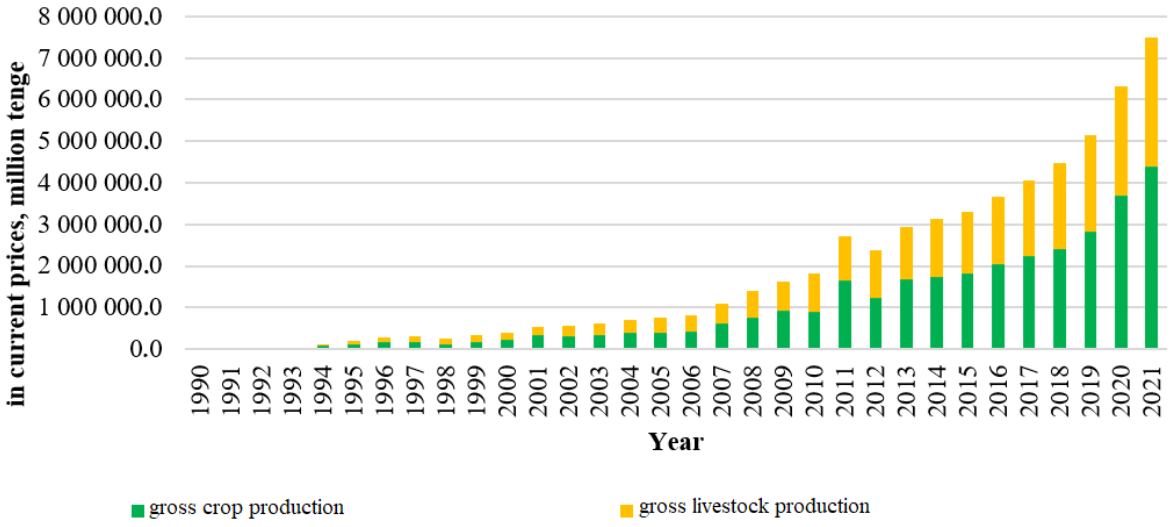

Figure 1 – Gross agricultural output in Kazakhstan
Note – compiled by the authors based on (Statistics of agriculture, forestry, hunting and fisheries, 2022).

As can be seen from Figure 1, Kazakhstan's gross agricultural output has shown significant growth since 1990. Higher growth rates and a share in the structure of agriculture in Kazakhstan are characteristic of crop production. Thus, government authorities should pay attention to the development of animal husbandry, the creation of additional areas for cattle grazing, high-quality feeding and care, appropriate conditions and wages for business entities engaged in animal husbandry. In addition, the increase in sown areas over the past fifteen years should be noted (Figure 2).

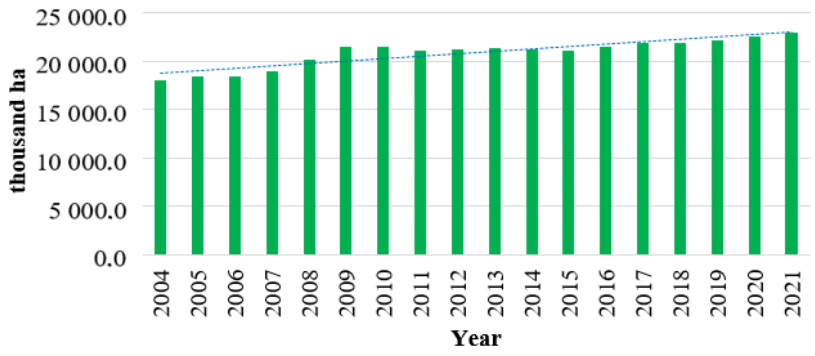

Figure 2 – Total adjusted sown area of agricultural crops
Note – compiled by the authors based on (Statistics of agriculture, forestry, hunting and fisheries, 2022).

Figure 2 indicates an increase in the area under crops, which contributes to the development of crop production and an increase in its gross output. This fact can be considered positive in the case when, due to the expansion of sown areas, the livestock grazing area is not reduced, so the state authorities need to pay attention to the balance or optimal ratio of areas for planting crops and livestock grazing. Data on the livestock production structure are presented in Figure 3.

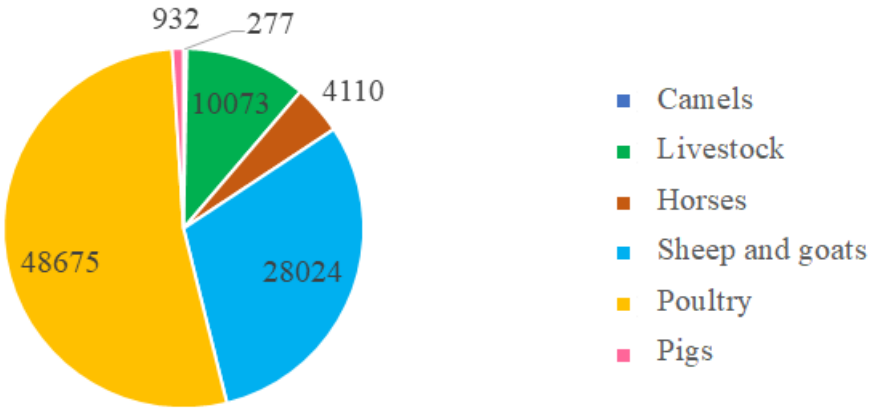

Figure 3 – Monthly number of livestock and poultry as of June 1, 2022, thousand animals
Note – compiled by the authors based on (Statistics of agriculture, forestry, hunting and fisheries, 2022).

As can be concluded from Figure 3, poultry prevails in the structure of the livestock and poultry numbers, sheep and goats are in second place, and cattle is third. This distribution is associated with the peculiarities of farming in Kazakhstan, cultural traditions, climate and other factors. The order that has developed naturally and is associated with the historical development of the sector should be actively supported and developed by state authorities, motivating and increasing the interest of the local population, providing priority areas with appropriate funding and innovations that optimize the management process. Table 1 contains information on the production of the main livestock products.

The production of the main types of livestock products can be increased through special attention to the development of this branch of agriculture, the use of undistributed lands to expand areas for cattle grazing, appropriate financing, improvement of living conditions, feeding, improvement of veterinary safety, qualification of specialists, etc. The structure of crop production is represented by the following types of products in appropriate proportions (Figure 4).

Table 1 – Production of main livestock products for May 2022

Types of livestock products	Quantity
Livestock and poultry slaughtered on the farm or sold for slaughter (live weight), thousand tons	147.179
Cow's milk, thousand tons	672.3853
Chicken eggs, million pieces	437.8175
Note – compiled by the authors based on (Statistics of agriculture, forestry, hunting and fisheries, 2022)	

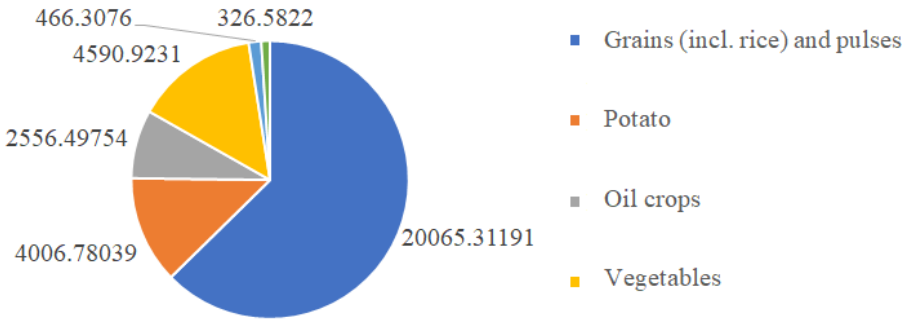

Figure 4 – Gross crop products harvest (thousand tons) in 2020
Note – compiled by the authors based on (Statistics of agriculture, forestry, hunting and fisheries, 2022).

As can be noted from Figure 4, grains, as well as vegetables and potatoes, are leading in the structure of gross crop production. Kazakhstan is the largest exporter of grains, which is the key to ensuring global food security. In addition to the gross harvest, crop yield is an important indicator of crop production (Figure 5).

As can be seen from Figure 5, the grain yield in Kazakhstan is quite low – it is several times inferior to the yield of the developed countries (for example, Germany) and developing countries (Ukraine, Azerbaijan). The methods to increase yields can be reduced to the technological reequipment of the sector, the introduction of digitalization, increasing of funding and the level of management. Thus, it can be concluded that Kazakhstan has a wide potential for the development of agriculture, but its implementation requires overcoming certain barriers and issues, which will be discussed in detail at the next stage of the research.

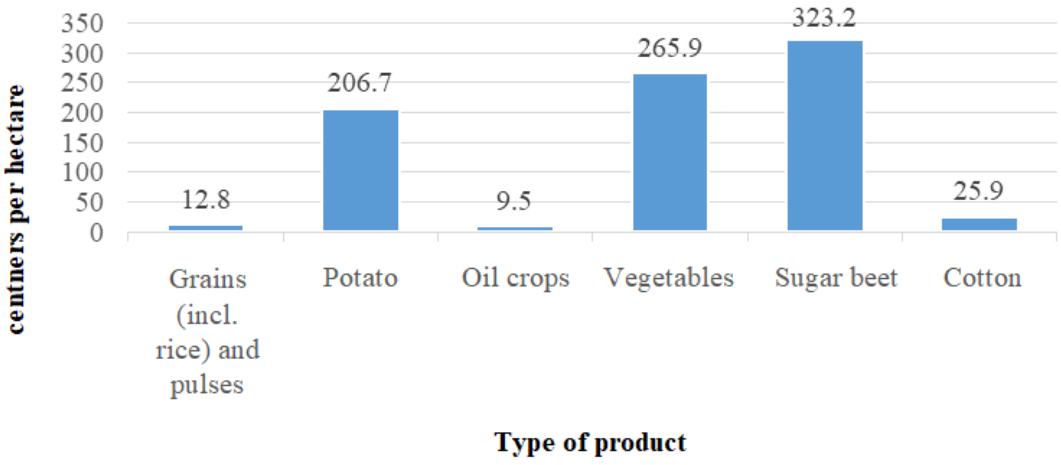

Figure 5 – Yield in 2020
Note – compiled by the authors based on (Statistics of agriculture, forestry, hunting and fisheries, 2022).

Analysis of the strengths and weaknesses, opportunities and threats of the agricultural sector in Kazakhstan and the choice of the optimal strategy

SWOT analysis allows identifying strengths and weaknesses, as well as opportunities and threats for the business. The SWOT analysis given in Table 2 defines these aspects for the agricultural sector of Kazakhstan as a whole, but they are also characteristic for each business entity separately.

Table 2 – SWOT analysis of the agricultural sector of Kazakhstan in the context of the world economy integration

Strengths	**Weaknesses**
Diversity of climatic and geographical conditions enables the development of a wide range of livestock and crop sectors. Availability of extensive sown areas. Low labor costs. High export potential.	Relatively low share in the country's GDP. Decrease in areas allocated for pastures. The sector is largely represented by small-scale households. Insufficient funding of the sector. Reduced efficiency and deterioration of fixed assets. Low wages. Lack of sectoral logistics of product turnover. Low attractiveness for investors. Questionable export prospects for high-quality livestock products. Mixed effect of agricultural subsidies. Unequal conditions for access to state support. Insufficient level of veterinary and food safety.
Opportunities	**Threats**
Increasing support for small commodity producers. Huge potential for renewable energy production. Desire to reduce the greenhouse effect and increase energy production from alternative sources. Efforts are being made to increase export potential.	Environmental threats include the lack of water resources and their reduction, air pollution. Small population of the country and its low density in the presence of vast territories threatens to increase transport costs and imposes difficulties in increasing the output volume.
Note – compiled by the authors based on (Shejkin, 2018); (Tokbergenova, 2018); (Jianzhong, 2018); (Rustamov, 2020); (Lukhmanova, 2019).	

The SWOT analysis carried out in Table 2 allows concluding that the weaknesses of the agricultural sector in Kazakhstan prevail over the strengths, while the opportunities outweigh the threats. It would be advisable to dwell on individual weaknesses and opportunities in more detail. As noted in Table 2, a significant share of the sector falls on small-scale producers, whose products are sometimes characterized by unsatisfactory quality, which, among other things, reduces their export potential. There is a need for appropriate certification and control of such enterprises. Low wages are set due to the lack of competition, which entails a lack of highly qualified specialists in the sector. The absence of sector-specific logistics of product turnover is more beneficial for intermediaries, rather than manufacturers, reducing the interest of the latter. The low attractiveness for international investors as well as for private investments is due to unequal conditions for competition between private and state capital. Doubtful prospects for the export of quality livestock products exist in view of the fact that most of it is represented by households. Providing subsidies to agriculture as well as subsidizing interest rates has an ambiguous effect, distorting the market mechanisms for setting interest rates in the sector. Unequal terms of access to government support from large and small producers contribute to social stratification (Shejkin, 2018).

As for the opportunities, it can be added that increasing support for small-scale producers will help preserve cultural values and supplement consumption structure with organic products. In addition, given a very large but sparsely populated area, Kazakhstan has a huge potential for renewable energy production, in particular wind power. Kazakhstan is a party to the Kyoto Protocol and the Paris Agreement and thus seeks to reduce the greenhouse effect and increase energy generation from alternative sources. In addition, efforts are being made in Kazakhstan to increase the export potential of agricultural products, which will be known under the single brand "Made in Kazakhstan" (Jianzhong, 2018). The matrix presented in Figure 6 is intended to determine the strategy for agricultural enterprises, which are characterized by the prevailing of weaknesses over strengths and opportunities over threats.

Figure 6 – Determination of the enterprise strategy based on the results of the SWOT analysis
Note – compiled by the authors based on (Chowdhury, 2019).

Looking at Figure 6, it is necessary first of all to determine whether weaknesses or strengths prevail in the enterprise's activities. Then the researcher establishes whether opportunities or threats affect the activities of the enterprise more. The strategy is chosen at the intersection of these two. Analysis of Table 2 allows saying that weaknesses prevail in the agricultural sector of Kazakhstan according to the results of the SWOT analysis – their number is much larger than the number of strengths, and the cumulative impact on the sector is stronger. It can also be concluded that the sector is characterized by ample opportunities that prevail over the threats. Thus, the minimax strategy (weaknesses and opportunities – WO) is suitable for agricultural enterprises in Kazakhstan. It is worth clarifying that the analysis was carried out according to the average characteristics of the sector, so other combinations of indicators and, accordingly, other strategies may be typical for individual enterprises.

However, most agricultural enterprises should apply a minimax strategy in their activities. This strategy involves minimizing weaknesses and maximizing opportunities. Its goal is to transform internal weaknesses by capitalizing on external opportunities. Company management should discover various alternatives in order to abstract from weaknesses and take control of the opportunities that appear in the process. It is always a wise decision to remove or correct flaws and realize opportunities. Example: If a company does not have experience in any of the areas of business that are necessary for growth, and it is given the opportunity to team up with another company that has the necessary experience, this can be quite a convenient situation for both companies (Chowdhury, 2019).

It is necessary to see the need for adaptive strategies to address regional inequalities, aiming to boost agricultural productivity and foster sustainable growth across Kazakhstan (Kenzheali, 2024).

Modernization of the agricultural economy entails not only an innovative, but also a multiplier effect (transport infrastructure in rural areas of Kazakhstan, logistics, warehouse and wholesale distribution infrastructure, pre-sale preparation of agricultural products, storage facilities for agricultural products, special tractors of small and medium power, equipment for gardening, irrigation systems) (Kurmanova, 2021).

Early reforms facilitated macroeconomic stability and market liberalization; the economy remains highly dependent on raw material exports (Shukeyev, 2025).

Conclusion

The study of the process of formation and development of agriculture in Kazakhstan, as well as modern statistical data, suggests that there is some stagnation in the sector. From the foregoing, it can be concluded that farmers in Kazakhstan prefer to follow established traditions, farm with outdated

management methods, use depreciated fixed assets, and the state allocates insufficient funds to the sector, while the efficiency of public funding is quite low. A possible solution to the above problems can be a focus on stimulating the introduction of innovative international practices into the economy of Kazakhstan, which corresponds to the strategy determined at the previous stage, since the introduction of international experience is designed to minimize weaknesses by realizing opportunities. In the context of this issue, it is useful to consider the following concepts: sustainable development of the agricultural sector; organic agriculture; digitalization of the agro-industrial sector. This choice of concepts is due to their high relevance today, which is confirmed by numerous studies by Kazakh and international scientists (Laurett et al., 2021; Tokbergenova et al., 2018; Meemken, 2018; Baytaeva, 2019; Rustamov et al., 2020; Bahn et al., 2021; Ehlers et al., 2021; Akhmedyarov, 2019).

The general concept of sustainable development is to balance the interests of society, economy and business, as well as the environment. Sustainable development in the agricultural sector can be considered an important ally in addressing environmental issues, minimizing inequalities, improving food quality and reducing soil damage and the adverse effects of chemical products, etc., given the growing demand for food production for a growing population. As for the environmental situation in the country, it can be argued that today it requires increased attention. The main environmental issues include:

- lack of water resources (ecological catastrophe of the Aral Sea, ecological issues of Lake Balkhash);
- radioactive, bacteriological and chemical contamination of land resources (Semipalatinsk region, where the military space test site was located and where nuclear weapons were tested for 40 years);
- air pollution (the permissible level was exceeded in fifteen large cities);
- accelerated climate change (Yessymkhanova, 2021).

Researchers A. Tokbergenova, L. Kiyassova, S. Kairova (2018) identify the following main directions of sustainable development of agriculture in Kazakhstan:

- introduction of undistributed lands into agricultural production, ensuring employment in the rural areas, development of animal husbandry;
- development of a state social housing construction program to secure specialists in the rural areas, provision of marketing infrastructure and upgrade of educational, medical, cultural and sports facilities;
- establishment of industrial production in rural settlements, taking into account specialization and application of benefits;
- attraction of international full-cycle agricultural companies, rational use of production and export potential, search for new markets (Tokbergenova et al., 2018).

The above recommendations allow concluding that scientists pay more attention to two of the three sustainable development pillars – economic and social well-being, while not paying enough attention to the third, environmental aspect. However, the study conducted in the article focuses on the environmental safety of agriculture in view of the presence in the country of a number of issues associated with environmental pollution. Thus, it is advisable to supplement the recommendations of the researchers with the following:

- conservation and renewal of natural resources, namely, ensuring the purity of air and land, rational water use through the introduction of environmental technologies into production;
- ecological problems of Lake Balkhash associated with shallowing, increased concentration of harmful substances, as well as poaching deserve special attention, and their solution requires government measures, including international ones, since some of the issues are related to China's activities regarding the settlement of the Ili River, which is the main artery of the lake;
- preservation of soil fertility by calculating the optimal amount of fertilizers applied, the use of organic fertilizers, adaptation of modern soil fertility preservation technologies to local conditions;
- use of renewable resources, such as wind energy, solar energy, etc.

The idea of organic agriculture is a qualitative addition and expands the possibilities of the sustainable development concept. It arose at the beginning of the twentieth century in the context of urbanization and the expanded use of agrochemical resources. Organic standards cover crop production, animal husbandry, beekeeping, aquaculture and recycling. Organic production includes nutrient recycling, banning synthetic fertilizers and chemical pesticides, using organic fertilizers, feeding animals with organic feed, as well as providing adequate space and access to outdoor areas. From 2000 to 2015, the global area of certified organic agriculture increased from 15 million hectares to 51 million hectares (Meem-

ken, 2018). Motives for the consumption of organic products are as follows: environmental safety of food products; high quality and freshness of products; best taste qualities of organic products; preservation of the natural environment in the production process; absence of genetically modified organisms (Baytaeva, 2019).

Legislative regulation of organic production in Kazakhstan began with the adoption of a relevant law at the end of 2015. Since then, the main regulations on organic production as well as regulatory and technical documents have been developed and adopted. In particular, three standards for organic products came into force in 2018, including a mark confirming the conformity of organic products (Baytaeva, 2019). Kazakhstan has about 300 thousand hectares of organic land certified in accordance with international standards. The following should be developed and approved for the successful development of organic production in the country:

- technical regulations for the production of organic products and raw materials;
- procedure for assessing the suitability of soils for organic production;
- procedure and requirements for labeling organic products;
- national system of certification, accreditation of state control over the activities of the subjects of production, transportation, storage, sale of organic products;
- Straightening scientific research and organize the training of qualified personnel in the field of organic farming (Baytaeva, 2019).

The effectiveness of introducing digitalization to enterprises, including those in the agricultural sector, is confirmed by the example of developed and developing countries that make the most of its benefits: thanks to digitalization, the productivity of international enterprises increases significantly (Bahn, 2021). This applies to the entire production cycle, from speeding up the workflow to the calculation of the required amount of fertilizers applied to the soil. The positive effects of digitalization include a reduction in the cost and an increase in the speed of "paper" work, an increase in product quality due to the optimal amount of fertilizers, an increase in the efficiency and environmental friendliness of the entire production process, etc.

The participation of Kazakhstan in integration associations, in particular in the Eurasian Economic Union, helps to synchronize the direction of movement towards the digitalization of agriculture. Y. Akhmedyarov (2019) specifies the establishment of information platforms and technological reequipment as the main recommendations for the transition to the digital structure of the agricultural market. Such recommendations are somewhat lengthy and general, and therefore require detailing. Based on the research results, the following more specific recommendations can be made regarding the transition to digital agriculture:

- development of legal support for digitalization and provision of financial support from the state;
- technological reequipment of the sector;
- increasing investment in science and technology in the field of agriculture;
- analysis and minimization of possible risks;
- creation of conditions that enable agricultural enterprises to use the experience of international companies, access to satellite data, information about the latest technologies, etc.

Taking into account the considered recommendations for improving agriculture in Kazakhstan will allow developing the agro-industrial sector in three main areas – sustainable development, organic agriculture and digitalization, which will ensure faster agro-industrial integration, efficient and safe management, taking into account the interests of entrepreneurs, consumers and the environment. Comparison of own research results with the findings obtained by Kazakh and international scientists allows stating that the authors' research lacks an integrated approach to solving issues and developing recommendations, on the basis of which their research results were expanded and supplemented with their own developments.

Thus, government authorities need to pay attention to animal husbandry, namely, to provide additional areas from undistributed lands, as well as to provide high-quality animal feeding and veterinary care. The third stage of the study contains a SWOT analysis of the agricultural sector in Kazakhstan, which includes an analysis of the strengths, weaknesses, opportunities and threats for the country's agriculture. Based on the analysis, it was found that the optimal strategy for agriculture in Kazakhstan is the minimax strategy, which involves minimizing weaknesses by maximizing opportunities and it is advisable to use the world experience and practice of farming in the context of the most relevant trends today, which are sustainable development, organic agriculture and digitalization.

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Information about authors:

Abdigul Gulzhaukhar – Senior Manager, Department for Strategic Development, S.Seifullin Kazakh Agro Technical Research University (Astana c., Kazakhstan, e-mail: zhaukanai_ak@mail.ru);

Balkibayeva Aida – C.e.s, associate professor, Department of Social-Humanitarian Disciplines, Academy of Physical Education and Mass Sports, (Astana c., Kazakhstan, e-mail: ambal1974@mail.ru);

Assanova Gulnara – C.e.s, associate professor, Chief Consultant of the Department for Support of Civil Initiatives of the central office of the Republican Public Association "Auyl Partiyasy" (Astana c., Kazakhstan , e-mail: assanga@mail.ru);

Iskakova Damira – Director, C.e.s, Researcher, Scientific and Production Enterprise "Innovator" LLP (Astana c., Kazakhstan, e-mail: damirais61@mail.ru).

Авторлар туралы мәлімет:

Әбдігүл Гүлжаухар Қазболатқызы – аға менеджер, Стратегиялық даму жөніндегі департамент, С. Сейфуллин атындағы Қазақ агротехникалық зерттеу университеті (Астана қ., Қазақстан, e-mail zhaukanai_ak@mail.ru);

Балкибаева Аида Максутовна – э.ғ.к., қауымдастырылған профессор, Әлеуметтік-гуманитариялық пәндер кафедрасы, Дене шынықтыру және бұқаралық спорт Академиясы, (Астана қ., Қазақстан, e-mail: ambal1974@mail.ru);

Асанова Гульнара Абдильдиновна – э.ғ.к., қауымдастырылған профессор, "Ауыл партиясы" Республикалық қоғамдық бірлестігі Орталық аппаратының азаматтық бастамаларды қолдау департаментінің бас консультанты, (Астана қ., Қазақстан, e-mail: assanga@mail.ru);

Искакова Дамира Максутовна – э.ғ.к., директор, ««Инноватор» ғылыми-өндірістік кәсіпорын» ЖШС, (Астана қ., Қазақстан, e-mail: damirais61@mail.ru).

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K.A. Mussa [1*], S.K. Akhmetkaliyeva [1], A.A. Muratbekova [2], J. Jeevan [3]

[1]Al-Farabi Kazakh National University, Almaty, Kazakhstan
[2]LLT «TEMIS SU LOGISTICS», Almaty, Kazakhstan
[3]Universiti Malaysia Terengganu, Kuala-Terengganu, Malaysia
*e-mail: musa_karlygash.kz@mail.ru

MODELLING TERRITORIAL LOGISTICS BASED ON ECONOMIC DISTANCE

This article examines methods for modeling territorial logistics using the concept of economic distance. Logistics plays a key role in the socio-economic development of Kazakhstan by facilitating the efficient movement of goods and integrating the country into international transport corridors. The study explores the principles of modeling transport flows by applying models that assess the impact of transport accessibility and infrastructure capacity on the effectiveness of logistics processes.

A comparative analysis was carried out on the Huff Model, the Rayleigh Distribution, and the Modified Gravity Model across six parameters. Based on a hypothetical example using the Huff and Rayleigh models, a practical study was conducted for three regions of Kazakhstan's transport network. As an example, the transport network of Kazakhstan, including logistics hubs in the cities of Astana, Almaty, and Karaganda, was examined. The calculations demonstrated that the distribution of cargo turnover is determined not only by the volume of freight flows but also by economic distance, which reflects the logistics attractiveness of hubs in regional development.

The practical analysis of Kazakhstan's transport network shows that hubs with high cargo turnover located in close proximity to consumer regions possess enhanced logistical attractiveness. This enhances the significance of economic distance, which combines physical distance and the economic costs of transport.

Optimizing the territorial logistics infrastructure helps reduce transport costs, improve the efficiency of freight transport, and facilitate the integration of regions into national and international transport corridors. The models and methods presented in the article can be employed for strategic planning of logistics processes and the development of effective cargo distribution schemes.

Key words: territorial logistics, economic distance, Huff Model, Rayleigh Model, Modified Gravity Model, transport accessibility, cargo turnover.

Қ.А. Мұса [1*], С.К. Ахметкалиева [1], Ә.Ә. Мұратбекова [2], Д. Дживан [3]

[1]әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан
[2]«TEMIS SU LOGISTICS» ЖШС, Алматы, Қазақстан
[3]Малайзия Теренггану Университеті, Куала-Теренггану, Малайзия
*e-mail: musa_karlygash.kz@mail.ru

Экономикалық қашықтық негізінде аумақтық логистиканы модельдеу

Бұл мақалада экономикалық қашықтық тұжырымдамасын қолдана отырып, аумақтық логистиканы модельдеудің әдістері талданады. Логистика Қазақстанның әлеуметтік-экономикалық дамуын қолдауда шешуші рөл атқарады, жүктің тиімді тасымалдануына және елдің халықаралық көлік дәліздеріне интеграциясына ықпал етеді. Жұмыста көлік ағындарын модельдеу принциптері қарастырылады, ол арқылы көлік инфрақұрылымының қолжетімділігі мен өткізу қабілетінің логистикалық процестердің тиімділігіне әсері бағаланады.

Зерттеу барысында Хафф моделі, Рейли моделі және модификацияланған гравитациялық модель алты параметр бойынша салыстырмалы талдауға алынған. Гипотетикалық мысал негізінде Хафф және Рейли модельдері үш аймақтың (Астана, Алматы және Қарағанды қалаларының логистикалық жүйесі) көлік желісі үшін практикалық зерттеу жүргізуге пайдаланылды. Есептеулер көрсеткендей, жүк айналымының бөлінуі тек жүк ағындарының көлеміне ғана емес, сонымен қатар экономикалық қашықтыққа байланысты анықталады, ол аумақтардың дамуына әсер ететін логистикалық хабтардың тартымдылығын сипаттайды.

Қазақстан көлік желісіндегі практикалық талдау көрсетуі бойынша, жоғары жүк айналымы бар және тұтынушы аймақтарға тікелей жақын орналасқан логистикалық объектілер жоғары логистикалық тартымдылыққа ие, бұл физикалық арақашықтық пен тасымалдау шығындарын біріктіретін экономикалық қашықтық параметрін күшейтеді.

Аумақтық-логистикалық инфрақұрылымды оңтайландыру көлік шығындарын азайтып, жүк тасымалының тиімділігін арттыруға және аймақтарды ұлттық және халықаралық көлік дәліздеріне интеграциялауға ықпал етеді. Мақалада ұсынылған модельдер мен әдістер логистикалық процестерді стратегиялық жоспарлау және тиімді жүк бөлуді қамтамасыз ететін схемаларды әзірлеуге арналған.

Түйін сөздер: аумақтық логистика, экономикалық қашықтық, Хафф моделі, Рейли моделі, модификацияланған гравитациялық модель, көлік қолжетімділігі, жүк айналымы.

К.А. Муса [1*], С.К. Ахметкалиева [1],
А.А. Муратбекова [2], Д. Дживан [3]

[1]Казахский национальный университет имени аль-Фараби, Алматы, Казахстан
[2]ТОО «TEMIS SU LOGISTICS», Алматы, Казахстан
[3]Университет Малайзии Тренгану, Куала-Тренгану, Малайзия
*e-mail: musa_karlygash.kz@mail.ru

Моделирование территориальной логистики на основе экономического расстояния

В данной статье рассматриваются анализ методов моделирования территориальной логистики с использованием концепции экономического расстояния. Логистика играет ключевую роль в социально-экономическом развитии Казахстана, способствуя эффективному перемещению грузов и интеграции страны в международные транспортные коридоры. В работе рассматриваются принципы моделирования транспортных потоков с применением моделей, позволяющих оценить влияние транспортной доступности и пропускной способности инфраструктуры на эффективность логистических процессов.

Проведён сравнительный анализ модели Хаффа, Рейли и модифицированная гравитационная модель по шести параметрам. На основе гипотетического примера моделей Хаффа и Рейли проведено практическое исследование для трёх регионов транспортной сети Казахстана. В качестве примера рассмотрена транспортная сеть Казахстана, включая логистические узлы в городах Астана, Алматы и Караганда. Расчеты показали, что распределение грузооборота определяется не только объемами грузопотоков, но и экономическим расстоянием как логистическая привлекательность узлов в развитии территорий.

Практический анализ, проведённый на примере транспортной сети Казахстана, демонстрирует, что узлы, обладающие высоким грузооборотом и находящиеся в непосредственной близости к потребительским регионам, имеют повышенную логистическую привлекательность, что усиливает параметры экономического расстояния, которое объединяет физическую дистанцию и экономические издержки перевозки.

Оптимизация территориально-логистической инфраструктуры способствует снижению транспортных издержек, повышению эффективности грузоперевозок и интеграции регионов в национальные и международные транспортные коридоры. Представленные в статье модели и методы могут быть использованы для стратегического планирования логистических процессов и разработки эффективных схем грузораспределения.

Ключевые слова: территориальная логистика, экономическое расстояние, модель Хаффа, модель Рейли, модифицированная гравитационная модель, транспортная доступность, грузооборот.

Introduction

Territorial logistics plays a key role in the socio-economic development of the region, country, various inter-country unions including the entire globe (Konkova, 2012, Toluev, 2008). Logistics ensures the efficient movement of goods, services and labour through the development of territorial transport systems.

Kazakhstan, having a strategic geographical location, is actively developing its transport and logistics system, increasing its role in international transit corridors between Europe and Asia. As emphasised by the President of Kazakhstan K. J. Tokayev in his message to the nation, the concept of full utilization of the potential of the transport logistics industry and the development of the country's logistics complex for the long term is one of

the key directions of the development strategy until 2030.

The development of the territorial transport system of the Republic is based on the transport infrastructure: an extensive network of roads and railways, air and sea routes, logistics centers, corridors and transit at the international level. Kazakhstan's transport network plays a key role in ensuring logistics flows both domestically and internationally. Over the past 15 years, $35bn has been invested in transport and logistics, which has contributed to a significant development of the industry. It is forecast that by 2025 the share of the transport sector in the country's GDP will grow from 6.2% (in 2022) to 9%.

Kazakhstan has 16,000 km of railways, 94,800 km of roads, 25 airports and major seaports on the Caspian Sea. A significant role in the transport system is played by a 29,000 km pipeline network that transports oil and gas.

Figure 1 illustrates a map of Kazakhstan's transport infrastructure, showcasing key highways, railways, ports, and border crossing points. The country's transit potential is expanding due to the use of Caspian Sea ports, which facilitates Kazakhstan's integration into global trade networks.

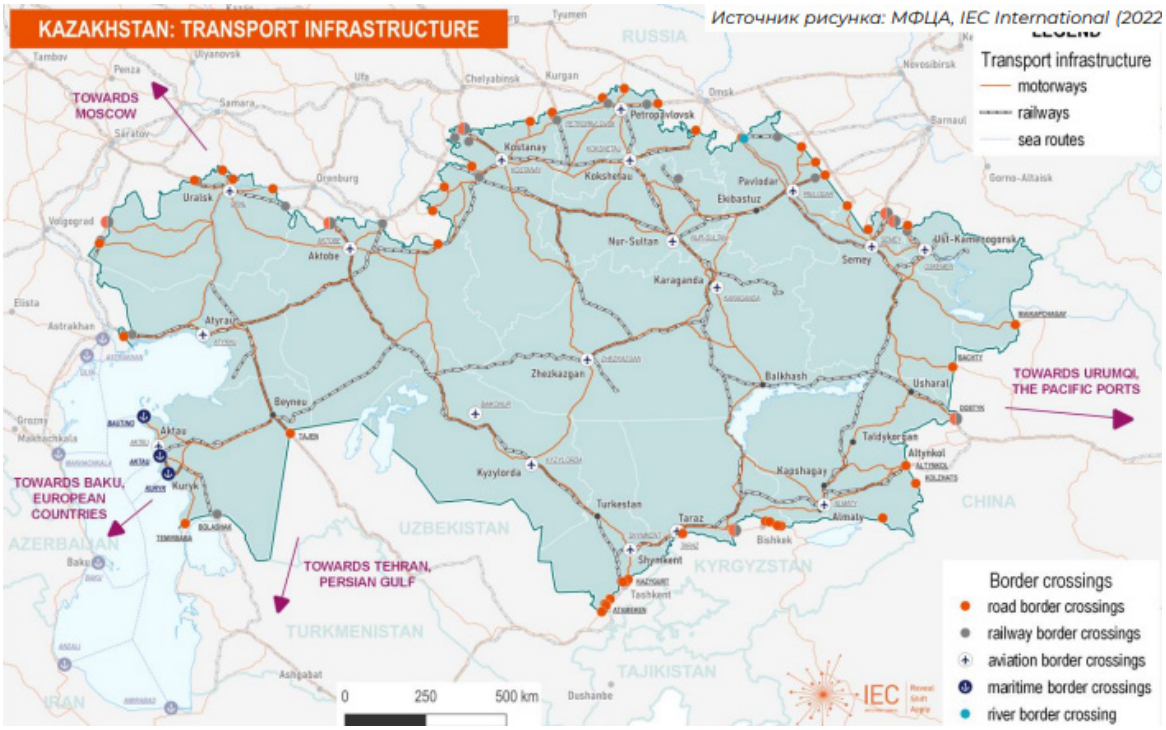

Figure 1 – Transport infrastructure of Kazakhstan
Note – Transport and Logistics Industry of Kazakhstan, 2024

Challenges related to transport accessibility, infrastructure capacity and critical loads on key facilities keep the logistics system in Kazakhstan actively developing. The territorial logistics system is a complex, multi-criteria, multi-level hierarchical structure. The system is affected by external weather conditions, foreign policy, etc. and, as a rule, the output parameters of the system randomly depend on the input parameters, the analysis and study of which is possible using traffic flow modelling methods (Tararychkin, 2016).

This paper considers the key factors and methods of optimal location of elements of territorial logistics infrastructure. It analyses the relationship between the capacity indicators of transport nodes and their location on the basis of Huff models and Rayleigh's law (Kolosov, 2015). The study is based on hypothetical examples demonstrating the improvement of the territorial logistics system taking into account geographical, technological and social parameters. The results that will be acquired will enable the identification of existing problems and

propose effective solutions that will help further develop any size territory.

Kazakhstan's President Kasym-Jomart Tokayev has consistently underscored the necessity of modernizing the country's transport and logistics infrastructure. The priority areas include the construction of new railway lines, such as «Moyynty – Kyzylzhar», the expansion of the «Altynkol – Zhetygen» corridor, and the establishment of an international aviation hub with modern cargo and passenger terminals. These measures are aimed at strengthening Kazakhstan's transit potential and increasing its competitiveness in global transport flows (Kazakhstan Government's Extended Meeting, 2024).

Literature review

Area logistics is becoming an important area of research in modern logistics, which deals with the management of economic and human flows for the optimal location of transport nodes of a region, state and territory of any type in the world, including itself. The works of E.D. Konkova and Y.I. Toluev, E. Sassi, A. Benabdelhafid, highlight the main aspects of the concept of territorial logistics, including a set of methods and services, as well as the need to optimise territories to ensure the effective placement of spatial objects.

Development of territorial transport systems is the logistics infrastructure, which requires the definition of economic, technical and geographical parameters. From the works of authors Singer O. A. and Ilyasova A. V. We can identify 3 parameters: economic, technical, geographical. Including foreign and domestic authors analyse the spatial characteristics of transport infrastructure, the density of transport hubs and methods of optimizing the location of logistics centres.

In this context, several models have been employed to examine spatial interactions and the concept of economic distance in logistics. Foreign authors Bowersox, Donald J., Mentzer, John T. Speh, Thomas W. In an article published in the Journal of Business Strategies, the advantages and disadvantages of logistic shoulders defined by 'economic distance' were noted. It is noted that the term 'logistic leverage' refers to the high market returns that can be obtained with a relatively small investment. The authors Stroeva G.N. and Slobolchikov D.V. in their work revealed in detail the definition of transport accessibility. Kopytova Y.V. in the book 'Young Scientist' investigated transport capacity as the main parameter that determines the place of transport systems in the urban transport structure. In the article by P.V. Popov and I.Yu. Miretsky considered the main methods of solving the problems of logistics infrastructure. Among the models and methods used in practice, the author singled out those that take into account the influence of factors and allow calculating the most favourable location of warehouses in the distribution network. The methods of commercial attractiveness and Arthur Geofrion's centre of gravity method were mentioned in particular.

Modern approaches to developing logistics infrastructure in constrained spaces have been summarized by American economist E. Hoover and Russian researchers V.I. Sergeev and V.V. Dybskaya, emphasizing the integration of economic, technological, and spatial factors. A.O. Kolosov demonstrated the practical application of the Huff Model in this context, quantifying consumer choice based on the ratio of a location's attractiveness to its travel cost using a power-law decay function (Huff, 1963). Additionally, recommendations have been made for using gravity models as tools for retail customer orientation. Kosterin I.G. conducted a sociological analysis of customer movements from small towns to larger cities using Reilly's law, drawing an analogy with Newton's universal gravitation to explain spatial interactions.

This study compares three foundational models for analyzing economic distance—the Huff Model, the Rayleigh Distribution, and the Modified Gravity Model. Together, these models form a robust theoretical framework for understanding and optimizing spatial interactions in territorial logistics.

Territorial logistics includes a set of logistics services that are performed on some specific territory by a logistics operator, which manages logistics nodes in the structure of material flows. However, the services are performed by a logistics operator, which is not a node in the structure of material flows, but it plays a key role in ensuring the effective functioning of the logistics system in a particular territory (Stroeva & Slobodchikova, 2016), (Slobodyanyuk & Gorobchenko, 2020).

A logistics hub is an element of logistics infrastructure as a set of services through which the movement of material and financial flows or the process of distribution of goods is carried out.

The targets of logistics infrastructure are production enterprise warehouses, logistics centers, loading and unloading terminals, distribution centers, sorting and distribution warehouses and retail outlet warehouses. Determining the required number of such facilities, their location and economic functions is the most important element in the formation (design) of the logistics infrastructure

of territorial logistics. Integration of infrastructural objects by a logistics operator, provides relevant services regardless of who exactly performs these operations. Thus, the objects of territorial logistics infrastructure (table 1) are divided into three main groups.

Table 1 – Objects of logistics infrastructure of territorial logistics

Level	Description
Local	facilities of local importance, called logistics parks or centres.
Regional	Regional logistic centers in regions where there is well-established transport infrastructure and a stable information system provide the broadest range of logistics services.
International	International logistics centers are large-scale infrastructure facilities located over a significant area and constructed in close proximity to key transport hubs, such as ports, airports, railway junctions, and intermodal terminals.
Note – complied by author	

The facilities of the first group include specialised facilities for the provision of certain types of commodity flow regulation services by individual firms and networks. The facilities of the second group create conditions for effective regulation of input and output flows of various goods in the national and regional markets. The facilities of the third group, using innovative information and communication technologies, ensure the qualitative performance of the entire range of logistics services, respectively, introduce the necessary coordination to ensure a reduction in the time of realisation of goods along the entire chain and pulling commodity flows in transit within the country (Bolodurina, 2019), (Popov, 2019).

Now let us consider the main methods of solving problems of logistics infrastructure facilities location.

Simple models and procedures. These models allow us to establish the coordinates of individual objects of logistics infrastructure and their networks. Among the techniques and models that have gained extensive practical application, we would highlight the Ardalan technique due to which you can determine the optimal location of warehouses in the distribution network by considering the impact of factors, Erlenkotter's 'total optimal market service area' model, commercial attractiveness approaches, and Arthur Geofrion's centre of gravity method. These methods are based on many assumptions and include an operational assessment of the assumed logistics infrastructure.

Complex methods and models. Researchers A. Klose and A. Drexil proposed to divide all complex methods and models into three main groups (figure 2): network modelling, continuous and discrete optimization methods.

Approximate heuristic and metaheuristic methods are used to solve problems with a large number of possible options for the location of logistics infrastructure facilities. They make it possible to approach the optimal location of the network of transport and warehousing facilities in a 'reasonable time'. They include genetic algorithms, local search algorithms and the method of prohibitions.

One of the modern approaches to developing logistics infrastructure in a limited space was systematized by American economist E. Hoover, as well as Russian scholars V. I. Sergeev and V. V. Dybskaia. The location and number of infrastructure facilities are determined based on an analysis of key socio-economic characteristics of the territory, including the location of consumers, demand volume, required level of logistics services, and other factors. The primary criterion for site selection is its proximity to the target market within the designated geographical region (Zinger & Ilyasova, 2015).

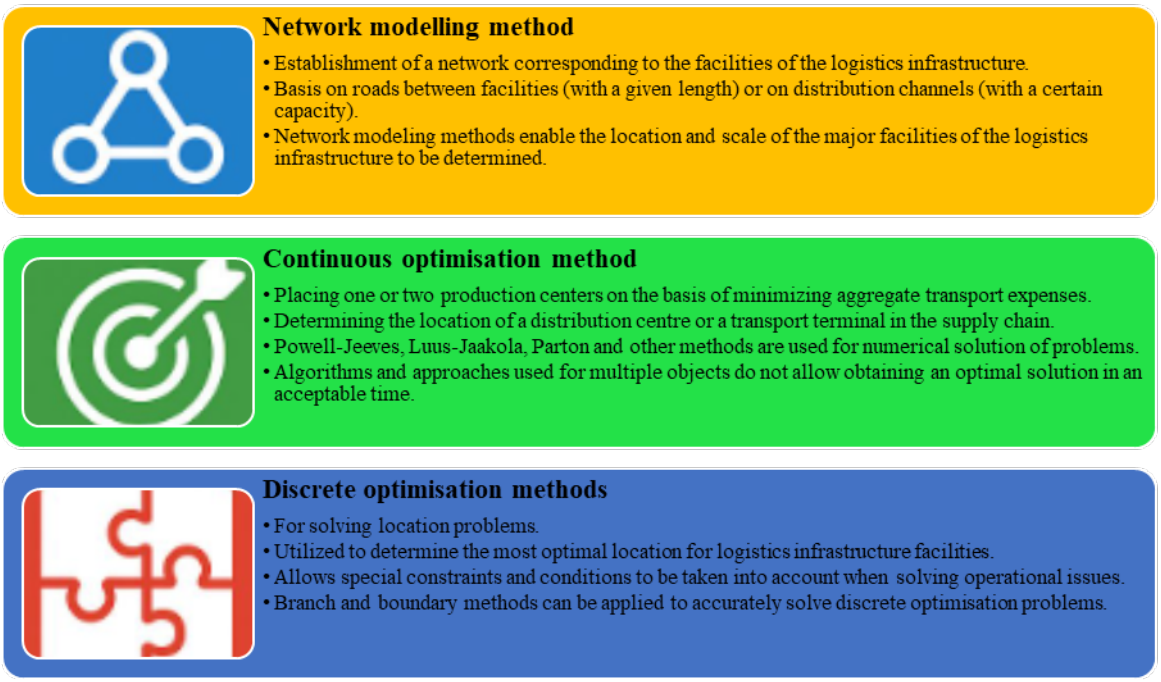

Figure 2 – Complex methods and models for solving problems of logistics infrastructure facilities location
Note – complied by author

Methodology

Let us consider the main parameters of size, distance, transport costs, infrastructure, attractiveness of the objects according to the infrastructure levels of territorial logistics. Infrastructure objects, for example, at the local level of infrastructure are warehouses, at the regional level distribution centres, and at the international level transit corridors. The placement and interaction of these facilities can be investigated using Huff and Reilly models. (Piketty, 2015), (Bowersox, 2008).

Given that one of the main parameters in logistics is economic distance, which is defined not only by the physical distance between points, but also by a set of factors (transport costs, delivery time, risks, etc.). The Huff, Reilly and modified gravity models demonstrate different mathematical representations that take into account the influence of distance on the intensity of interactions. Such approaches have direct relevance to the concept of economic distance in logistics and the concept of 'logistic shoulder'. In a logistics network, logistics shoulder can be understood as the part where interactions (e.g. delivery of goods, movement of goods) remain economically efficient. It is a kind of 'radius of action' of the logistics system around the central node (warehouse, distribution centre), beyond which the costs of transportation start to exceed the potential benefits of the interaction. For example, in logistics, 'shoulder' can be interpreted as the distance from the loading point to the unloading point. There is a distinction between 'short shoulder' and 'long shoulder', between which there is a fundamental difference.

- A 'short shoulder' is the transport of goods between several settlements at a distance not exceeding 500 km or within one working day.
- 'Long shoulder' in the field of road transport means the carriage of goods over long distances, over 500 km, which requires several days on the road. International freight transport can be attributed to such transportations.

Let us consider the advantages of 'short' and 'long' economic distance (Table 2).

Discussions about which option – 'long shoulder' or 'short shoulder' – is more favourable arise quite often, as both have their significant advantages (Kolosov, 2015).

Table 2 – Advantages of economic distances ('short'/'long') in logistics.

Advantages of 'short leverage':	The 'advantages' of the 'long arm':
- Work on regular routes with regular customers; - Work in a relatively close neighbourhood to the place of residence; - Equal fares for each kilometre travelled in both directions; - Close monitoring of driver and vehicle performance; - Reduced vehicle repair and maintenance costs.	- The number of loading and unloading operations decreases, transport operating time increases, total revenue increases; the efficiency of vehicle utilisation increases. - On the 'long shoulder' the carrier's income at first glance seems quite high. - Working with a smaller number of customers.
Note – complied by author's	

If the parameter of economic distance, as an abstract economic indicator, is transferred to the geographical characteristics of the logistics infrastructure, it is possible to distinguish networks according to the following parameters: density of facilities, network topology, definition of service areas, connectivity and accessibility. Indeed, when using the Huff and Reilly models together, it is possible to optimise the placement of facilities in a logistics network: taking into account not only the individual attractiveness of each node, but also its spatial position relative to the centre or other nodes in the network. Therefore, it is possible to form an efficient topology of the service network, where the objects are placed taking into account optimal territory coverage, minimising transport costs and providing a high level of service.

It is of scientific interest to carry out a comparative analysis of Huff, Reilly and modified gravity models according to 6 characteristics (principle, attenuation function, main parameters, application, advantages, disadvantages) (table 3):

Table 3 – Comparative analysis of models for economic distance

Characteristic	Huff Model	Rayleigh Distribution	Modified Gravity Model
Principle	Probabilistic consumer choice based on the ratio of a location's attractiveness to the cost (or distance) required to reach it.	Describes the random distribution of distances with an exponential decay in probability as distance increases from the central point.	Inspired by the analogy with Newton's law of gravitation: the interaction between objects is proportional to the product of their «masses» and inversely proportional to a distance decay function.
Decay Function	Typically a power function: $d_{ij}^{-\beta}$.	The probability density function: $f(d) = \frac{d}{\sigma^2} \exp \frac{d^2}{2\sigma^2}$ where the exponential decay is associated with the square of the distance.	Can adopt various forms (e.g., exponential, logarithmic, or combined decay) to better fit empirical data.
Main Parameters	– Attractiveness of the location Aj. – Distance dij. – Parameter β (rate at which distance influence decays).	– Scale parameter σ\sigma that determines the «width» of the distribution.	– «Masses» of the objects Mi and Mj – Distance function f(dij). – Scaling coefficient k and additional parameters to account for specific factors.
Application	Used for analyzing retail trade, planning commercial zones, and estimating the probability of consumer store choice.	Applied in the analysis of random distributions, spatial modeling of point objects, and in problems involving random process theory and network topology.	Used in modeling migratory, transportation, and trade flows, as well as in demographic and economic modeling where multiple influencing factors are taken into account.
Advantages	– Simple interpretation and calibration. – Convenient for assessing the competitiveness of locations.	– Easy to configure with one or two parameters. – Effective in describing the general behavior of distance distribution.	– Highly adaptable due to the inclusion of additional variables. – Allows for a comprehensive consideration of spatial and economic factors impacting interactions between locations.

Continuation of the table

Characteristic	Huff Model	Rayleigh Distribution	Modified Gravity Model
Disadvantages	– Sensitive to the estimation of the parameter β and the attractiveness measure. – Does not always account for individual consumer characteristics or competitive effects.	– Limited in modeling deterministic preferences since it describes only the overall pattern of distance distribution.	– Complex calibration due to the larger number of parameters. – Potential risk of overfitting if empirical data is insufficient.
Note – The table was compiled by the authors on the basis of sources (Huff, 1963), (Gaul, L. (2011), (Wilson, 2010), (Haggett & Chorley, 1969)			

The analysis demonstrates that each of the presented models has its own strengths and weaknesses, determined not only by the mathematical form and parameters used, but also by the field of application.

- The Huff model is ideal for problems where the main importance is to assess the attractiveness of objects for consumers, but it may not be flexible enough when taking into account a complex set of variables.

- The Rayleigh distribution provides a powerful tool for describing the spatial distribution of objects with a minimum number of parameters, but is not always able to take into account individual consumer preferences.

- The modified gravity model due to its versatility and flexibility can be used in a wide range of problems, but requires more accurate tuning and a significant amount of data.

In general, the choice of model depends on the specific task: if a detailed analysis of consumer choice is required, the Huff model is preferred, for analysing the overall spatial structure – the Rayleigh model, and for complex economic or transport flows – the modified gravity model. It should be noted that the integration of all three models allows for a comprehensive assessment of the logistics system: from the level of interaction with the final consumer, through the distribution of infrastructure nodes in the territory, to the optimisation of transport flows between nodes.

Consider practical examples with the Huff and Reilly models.

The Huff model takes into account the influence of multiple shopping centres and, above all, applies the probability of customer behaviour. Huff's model predicts the flow between two points (in general, between multiple points) based on the number of potential customers or other consumers at each outlet, and is inversely proportional to a certain dimension of the distance or travel time between the points. However, the model also introduces a new 'gravity' concept of the probability of potential customers visiting a site when the external conditions are the same. This gravitational concept can be determined by the internal characteristics of a retail outlet (cleanliness, queues at checkouts, availability of price tags, assortment, etc.) or by economic activity, availability of services or amenities, and the general attractiveness of the location (Ingram, 1982), (Arhipova et al., 2020).

The Huff model also has its limitations. Flow is assumed to be homogeneous, and only distance affects it, while other factors are accounted for through the integral attractiveness factor of the outlet, making the identification of these influences one of the most difficult tasks of model calibration.

Huff's model suggests that the consumer is able to choose a location by analyzing the alternative locations. The market area is thus presented as a line of probability when there are no alternative locations. The point of indifference turns into a point equal to the probability that a customer will visit a particular location, as shown in figure 3.

In the above image, the probability that the client chooses point A (0.71) is much higher than the probability of choosing point B (0.29). The advantage of the Huff model is that it leaves room for the buyer to choose a location.

The Reilly gravitational model (Reilly's law of partial attraction, the Reilly-Converse model) – large cities attract a large number of customers who are willing to cover the distance to large shopping malls, and the force of gravity is proportional to the population or local trade turnover. The model was developed in 1931 by William John Reilly (1899-1970), a professor at the University of Texas, based on empirical research and is similar to Newton's law of attraction, with the addition of work by Paul D. Converse in 1949.

Reilly's law aims to determine the point of indifference between two points, as shown in figure 4, so you can determine the trading area of each of these points.

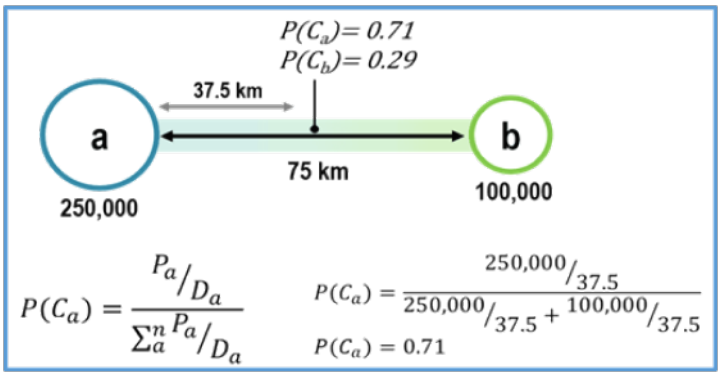

Figure 3 – Huff Model
Note – The Geography of Transport Systems. Huff's Law.

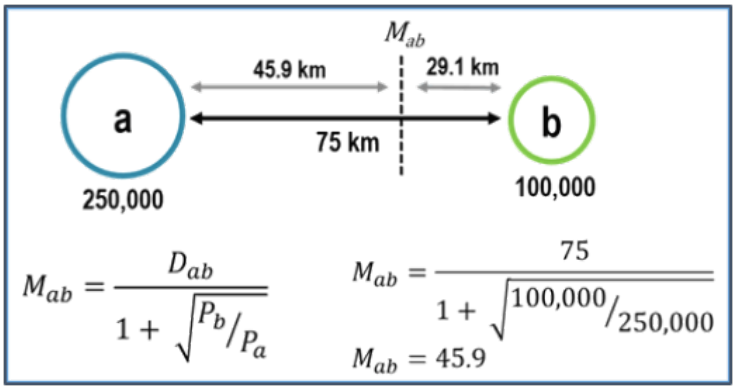

Figure 4 – The Reilly model
Note – The Geography of Transport Systems. Reilly's Law.

This point is a function of the distance between two points, and their respective sizes are taken into account (population is often used for this purpose). Thus, one place may be more attractive than another.

In the image above, two points are located at a distance of 75 km from each other. According to the principle of store placement, the point of indifference should be in the center between them (at a distance of 37.5 km). However, since point A has a larger population (with more weight), it is expected to attract more customers. In such cases, the point of indifference is located at a distance of 45.9 km from point A.

Similarly, 250,000 and 100,000 can serve as indicators of the intensity of freight flows between logistics nodes or regions. Such an indicator is important for developing routing strategies, assessing the cost-effectiveness of transport routes and determining the need for additional infrastructure investments. These parameters help to understand how efficiently infrastructure is distributed, what its capacity to handle freight is, and how adequately it meets demand.

Having considered how economic distance determines the basic costs of transport and how geographical parameters shape the spatial location of logistics hubs, it is important to move on to the aspect that enables the real performance and dynamism of the entire system – the technical parameters of the infrastructure. Modern technology and the level of equipment of logistics centres become the link that connects theoretical optimisation with practical implementation. It is the technical parameters such as freight turnover, transport accessibility and throughput that determine how efficiently an optimal network topology can be realised in practice.

Technical parameters include transport accessibility and indicators of traffic and transport capacity of communications.

Transport accessibility is a complex phenomenon with the time of travel from the point of departure to the destination. As an important indicator of

the level of exploration, development, location convenience of a specific region, as well as its investment attractiveness, it should be taken into account in various spheres of human activity:

- production goals (development of new territories, design of various facilities, construction of any infrastructure, etc.);
- personal goals of a person (choosing a place of residence, recreation, drawing up a route, travelling, etc.).

Transport accessibility analysis. Analyses of transport accessibility of territories are necessary for strategic decision-making, including management and investment decisions, such as:

- designing various transport infrastructure solutions;
- assessment of promising territories for the development of various industries, including the oil and gas sector;
- studying the peculiarities of remote territories;
- monitoring the state of the transport network in seasonal conditions;
- complex research of territories with difficult climate or relief;
- logistics of various cargoes and calculation of their cost;
- organisation of passenger transport.

Transport accessibility is an indicator that helps to determine how long it takes to get from home to work, shop, bar, gym or other important places. It takes into account all modes of transport: walking, cycling, private car or public transport (Kosterin, 2007).

One of the indicators of provision of territories with logistics infrastructure is the throughput and transport capacity of communications.

Throughput capacity is an attribute that defines the ability of a specific mode of transport to carry a specific number of passengers (cargo) for a unit time on a single lane.

Transport capacity is the main parameter determining the location of transport systems in the urban transport structure. Low-capacity transport systems, i.e., monorail systems, are used at airports as tourist and transport facilities, and bus and trolleybus systems as vehicles of high-capacity mainline transport, e.g., light rail, subways and electric trains.

Freight turnover is the volume of transport work on the transport of goods, expressed in tonne-kilometres. It is defined as the sum of the product of the weight of each batch (shipment) of transported cargo by the distance of its transport (Agency of Statistics of the Republic of Kazakhstan, 2024).

Thus, technical parameters not only complete the picture of logistics infrastructure, but also serve as a key tool for improving its efficiency. They turn a strategically planned allocation of logistics facilities, based on economic and geographical analyses, into a functioning system.

Results and discussion

In the last ten years socio-economic development of Kazakhstani regions is realized under the influence of the following main trends:

- unevenness and significant differentiation of socio-economic development of regions;
- growth of trade volume surpasses economic development;
- growth of volume, geography and types of transportation, in particular, the Kazakhstani market of container transportation has been significantly expanded.
- growth of mutual trade between CIS and non-CIS nations;
- increase in capacity issues in transportation corridors;
- low competitiveness of the regions in development (Raimbekov & Syzdykbaeva, 2019).

In the context of these trends, territorial logistics aimed at effective management of transport flows and resources is of particular importance. This brings to the forefront the need to create regional transport and logistics systems (RTLS) and logistics clusters with their subsequent integration into a single national transport and logistics system (TLS).

World experience shows that in recent years integration processes in logistics are mainly realized through the formation of interstate and transnational macro-logistic systems (MLS). This approach to the development of territorial logistics is the most effective strategy of integration into the world economy. The creation of a national MLS will allow not only to modernize infrastructure, but also to strengthen internal interregional ties, which will become a stimulus for further economic growth.

The competitiveness of Kazakhstan's regions is largely determined by effective territorial logistics, rational distribution of production capacities, optimal use of transport potential and improvement of transport and economic links between regions. It is where the creation of the backbone transport network and construction of transport and logistics infrastructure, its modernization, become crucial and are a prerequisite that enhances the economic potential of the country.

Taking into account technological and organizational parameters, the analysis of cargo turnover of all types of transport in Kazakhstan for the period from January to December 2024 was carried out. The total volume of cargo turnover amounted to 514,455.47 million t-km, which is 2.6% higher than in the same period of 2023 (501,414.34 million t-km). In the reporting month (December), cargo turnover reached 47,187.43 million t-km, up 5.7% from the previous month (44,651.86 million t-km).

Analysis of the data showed that the leader in cargo turnover was Atyrau region with 4,290.00 mln t-km for December and 46,409.55 mln t-km for the whole year. The lowest volume was recorded in Ulytau region – 611.91 mln t-km for December, which is due to geographical and infrastructural peculiarities of the region.

In large cities of Kazakhstan cargo turnover was distributed as follows:

- Astana – 3,787.00 mln t-km for December;
- Almaty – 2,245.04 mln t-km for December;
- Shymkent – 1,221.88 mln t-km for December.

Some regions showed significant growth of cargo turnover in the reporting month:

- North-Kazakhstan region – 18.7% increase compared to November;
- Mangistau region – growth by 11.9%;
- Shymkent city – increase by 41.7%, which is the highest indicator in comparison with other regions.

At the same time in Zhetysu there was a decrease in cargo turnover by 2.5% in comparison with the previous month.

The positive flow of cargo turnover in Kazakhstan affirms to the effective utilize of transport foundation and its potential for encourage advancement. Regional differences highlight the need for a targeted approach to modernizing the transport network in less developed areas such as Ulytau and Zhetysu.

Table 4 – Cargo turnover of all modes of transport for January-December 2024

	Actual volume in 2024.			Actual volume in 2023.		As a percentage of the corresponding period of 2023.		Percentage of previous month
	reporting month	previous month	period since beginning of the year	period since beginning of the year	reporting month	period since beginning of the year	reporting month	
Republic of Kazakhstan	47 187,43	44 651,86	514 455,47	501 414,34	42 941,69	102,6	109,9	105,7
Abay	1 262,83	1 209,89	13 956,24	15 230,73	1 282,01	91,6	98,5	104,4
Akmola	2 416,69	2 335,55	26 183,29	26 757,88	2 257,65	97,9	107,0	103,5
Aktobe	3 821,45	3 775,75	42 679,88	45 571,90	3 845,99	93,7	99,4	101,2
Almaty	1 685,25	1 637,75	19 640,90	20 443,47	1 740,66	96,1	96,8	102,9
Atyrau	4 290,00	3 832,54	46 409,55	44 459,85	3 915,83	104,4	109,6	111,9
West Kazakhstan	1 040,67	1 123,81	11 501,58	11 210,18	890,50	102,6	116,9	92,6
Zhambyl	3 801,22	3 799,05	44 134,68	41 471,64	3 491,71	106,4	108,9	100,1
Jetisu	933,88	911,33	11 116,95	14 201,44	1 235,40	78,3	75,6	102,5
Karaganda	3 627,82	3 445,45	39 659,03	40 687,84	3 408,73	97,5	106,4	105,3
Kostanay	2 501,65	2 354,71	27 322,76	27 137,95	2 291,47	100,7	109,2	106,2
Kyzylorda	3 103,01	2 955,21	34 034,61	33 728,85	3 070,81	100,9	101,0	105,0
Mangystau	2 608,51	2 496,74	29 000,82	28 584,78	2 583,30	101,5	101,0	104,5
Pavlodar	3 446,45	2 899,76	32 784,37	27 931,20	2 351,02	117,4	146,6	118,9
North Kazakhstan	915,23	890,99	10 171,58	11 487,87	988,16	88,5	92,6	102,7
Turkestanskaya	1 871,18	1 914,13	23 400,94	24 828,64	2 155,23	94,2	86,8	97,8
Ulytau	1 269,74	1 202,47	14 020,39	15 592,57	1 328,40	89,9	95,6	105,6
East Kazakhstan	624,14	611,91	6 892,76	7 609,76	633,44	90,6	98,5	102,0

Continuation of the table

	Actual volume in 2024.			Actual volume in 2023.		As a percentage of the corresponding period of 2023.		Percentage of previous month
	reporting month	previous month	period since beginning of the year	period since beginning of the year	reporting month	period since beginning of the year	reporting month	
Astana city	3 934,82	3 787,00	43 218,15	34 377,02	2 880,16	125,7	136,6	103,9
Almaty city	2 301,87	2 245,94	23 656,93	19 045,74	1 641,77	124,2	140,2	102,5
Shymkent city	1 731,03	1 221,88	14 670,06	11 055,03	949,45	132,7	182,3	141,7
* Taking into account the volume of work done by individual entrepreneurs engaged in commercial transport.								
Note – Bureau of National Statistics, 2024 (https://stat.gov.kz)								

Kazakhstan's transport infrastructure plays a key role in ensuring logistics flows both domestically and internationally. The development of road, railway and pipeline routes, as well as the creation of modern logistics hubs, helps to improve transport accessibility of regions and increase the efficiency of cargo turnover. Optimisation of logistics infrastructure facilitates Kazakhstan's integration into global transport chains and stimulates economic growth by increasing the capacity of transport corridors and developing regional hubs.

Geographical location and territorial characteristics play a key role in the distribution of freight turnover between regions. This paper considers three cities in Kazakhstan: Karaganda, Astana and Almaty, between which cargo flows are redistributed.

To demonstrate the applicability of the models under consideration, we will perform calculations based on data on freight turnover and distances between the regions. This will allow us to assess the degree of influence of various factors on the choice of a logistics hub based on the Huff and Reilly model.

$$P_{ij} = \frac{S_j / T_{ij}^{\gamma}}{\sum_k (S_j / T_{ij}^{\gamma}} \quad (2)$$

P_j – logistic node selection probability j
S_j – logistics hub cargo turnover
T_{ij} – distance to a logistics hub
γ – distance sensitivity parameter {1}
$\sum_k$ – sum of all logistics node alternatives.

An example of the calculation of the Huff model:

Data:

Almaty cargo turnover (S_1) = 2301.87 million tonne-km

Astana cargo turnover (S_2) = 3934.82 million tonnes-km

Distance Karaganda – Almaty: d_{K-} = 1000 км

Distance Karaganda – Astana: d_{K-c} = 1000 км

Computations:

$$P_{ij} = \frac{2301{,}87/1000^2}{\left(\frac{2301{,}87}{1000^2}\right) + \left(\frac{3934{,}82}{200^2}\right)}$$

$$P_{ij} = \frac{0{,}00230187}{0{,}00230187 + 0{,}0983705} =$$

$$= \frac{0{,}00230187}{0{,}10067237} = 0{,}0228649628$$

$$P_{\text{стана}} = 1 - \text{P} = 0{,}977$$

Conclusion: Based on the Huff model, the probabilities of redistribution of cargo flows from Karaganda to Almaty and Astana were calculated. As can be seen on the map, most of the freight flows (≈97.7%) are directed to Astana, which is explained by its shorter distance from Karaganda (200 km) and higher freight turnover (3934.82 million tonnes-km). At the same time, Almaty receives only 2.3% of freight traffic, despite its significant freight turnover (2,301.87 million tonnes-km), which is due to the city's remoteness (1,000 km).

Thus, the results of the analysis confirm that territorial proximity and economic capacity (freight turnover) play a decisive role in the redistribution of freight flows.

According to the Rayleigh model, we make calculations.

This model is used to estimate the probability

of choosing a logistics node depending on its cargo turnover and distance to it.

$$M_{ij} = \frac{S_j}{d_{ij}^2} \quad (3)$$

Where:

M_{ij} – attraction of the logistics node $_j$ for the region $_i$,

S_j – volume of cargo turnover of the logistics hub,

d_{ij} – distance between the region $_i$ and the node $_j$,

d_{ij}^2 – the square of the distance (to account for the decrease in influence with increasing distance).

Let us calculate the attractiveness of Almaty and Astana as logistics hubs for the Karaganda region.

Data:

Almaty cargo turnover (S_1) = 2301.87 million tonnes-km

Cargo turnover of Astana (S_2) = 3934.82 million tonnes-km

Distance Karaganda – Almaty: d_{K-} = 1000 км км

Distance Karaganda – Astana: d_{K-c} = 1000 км

Computations:

$$M_{K-} = \frac{2301,87}{1000^2} = 0,00230187$$

$$M_{K-c} = \frac{3934,82}{200^2} = 0,0983705$$

The results of the calculations show that the logistic attractiveness of a node is inversely proportional to the square of the distance to the region, which confirms the validity of the gravity model of transport flows. Despite Almaty's high freight turnover, its remoteness (1000 km) results in low attractiveness (0.002302), while Astana (200 km) shows a much higher indicator (0.098370). This is consistent with the gravity model of traffic flows and shows that distance plays a key role in the distribution of freight flows.

Huff's and Reilly's laws were used to analyse the distribution of freight flows in the logistics system of Kazakhstan. As an example, let us consider Karaganda region and two possible logistics hubs – the cities of Astana and Almaty. Data on cargo turnover of these hubs, as well as distances between them and the region are presented in table 4. The Huff model calculations show that Astana has a 97% probability of being selected, while Almaty has a 3% probability of being selected. This is due to the shorter distance to Astana, as well as the greater volume of cargo turnover, which indicates its higher role in the territorial and logistics infrastructure of the region.

Similar conclusions were obtained from the Rayleigh model. Raleigh's law revealed that the attractiveness of a logistics node decreases with increasing distance, which is consistent with the theoretical provisions of the model. According to the calculations, the logistics hub in Astana has a higher attractiveness for freight traffic from Karaganda than Almaty due to its shorter distance and significant cargo turnover. Thus, the results confirm that the choice of logistics hub is determined not only by its freight turnover, but also by the distance to the consumer of transport services. This confirms that, all other things being equal, a logistics hub with higher freight turnover located closer to the region is more attractive.

Thus the use of these models in Kazakhstan confirms their effectiveness in optimising transport flows and strategic planning of logistics processes. The results obtained can be used in further research in the field of territorial logistics, including the development of recommendations on the location of new logistics centres and expansion of the existing transport infrastructure.

Conclusion

This paper provides a comprehensive analysis of territorial logistics modelling based on the concept of economic distance, which allows us to combine economic, geographical and technical parameters of transport and logistics infrastructure. The study demonstrates that economic distance, defined not only by physical distance, but also by the totality of transport costs, time and risks, is a key indicator affecting the distribution of logistics flows and the optimal placement of nodes in the network.

Analyses of the Huff, Rayleigh distribution and modified gravity models showed that:

The Huff model, which takes into account the attractiveness of facilities and the costs of reaching them, is suitable for detailed analyses of consumers' choice of logistics nodes and the definition of service areas.

The Rayleigh distribution effectively describes the spatial distribution patterns of logistics facilities, allowing the identification of activity 'cores' and peripheral zones.

The modified gravity model, capable of taking into account multiple factors, demonstrates high

adaptability in modelling migration, transport and trade flows.

The application of these models allows not only to assess the basic characteristics of freight flow distribution (including such indicators as freight turnover, transport accessibility and capacity), but also to identify the 'weaknesses' of the existing logistics infrastructure in Kazakhstan's regions. Calculations carried out on the example of the country's transport network confirmed that territorial proximity and economic capacity of logistics hubs play a decisive role in redistributing freight flows. Moreover, the results of the research underline the need for strategic infrastructure development, taking into account the optimal location of logistics centres, which will reduce transport costs and increase the efficiency of freight traffic.

Thus, a comprehensive approach based on the integration of economic, geographical and technical parameters allows the formation of an efficient logistics network capable of adapting to the dynamics of the external environment and meeting the growing demand for transport and logistics services. The presented models and methods can serve as a basis for further research and practical recommendations for optimising transport and logistics infrastructure, which, in turn, will contribute to the socio-economic development of regions and strengthening the integration position of Kazakhstan in the international arena.

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Information about the authors:

Mussa Karlygash – (corresponding author) PhD student, Departament of «Business –technologies», Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail: musa_karlygash.kz@mail.ru);

Akhmetkalieva Sandygul – Candidate of technical sciences, Acting Associate Professor, Departament of «Business – technologies», Al-Farabi Kazakh National University (Almaty, Kazakhstan, e-mail: sandygula@yandex.ru);

Muratbekova Assel – Master, Logistics Manager at TEMIS SU LOGISTICS LLP (Almaty, Kazakhstan, e-mail: aselyoss@mail.ru);

Jagan Jeevan – PhD, Associate Professor, University Malaysia Terengganu (Kuala-Terengganu, Malaysia, e-mail: jagan@umt.edu.my).

Авторлар туралы мәлімет:

Мұса Қарлығаш Асылқызы – (корреспондент-автор) PhD докторант, «Бизнес – технологиялар» кафедрасы, Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, e-mail: musa_karlygash.kz@mail.ru);

Ахметкалиева Сандыгуль Кусмановна – Техника ғылымдарының кандидаты, доцент м.а., «Бизнес – технологиялар» кафедрасы, Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, e-mail: sandygula@yandex.ru);

Мұратбекова Әсел Әбдіәкімқызы – магистр, «TEMIS SU LOGISTICS» ЖШС-нің логистика жөніндегі менеджері (Алматы қ., Қазақстан, e-mail: aselyoss@mail.ru);

Джиган Дживан – PhD, қауымдастырылған профессор, Малайзия Теренггану Университеті, (Куала-Теренггану, Малайзия, e-mail: jagan@umt.edu.my);

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T.B. Zhumadilova [1*], R.D. Doszhan [1], B.M. Aliyeva [1], R. Pukala [2]

[1] al-Farabi Kazakh National University, Almaty, Kazakhstan
[2] State University of Applied Science, Jaroslaw, Poland
*e-mail: zhumadilova_tolkyn@mail.ru

ANALYTICAL APPROACHES TO BANKING SYSTEM STABILITY: A STUDY OF METHODS AND CURRENT STATE OF BANKS IN KAZAKHSTAN

The article presents methods of assessing the sustainable development of the banking system, which are highly relevant today, and the current analysis of indicators of financial stability indicators of second-tier banks of the Republic of Kazakhstan. The article examines various methods of assessing the stability of banking institutions, which play a crucial role in ensuring the stability of the financial system. The main focus is on the analysis of approaches and tools used to assess the financial stability of banks, such as stress testing, analysis of financial ratios and rating systems. A comparative analysis of the methods of stability analysis used in the modern banking sector is provided. The features, strengths and weaknesses, opportunities and risks of the CAMELS, BAKIS, PATROL, SREP methods of banking stability analysis thoroughly examined, along with a theoretical justification of their peculiarities. Additionally, the article conducts an analysis of the current state of commercial banks of the Republic of Kazakhstan using comparative analysis and comprehensive stability assessments to prevent financial crises and maintain public confidence in the banking sector. The authors also highlight the necessity of adapting assessment methods to reflect changes in the global economy and the evolving dynamics of the banking sector.

Key words: commercial banks, sustainable development concept, ESG, sustainability assessment, sustainable banks.

Т.Б. Жумадилова [1*], Р.Д. Досжан [1], Б.М. Алиева [1], Р. Пукала [2]

[1] Әл-Фараби атындағы Қазақ ұлттық университеті, Алматы, Қазақстан
[2] Мемлекеттік қолданбалы ғылымдар университеті, Ярослав, Польша
*e-mail: zhumadilova_tolkyn@mail.ru

Банк жүйесінің тұрақтылығын қамтамасыз етудің талдамалық тәсілдері: Қазақстандағы банктердің әдістері мен ағымдағы жай-күйін зерттеу

Мақалада бүгінгі таңда өте өзекті болып табылатын банк жүйесінің тұрақты дамуын бағалау әдістері және Қазақстан Республикасының екінші деңгейдегі банктерінің қаржылық тұрақтылық көрсеткіштерінің ағымдағы талдауы берілген. Мақалада қаржы жүйесінің тұрақтылығын қамтамасыз етуде шешуші рөл атқаратын банк мекемелерінің тұрақтылығын бағалаудың әртүрлі әдістері қарастырылған. Негізгі назар банктердің қаржылық тұрақтылығын бағалау үшін қолданылатын тәсілдер мен құралдарды талдауға аударылады, мысалы, стресс-тестілеу, қаржылық коэффициенттерді талдау және рейтинг жүйелері. Қазіргі банк секторында қолданылатын тұрақтылықты талдау әдістеріне салыстырмалы талдау қарастырылған. CAMELS, BAKIS, PATROL, SREP әдістерінің ерекшеліктері, күшті және әлсіз жақтары, мүмкіндіктері мен тәуекелдері, олардың ерекшеліктерін теориялық негіздеумен қатар банктік тұрақтылықты талдау әдістері жан-жақты зерттелді. Сонымен қатар, мақалада қаржылық дағдарыстардың алдын алу және халықтың банк секторына деген сенімін сақтау үшін салыстырмалы талдау мен тұрақтылықты кешенді бағалауды қолдана отырып, Қазақстан республикасының коммерциялық банктерінің қазіргі жағдайына талдау жасалады. Авторлар сонымен қатар әлемдік экономикадағы өзгерістерді және банк секторының дамып келе жатқан динамикасын көрсету үшін бағалау әдістерін бейімдеу қажеттілігін атап көрсетеді.

Түйін сөздер: коммерциялық банктер, тұрақты даму тұжырымдамасы, ESG, тұрақтылықты бағалау, тұрақты банктер.

Т.Б. Жумадилова [1]*, Р.Д. Досжан [1],
Б.М. Алиева [1], Р. Пукала [2]

[1] Казахский Национальный университет им.Аль-Фараби, Алматы, Казахстан
[2] Государственный университет прикладных наук, Ярослав, Польша
*e-mail: zhumadilova_tolkyn@mail.ru

Аналитические подходы к обеспечению стабильности банковской системы: исследование методов и текущего состояния банков в Казахстане

В статье представлены методы оценки устойчивого развития банковской системы, которые сегодня весьма актуальны, и текущий анализ показателей финансовой устойчивости банков второго уровня Республики Казахстан. В статье рассматриваются различные методы оценки устойчивости банковских учреждений, которые играют решающую роль в обеспечении стабильности финансовой системы. Основное внимание уделяется анализу подходов и инструментов, используемых для оценки финансовой устойчивости банков, таких как стресс-тестирование, анализ финансовых коэффициентов и рейтинговых систем. Представлен сравнительный анализ методов анализа стабильности, используемых в современном банковском секторе. Подробно рассмотрены особенности, сильные и слабые стороны, возможности и риски методов анализа банковской стабильности CAMELS, BAKIS, PATROL, SREP, а также теоретическое обоснование их особенностей. Кроме того, в статье проводится анализ текущего состояния коммерческих банков Республики Казахстан с использованием сравнительного анализа и всесторонних оценок стабильности для предотвращения финансовых кризисов и поддержания доверия населения к банковскому сектору. Авторы также подчеркивают необходимость адаптации методов оценки с учетом изменений в мировой экономике и меняющейся динамики банковского сектора.

Ключевые слова: коммерческие банки, концепция устойчивого развития, ESG, оценка устойчивости, устойчивые банки.

Introduction

The stability and continuous growth of commercial banks are critical due to their direct impact on the national economy. However, the absence of a unified and comprehensive approach to assessing banking stability in the context of the transition to a digital economy presents a significant challenge. The increasing influence of digital transformation, the Fourth Industrial Revolution, and the complex interplay of internal and external variables have accelerated the need for adaptive assessment methodologies.

In the current economic landscape, characterized by rising inflation, geopolitical uncertainties, and emerging climate-related financial risks, ensuring the resilience of commercial banks is more relevant than ever. Credit institutions must rapidly adapt to these evolving conditions to maintain a stable competitive position and mitigate potential vulnerabilities.

A study published by researchers Dalke A. Yu., Svyatov S. A., and Ruziyeva E. A. analyzes the role of large banks in Kazakhstan in ensuring the country's financial stability. The results show that systemically important banks significantly impact the financial performance and sustainability of the economy (Dalke et al., 2023).

The analytical report from Ranking.kz examines the dynamics of deposit growth in the country's largest banks. For instance, Bank RBK reported a monthly increase in deposits of 9.1%, indicating depositor trust and the financial institution's stability. According to Ranking.kz, over the past five years, the number of second-tier banks in Kazakhstan has decreased from 28 to 21. This points to a consolidation process in the banking sector aimed at enhancing the stability and reliability of financial institutions.

The National Bank of the Republic of Kazakhstan has developed a research Program defining strategic objectives in the field of macroeconomic policy, financial markets and new technologies. This highlights the regulator's commitment to exploring and implementing best practices to ensure the sustainable development of the banking sector.

Development Bank of Kazakhstan JSC also demonstrates its commitment to the principles of sustainable development and responsible investment, paying attention to the impact of its activities on the economy, society and the environment. This is an example of the implementation of ESG practices in the Kazakhstan's banking sector.

The primary objective of this study is to develop a comprehensive methodology for assessing the stability of commercial banks. To achieve this goal, the research sets forth the following key tasks:

- Identifying critical indicators and methodologies for evaluating banking stability;

- Analyzing the applicability of international assessment frameworks to the banking system of the Republic of Kazakhstan;
- Examining the impact of macroeconomic and regulatory factors on banking resilience;
- Proposing a balanced model that integrates qualitative and quantitative assessment criteria.

Commercial banks, as intermediaries of savings and investments, face a broad spectrum of risks that could lead to financial instability and insolvency. Therefore, assessing and ensuring their sustainable development has become a pressing concern.

The sustainable development of the banking sector requires a multidimensional approach that emphasizes business models aligned with sustainability principles. While sustainable banking practices may not directly influence the financial performance of banks, they shape ownership structures and longevity of financial services. By incorporating macroeconomic factors and state-specific characteristics, commercial banks can enhance their resilience by diversifying their traditional operations. However, there remains a lack of a standardized system of indicators and methodologies for assessing banking stability, necessitating further research and development in this area.

Literature review

As financial institutions, banks participate in business and investment activities that span the entire economic sector. As a result, they have sought to incorporate the principles of sustainable development outlined in the 1987 Brundtland Report into both their short-term and long-term business strategies. The pursuit of sustainable development within the banking system is closely tied to fostering a strong and supportive socio-economic environment. The primary goal is to implement fostering sustainable and innovative banking services that address environmental and social risks while meeting the needs of both current and future stakeholders. Therefore, in order to maintain ecological balance and preserve the environment for future generations, banks must incorporate sustainability science principles through their business plans and combine innovative services with sustainable development goals. The advancement of sustainability bank services is increasingly centered on the development of innovative financial strategies and business models that integrate digital finance, information security, reliable financial technologies, and the contributions of fintech companies (Ibrahim et al., 2019).

At both the regional and national levels, the stability of the banking system is a key indicator of economic security. The transition to a low-carbon economy and the acceleration of sustainable development are greatly aided by the banking industry (Report of the World Commission on Environment and Development, 2021; Report of the World Bank, 2021).

Today's modern banks execute a wide range of tasks, such as providing intermediary payments, participating in the stock and foreign exchange markets, offering settlement services, mobilizing temporarily accessible cash from individuals and legal entities, and distributing these funds on a remunerative, operational, and repayable basis (Bespalov et al., 2019; Cosma et al., 2020).

At present, a number of established studies are examining the various methods used to assess the sustainable development of banks. In a scientific study by Hussein and other authors, the method of constant value added was discussed as a method of analyzing the stability of banking activities. The approach focuses on all dimensions of sustainable development, aiming to conserve current energy resources while enhancing the value of assets for future generations. Furthermore, the authors highlight the necessity for auditors to receive advanced training in the environmental and social spheres (Hussein, 2023).

In their study, Fatih Ecer and Dragan Pamucar put forth a novel multidimensional system, designated as LOPCOW-DOBI, for evaluating the stability indicators of banks. It comprises an objective measurement method and a multidimensional approach to evaluating alternatives (Ecer, F. et al., 2022).

Semenova, Ivanova, and Vasilkina's works present a hierarchical analysis process for evaluating the sustainable development of commercial banks (Semenova, 2011).

Betul O. Dogan and Muhammet B. Kilic discuss the assessment of corporate sustainability indicators in the banking sector using an integrated reporting system and the gray relational analysis method based on an entropy approach (Betul, D. et al., 2022).

Researchers C. Obiora, O. Babamisile, E. Opoku-Mansah, A. Frimpong reached the opinion that an increase in landing volumes leads to a rise in the emissions of dangerous substances by corporate entities in a comprehensive scientific study that looks at the functioning of banking and financial systems in 45 countries. On the other hand, the study finds that lower emissions are linked to higher interest rates on loans and savings. This suggests a complex interplay between financial system

activities and environmental impact, highlighting the potential environmental consequences of credit availability and cost (Obiora et al., 2020).

In the field of scientific research, a variety of methods for evaluating the stability of the banking sector are under consideration. He incorporated the Hellwig method of comparative analysis of the banking sector in Central and Eastern Europe into the methods. Paduszyńska and Lesiak (2022) employed a taxonomic approach utilizing indicators such as risk justification, asset quality, liquidity, and capitalization (Yehorycheva et al., 2022). Additionally, the camel system for assessing financial stability (Agarkova, 2022) and stress testing were considered. Furthermore, the Financial Stability Index and the method of regulatory assessment of the stability of the banking system (Business Inform, 2023) were also evaluated. This approach incorporates sub-indicators such as liquidity, management efficiency, asset quality, profitability, and reliability to develop a comprehensive measure of bank stability (Rachita, 2023).

Methodology

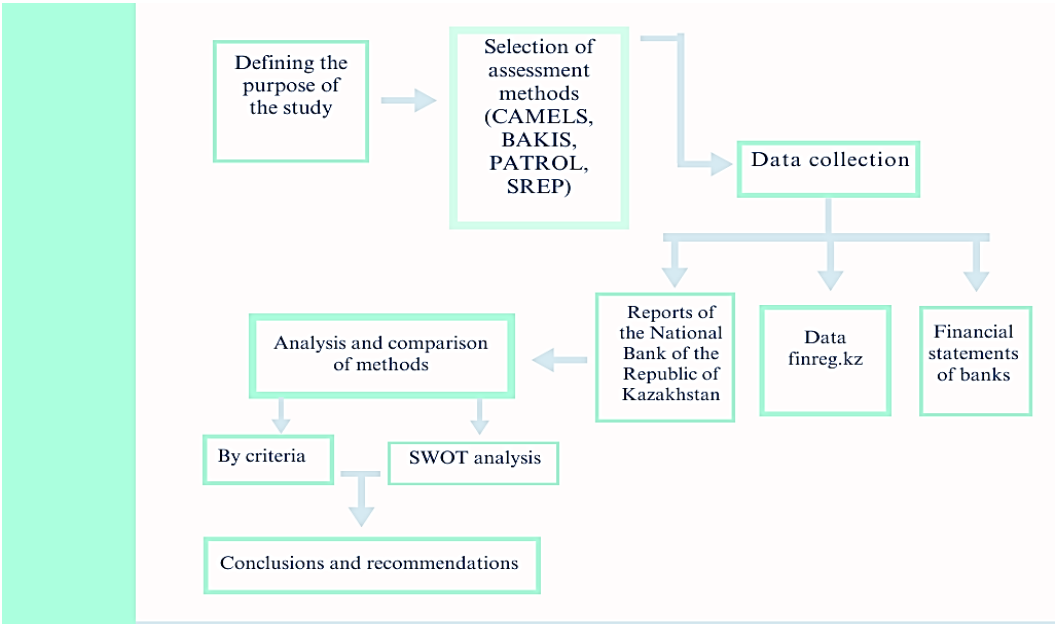

Figure 1 – Stages of the Research Methodology
Note – compiled by the author

In our research methodology, we substantiate the selection of the CAMELS, BAKIS, SREP, and PATROL methods based on a comprehensive set of criteria. The selection process considered the following key factors:

- International applicability;
- Adaptability to the banking system of the Republic of Kazakhstan;
- Balance between qualitative and quantitative indicators;
- Support from regulatory and financial institutions.

In light of these criteria, and based on reports from the National Bank of the Republic of Kazakhstan, the Agency for Financial Market Development and Regulation, as well as second-tier banks, alongside Scopus-based research and stability analysis of Kazakhstani banks, the scope of these methods is as follows:

The SREP method has been implemented by the Agency for Financial Market Development and Regulation since 2022. It has been specifically adapted to the domestic banking system to assess the stability of second-tier banks.

The CAMELS method is utilized by the National Bank of Kazakhstan as an internationally recognized standard for monitoring the financial soundness of commercial banks.

The BAKIS and PATROL methods, widely applied in Germany and Italy, have been selected as alternative approaches to liquidity and risk management due to their proven effectiveness in these areas.

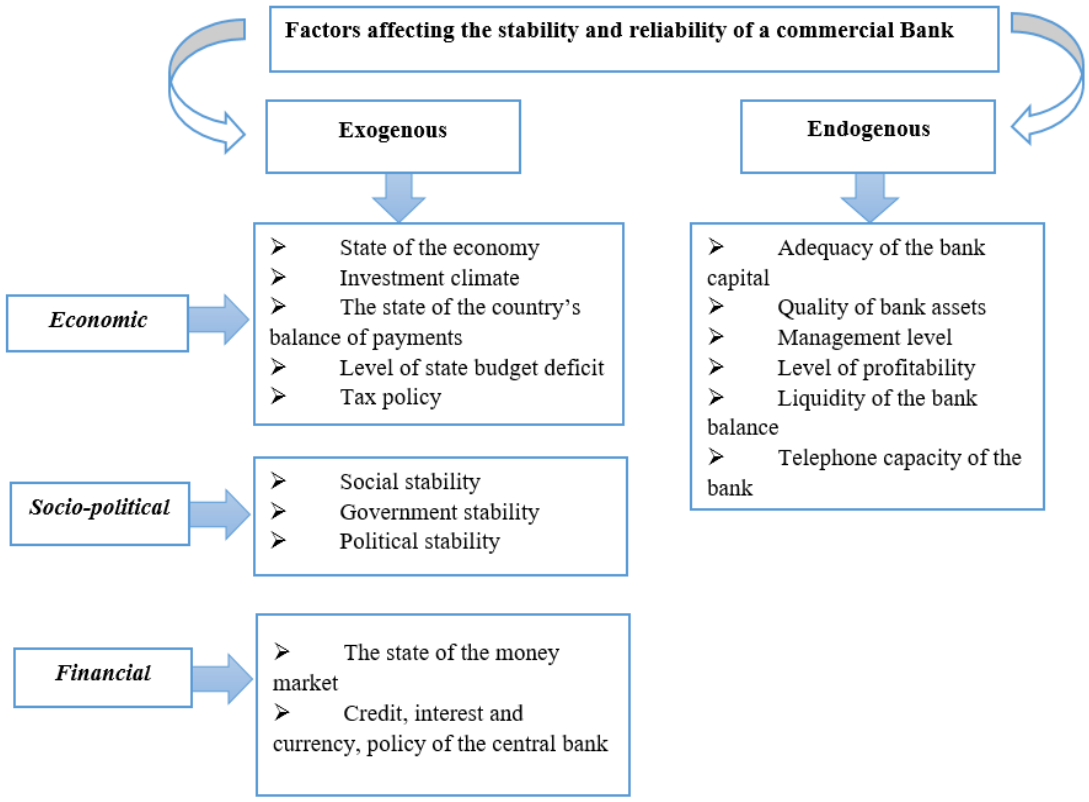

Figure 2 – Structure of influencing factors for stability of commercial banks
Note – compiled by the author based on source (Ostroumova, 2017)

Estimating the bank stability of the Bank of Kazakhstan

The assessment of bank stability in the Republic of Kazakhstan requires analyzing numerous indicators and factors to regulate institutions' ability to work effectively amongst economic variations and potential risks.

Key elements include:

Capital adequacy: A critical measure of financial stability evaluates the capital-to-asset ratio, which shows how well a bank could withstand possible losses. Institutions with larger capitalization levels are generally more resilient.

Credit portfolio quality: Assessing the credit portfolio helps to determine loan default risk. A lower percentage of non-performing loans, combined with stringent credit evaluation criteria, indicates greater stability.

- Liquidity: This indicator gauges a bank's capacity to fulfill its financial commitments. Institutions with high liquidity are able to handle short-term financial challenges.

- Risk management: Strong risk management procedures, such as mitigation and detection of credit, market, operational, and reputational risks, are essential to stability.

- Profitability: Representing prudent financial practices, profitability is a key indicator of financial health. Analyzing the sustainability of income streams is equally important.

- Regulatory compliance: Since compliance lowers exposure to financial risks, adherence to regulatory requirements enhances stability.

The broader macroeconomic environment is a significant aspect. The financial stability of second-tier banks can be greatly affected by inflation, GDP growth, interest and unemployment rates.

Table 1 shows a comparison of techniques and methods used to evaluate the stability of a second-tier bank. Notably, these methods mostly utilize quantitative metrics, with sporadic incorporation of qualitative elements. This limitation reduces the comprehensiveness and accuracy of assessing a bank's overall health.

Table 1 – Comparison of techniques for determining the stability of a commercial bank

Method	Quantitative indicators	Qualitative indicators	Expert assessment	Integral result indicator	Standart (recommended) values	Ranking of banks by group	An analysis rating
Foreign methods							
CAMELS (USA)	+	+	+	+	-	+	-
BAKIS (Germany)	+	-	-	-	+	+	-
PATROL (Italy)	+	-	-	-	+	+	-
SREP (Europe)	+	+	+	-	+	+	-
Note – compiled by the author based on the source (Semenova et al., 2021)							

Key factors like liquidity, capital, liabilities quality and assessed, and profitability are usually the focus of the examined approaches. Each method has distinct advantages and disadvantages. Their limited accessibility is a major issue because many of them rely on personal data, which limits their value for external stakeholders and a wider audience. Therefore, regulatory authorities are the main users of these techniques. As a result, these methods are primarily available to regulatory authorities (Semenova et al., 2021).

A sustainable extra value approach, financial stability indicator analysis, banking sector stress testing, assessment of banks' levels of financial stability and risks, and the regulatory and supervisory framework are some techniques for evaluating the bank's sustainable development. Other approaches include the use of complex indicators and indices, such as the Financial Stress Index (FSI) and the Financial Position Index (FCI) (Hussein, 2023; Betul, 2022).

Multidimensional systems and methods, including logarithmic objective measurement (LOPCOW) and Dombi Bonferroni (DOBI), which are based on percentage changes, can be employed to assess the stability indicators of a bank (Ecer, F. et al., 2022). Furthermore, by taking into consideration five important dimensions- economic, social, environmental, and institutional – the hierarchy analysis approach may be used to assess the sustainable development of commercial banks.

Another innovative method, the exchange method, serves as a patented approach for evaluating e-banking services, aligning them with sustainable development goals. These methodologies provide comprehensive frameworks for integrating sustainability into the evaluation of banking practices.

Results and discussion

All of these factors are examined as part of the analysis of bank stability in the Republic of Kazakhstan, which also includes the state of the Kazakh financial market and its regulatory characteristics. The systematic conduct of such an analysis will allow for identifying potential weaknesses in the banking system and taking measures to eliminate them in order to ensure the stability and reliability of the financial sector.

Table 2 – Comparative SWOT analysis of bank stability analysing methods

Method	Strengths	Weaknesses	Opportunities	Threads
CAMELS	Comprehensive Analysis Wide application Standardization	Complexity and labor intensity Limited prospects Dependence on reporting	Integration with new technologies and adaptation to changing regulatory requirements	Changing the regulatory environment Competition with alternative methods
BAKIS	Attention to quantitative and qualitative indicators Dynamic Update	Complexity Labor intensity	Use in combination with other methods Software development	The need for constant renewal Possible errors in the assessment

Continuation of the table

Method	Strengths	Weaknesses	Opportunities	Threads
PATROL	Emphasis on operational monitoring Integrated approach	Demanding big data High Requirements for IT infrastructure	Integration with AI and machine learning Adaptive flexibility	Technical risks: Data privacy
SREP	Have a clear and effective development strategy Sufficient financial resources High-tech equipment and modern IT systems Environmentally friendly production, positive reputation in terms of sustainable development Highly qualified employees	Lack of long-term planning Low adaptation to market changes Lack of investment in innovation Outdated technologies that do not meet environmental standards Low level of environmental awareness	Entering new markets Product line expansion, attracting investment Partnership with technology companies Introduction of environmentally friendly technologies Professional development of employees	Strengthening competition Market instability, financial crises Strengthening environmental legislation Negative impact of climate change on production Decrease in productivity due
Note – compiled by the authors on the sources (Agarkova, L. et al., 2022)				

According to the table above, if we reveal the essence of the analysis of the listed methods: CAMELS

Strengths: Comprehensive analysis: includes six essential metrics that give an in-depth picture of the bank's financial health: capital, assets, management, profit, liquidity, and risk sensitivity.

Wide Spread: widely used by regulators and financial analysts worldwide. Standardization: a single methodology that allows you to compare different banks.

Weaknesses: Complexity and labor-intensive: considerable resources and time are required to collect and analyze data. Prospective limitations: stability is assessed mainly on the basis of historical data, which may not always accurately reflect future risks. Reporting dependency: the quality of the analysis depends on the accuracy of the data provided.

Opportunities: Adapting to changing regulatory requirements: the capacity to modify the process to comply with new norms and regulations.

Threats: Regulatory environment change: The technique may need to be significantly adjusted in response to new laws and regulations. Competition from alternative methods: the requirement for CAMELS may decline when new methods for evaluating bank stability are developed.

BAKIS

Strengths: Focus on both qualitative and quantitative indicators: contains a wide range of indicators, allowing a more in-depth analysis. Adaptive Updates. The methodology enables assessments to be updated quickly as new data becomes available.

Weaknesses

- High complexity: The use of the methodology demands thorough knowledge and specialized experience.

- Resource-intensive: The process's high reliance on resources for data collection and processing contributes to high operational costs.

Opportunities:

- Integration with complementary frameworks: The methodology can be combined with CAMELS to provide a more effective assessment.

- Automation through software development: Creating particular applications enables to optimization of the evaluation process.

Threats

Technical risks: Depends heavily on the reliability of the IT framework and program

Data security issues: Present essential risks of data breaches and misuse.

SREP

Strengths

Strategic Focus: Define, long-term plan that promotes steady growth and development.

Resource availability: takes advantage of substantial financial resources and modern technologies.

Environmental responsibility: Fosters a positive reputation of the company as one that cares about the environment.

Human capital: Operational effectiveness is influenced by low turnover rates and trained staff.

Limitations

Strategic limitations: Struggles quickly adjusting to changing market conditions.

Resource gaps: Insufficient investment in technological upgrades and innovative projects.

Environmental standards: Depends on antiquated manufacturing techniques.

Workforce challenges: There is a lack of expertise in developing and rapidly changing sectors.

Characteristics:

Strategic Capability: Provides opportunities for entering international markets and diversifying products.

Resource: Focuses on attracting additional investments and forming partnerships with leading technology firms.

Environmental: Involves the adoption of advanced environmental technologies and active participation in environmental initiatives.

People: Aims to develop professional growth and incentive programs for employees.

Threats:

Strategic: Rising competition and economic volatility.

Resource: Increased costs of raw materials, which may lead to higher production expenses.

Environmental: Stricter environmental regulations and changes in climate conditions.

Personnel: High employee turnover and decreased motivation.

By utilizing various SWOT analysis techniques, it is possible to examine different facets of a company's operations in a more thorough and organized manner, enabling a more precise identification of strengths, weaknesses, opportunities, and threats.

Each method offers its own set of strengths, weaknesses, opportunities, and threats. To achieve a more comprehensive and precise evaluation of a bank's stability, it is recommended to combine these methods, considering their complementarity and individual advantages.

The Republic of Kazakhstan's agency for Financial Market Regulation and Development uses the SREP approach to evaluate second-tier banks.

Table 3 – Key directions for SREP methodology-based banking system assessment

Main directions	Responsibilites
Growth of assets of the banking sector due to an increase in the credit portfolio and the portfolio of government securities	Improving the supervision process according to the SREP methodology
The stability of banks to foreign economic shocks and the availability of sufficient capital and liquidity	Development and integration of ESQ principles
Conducting an annual full-scale supervisory assessment according to the SREP methodology	Reducing consumer lending risks
Positive changes in the increase in the number of banks with low risks	Restoration of liquidity to lending to the real sector economy
Observational stress testing with stable AQR and less conservative scenarios	IMF and World Bank assessment of Kazakhstan's financial sector
Development of climate stress testing for second-tier banks	Integration of Basel principles into the activities of the bank
Note – compiled by the author based on discussions on the supervisory policy and the main directions of the banking sector development.(Official Website of the Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market, 2024)	

The total quantity of highly liquid assets has grown by 20,7 % since 2022 (Official Website of the Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market) , and many banks' liquidity ratios are higher than those allowed by law. Banks use excess liquidity mainly to purchase government securities and to place funds in accounts with the National Bank. Despite geopolitical shocks, liquidity risks in many banks are considered quite moderate, with highly liquid assets accounting for one-third of banks' total assets.

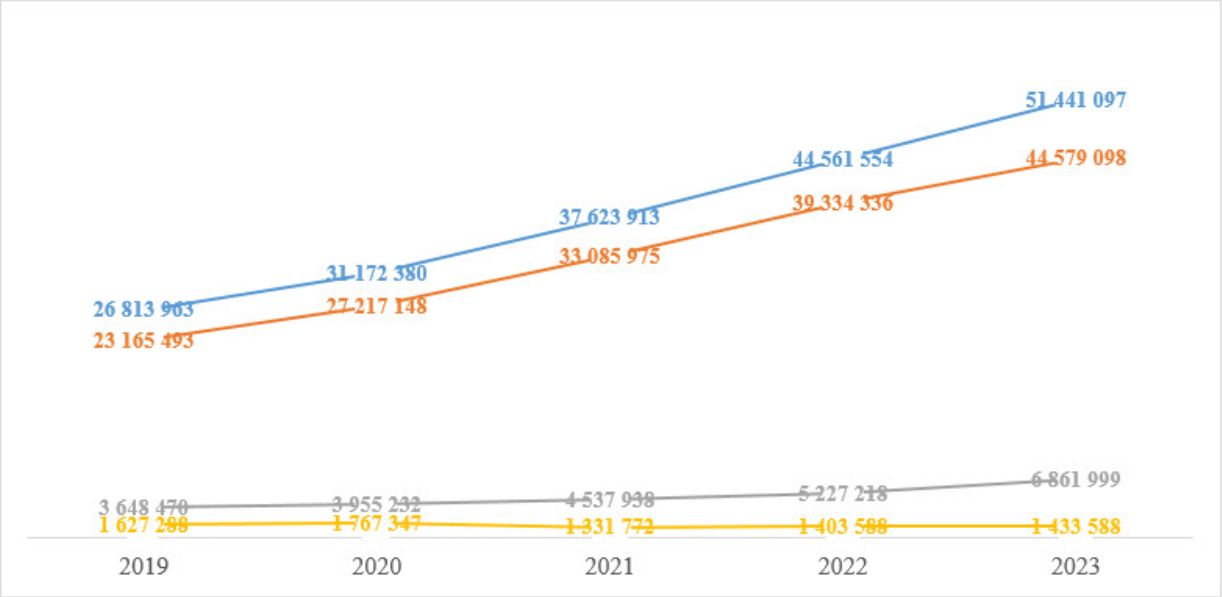

Figure 3 – Dynamics of financial indicators of STBs of the Republic of Kazakhstan, million tenge
Note – compiled by reports on the financial performance of second-tier banks
(Official website of the National Bank of Kazakhstan, 2024)

As can be seen from the figure above, if we analyse the main indicators of the banking sector, assets in 2019 will amount to млн 26,813,963 million. 51,441,097 million tenge in 2023. Liabilities will amount to KZT 23,165,493 million in 2019 and 44,579,098 million tenge in 2023. The growth of assets and liabilities reflects the expansion of the banking sector during this period. Equity capital in 2019 was KZT 3,648,470 million, compared to KZT 6,861,999 million in 2023. The authorised capital in 2021 was KZT 1,331,772 mln. In 2020, it was KZT 1,767,347 mln. It remained in of up to tenge and showed minor fluctuations. Excess of current income over current expenses: this figure is 726,803 million in 2022.of KZT 2,184,757 million in 2023. We can see that the tenge fluctuates. The largest increase was observed in 2023, which may indicate an improvement in banks' profitability.

Capital adequacy ratios:

The coefficients(k1-1),(k2-2) and (k2) varied with constants.

This shows that the banking sector is stable and has enough capital to cover risks.

The banking sector shows a significant increase in assets and liabilities over the last five years.

Banks' equity capital has also increased, which is a positive indicator. Capital adequacy ratios remain at a stable level, which indicates the financial stability of the banking sector.

These indicators allow us to analyse the development trends of the banking sector and assess its stability.

In 2023, amid the gradual stabilization of inflation and the subsequent easing of monetary policy, Kazakhstan's financial sector experienced favorable conditions, with no significant unforeseen external or internal disruptions. The national Bank was essential in protecting the stability of the financial system, working in tandem with the Government and the Agency for the regulation and development of the financial market.

The banking sector's financial health remained robust, supported by substantial liquidity reserves, adequate capitalization, and sustained growth in key performance indicators. By the end of 2023, bank assets surpassed 50 trillion tenge for the first time, reflecting an increase of 15.4% (6.9 trillion tenge), compared to an 18.4% rise in 2022. The loan portfolio grew to 29.9 trillion tenge, marking a 23.1% increase (5.6 trillion tenge), compared to a 20.1% growth (4.1 trillion tenge) in 2022.

Additionally, the corporate loan portfolio, including small and medium-sized enterprises (SMEs), expanded by 16.2% (1.7 trillion tenge) by the close of the year, further contributing to the sector's overall stability and growth trajectory (in 2022, 16.7% or 1.5 trillion tenge) and amounted to 12.5 trillion tenge.

According to the National Bank of the Republic of Kazakhstan, the top-10 second-tier banks in terms of assets were analyzed as of 01.05.2024.

This table shows the financial data of the top 10 banks in Kazakhstan, including their assets and liabilities, which are the basis for their net worth.

Table 4 – The financial indicators of second-tier banks as of 01.05.2024 (top 10 banks)

№	Name of the bank	Assets	Obligaions	Net assets
1	Halyk Savings Bank of Kazakhstan JSC	15,109,936,098	12,712,655,124	2,397,280,974
2	Kaspi bank JSC	6,845,732,231	5,991,317,720	854,414,511
3	Bank CenterCredit JSC	5,410,945,407	4,934,632,252,	476,313,155
4	Otbasy Bank JSC	4,016,441,949	3,379,140,380	637,301,569
5	Forte Bank JSC	3,670,567,601	3,188,122,426	482,445,175
6	First Heartland Jusan Bank JSC	2,918,572,877	2,184,904,664	733,668,213
7	Eurasian Bank JSC	2,676,676,461	2,319,041,745	357,634,716
8	Bank Freedom Finance Kazakhstan JSC	2,213,440,469	2,060,312,098	153,128,371
9	Bereke Bank JSC	2,108,877,862	1,941,770,453	167,107,409
10	Bank RBK Bank JSC	1,938605,349	1,754,335,965	184,269,384
Note – compiled by reports on the financial performance of second-tier banks (Official website of the National Bank of Kazakhstan, 2024)				

According to this, the largest banks by assets are

- Halyk Savings Bank of Kazakhstan JSC: has the largest assets among all banks – 15.1 trillion tenge.

- Kaspi Bank JSC: in second place with 6.8 trillion tenge assets.

- Bank CenterCredit JSC: in third place with 5.4 trillion tenge assets.

For many banks, liabilities are a significant part of assets. For example, Halyk Savings Bank of Kazakhstan JSC has liabilities of 12.7 trillion tenge, which is about 84% of its assets. At Kaspi Bank JSC has liabilities account for about 84% of assets.

Net assets (the difference between assets and liabilities):

- Halyk Savings Bank of Kazakhstan JSC has net assets of about 2.4 trillion tenge.

- Kaspi Bank JSC – about 854 billion tenge.

- Bank CenterCredit JSC – about 476 billion tenge.

The difference between assets and liabilities of Halyk Savings Bank of Kazakhstan JSC is the largest, indicating its high financial stability.

The market leaders are several large banks in Kazakhstan, such as Halyk Savings Bank of Kazakhstan JSC and Kaspi JSC, which are well ahead of other banks in terms of assets and liabilities. The financial stability of some banks can be analyzed through the ratio of their assets to liabilities, where high net assets reflect the stability of their strong financial position.

In 2023, the National Bank, the World Bank, and the Agency of the Republic of Kazakhstan for Financial Market Regulation and Development collaborated on the Financial Sector Assessment Program (FSAP) for Kazakhstan. The FSAP conducted a comprehensive evaluation of the financial sector, focusing on its stability, resilience to crisis, and adherence to international standards.

The FSAP encompassed several key areas, including:

Financial Security and Crisis Management: Evaluating the sector's preparedness and response capabilities.

Compliance with Basel Core Principles: Assessing adherence to the Basel Committee's Core Principles for Effective Banking Supervision.

Macroprudential Policy: Reviewing measures to mitigate systemic risks.

Climate Risk Analysis: Addressing the impact of climate-related risks on the financial sector.

Stock Market Development: Identifying opportunities and challenges, and capital market growth.

Following the FSAP, the National Bank and the World Bank issued targeted recommendations to address identified gaps and enhance the development of the financial sector. Key recommendations included aligning bank insolvency regulation

practices with international principles and standards. It was mentioned that the Government and the National Bank, if state support is necessary, have a role in the financial safety net, involving the Agency for regulations and development of the Financial market, and that the National bank believes it is essential to increase the government's participation in the regulatory process and exploring the use of state (budgetary) funds to support insolvency frameworks, the Government and the National Bank in case of need for state support, was noted. In particular, the National Bank considers it necessary to strengthen the participation of the government in the regulatory process.

Conclusion

The study systematized theoretical approaches to understanding the economic essence of sustainable development in second-tier banks and examined global methodologies for assessing bank stability. A methodological framework was developed to evaluate a bank's stability, incorporating five key dimensions: social, economic, environmental, institutional, and technological. Based on this framework, the following conclusions were drawn:

This study examines various methodologies for assessing the financial stability of banks, including CAMELS, BAKIS, PATROL, and SREP. Among these, the SREP method, currently employed by the Agency of the Republic of Kazakhstan for Regulation and Development of the Financial Market, has proven to be the most applicable to banks in Kazakhstan. This method encompasses a comprehensive evaluation of the banking system's stability, integrating macroeconomic analysis, stress testing, and adherence to international regulatory standards. Additionally, methodologies based on composite indicators and financial stability analysis, such as the Financial Stress Index (FSI) and the Financial Condition Index (FCI), have also demonstrated effectiveness in assessing financial resilience.

The objective of this study is to analyze the stability of Kazakhstan's banking sector by incorporating modern assessment methodologies and macroeconomic factors. Both quantitative and qualitative analytical approaches have been considered, including CAMELS, BAKIS, PATROL, and SREP. The findings indicate that the SREP method is the most suitable, given its current implementation in Kazakhstan for evaluating banking stability.

Based on the research findings, the following recommendations have been formulated:

1. For Regulatory Authorities:

- Enhance supervision of banks' loan portfolios and develop mechanisms for early risk detection.
- Implement stress testing methodologies that account for climate-related and macroeconomic factors.
- Encourage credit diversification and reduce reliance on government securities investments.
- Strengthen insolvency regulation frameworks in alignment with international best practices.

2. For Banking Institutions:

- Improve risk management frameworks by integrating digital technologies and artificial intelligence.
- Develop sustainable financial instruments, including green bonds and ESG-oriented lending practices.
- Enhance transparency and corporate governance structures to reinforce investor and depositor confidence.
- Leverage advanced methodologies, such as integrated indicators and artificial intelligence, to enhance financial risk forecasting and resilience analysis.

An analysis of financial indicators reveals that Kazakhstan's banking sector remains stable, exhibiting sustained asset growth, robust liquidity levels, and adequate capitalization. Nevertheless, potential risks persist, particularly in relation to loan portfolio quality, liquidity management, and macroeconomic fluctuations.

To ensure long-term financial stability, it is essential to enhance banking regulations, diversify credit portfolios, and optimize risk management strategies. The adoption of innovative financial technologies and the alignment of domestic banking practices with international regulatory standards will enable Kazakhstan's banking sector to reinforce its resilience amid global financial uncertainties.

Future research may explore alternative methods for assessing the sustainability of second-tier banks.

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Information about authors:

Zhumadilova Tolkyn (corresponding author) – PhD student at the Department of Finance and accounting, Al-Farabi Kazakh National University (Almaty c., Kazakhstan, email: zhumadilova_tolkyn@mail.ru*);*

Doszhan Raigul – PhD, associate Professor at the Department of Finance and accounting, Al-Farabi Kazakh National University (Almaty c., Kazakhstan, email: rdd2011@mail.ru*);*

Aliyeva Baglan – candidate of economic sciences, acting Associate Professor at the Department of Finance and accounting, Al-Farabi Kazakh National University (Almaty c., Kazakhstan, email: Baglan_a74@mail.ru*);*

Ryszard Pukala – prof., Faculty of Economic and Management, State University of Applied Science (Jaroslaw c., Poland, e-mail: ryszard.pukala@interia.pl *).*

Авторлар туралы мәлімет:

Жумадилова Толкын Бексултановна (корреспондент-автор) – PhD докторант, «Қаржы және есеп» кафедрасы, Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, эл. пошта: zhumadilova_tolkyn@mail.ru *);*

Досжан Райгул Дүкенбайқызы – PhD, «Қаржы және есеп» кафедрасының қауымдастырылған профессоры, Әл-Фараби атындағы Қазақ Ұлттық Университеті (Алматы қ., Қазақстан, эл. пошта: rdd2011@mail.ru)*;*

Алиева Баглан Муратовна – э.г.к.,, «Қаржы және есеп» кафедрасының доцент м.а., Әл-Фараби атындағы Қазақ ұлттық университеті (Алматы қ., Қазақстан, эл. пошта: baglan_a74@mail.ru*)*

Ричард Пукала – профессор, Экономика және Менеджмент Факультеті, Мемлекеттік Қолданбалы Ғылымдар Университеті (Ярослав қ., Польша, эл.пошта: ryszard.pukala@interia.pl *)*

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M. Mammadzada

Azerbaijan State Economic University, Baku, Azerbaijan
e-mail : mammadzada.matanat@unec.edu.az

OVERTIME WORK AND SATISFACTION: REVIEW AND DIRECTIONS FOR FUTURE RESEARCH

The connection between overtime work and satisfaction remains a crucial yet insufficiently studied research area. This review article examines the inconsistent findings on how overtime affects job satisfaction, life satisfaction, and health-related outcomes. Its aim is to deliver a comprehensive analysis of the existing literature and highlight research gaps to inform future investigations. Key research questions are about the existing literature's classification based on various approaches to the overtime-satisfaction relationship, overtime's impact on job satisfaction, life satisfaction, and other related factors, and the influence of different factors on the effects of overtime on satisfaction. The article posits that overtime's impact on satisfaction is not uniform but depends on the interaction of multiple factors, such as the amount of overtime, whether it is voluntary or mandatory, and its interference with personal life. To explore these questions, a systematic literature review was conducted, organizing studies into five key themes: recompense, overtime load, state of overtime, interference and impact. The review primarily examines cross-sectional studies across various industries. The findings indicate that a one-size-fits-all approach to managing overtime is inadequate, as the interaction of various factors is complex and context-dependent. The article concludes by advocating for a holistic approach in future research, encouraging scholars to move beyond isolated factors and adopt a multidimensional perspective.

Key words: overtime, satisfaction, health, personal life, compensation.

М. Маммадзада

Әзірбайжан мемлекеттік экономикалық университеті, Баку, Әзірбайжан
e-mail: mammadzada.matanat@unec.edu.az

Жұмыс уақытынан тыс еңбек ету және қанағаттану: шолу және болашақ зерттеулер бағыттары

Жұмыс уақытынан тыс еңбек ету мен қанағаттану арасындағы байланыс – маңызды, бірақ жеткіліксіз зерттелген ғылыми сала. Бұл шолу мақаласында жұмыс уақытынан тыс еңбек етудің жұмысқа қанағаттану, өмірге қанағаттану және денсаулыққа байланысты әсерлері туралы әртүрлі және қайшылықты тұжырымдар талданады. Оның мақсаты – бар әдебиеттерге кешенді талдау жүргізу және болашақ зерттеулерге бағыт-бағдар беру үшін зерттеу олқылықтарын айқындау.

Негізгі зерттеу сұрақтары жұмыс уақытынан тыс еңбек ету мен қанағаттану арасындағы байланысты зерттеудің әртүрлі тәсілдеріне сүйене отырып жіктеу, жұмыс уақытынан тыс еңбек етудің жұмысқа және өмірге қанағаттануға, сондай-ақ басқа да байланысты факторларға әсері, сонымен қатар қанағаттануға жұмыс уақытынан тыс еңбек етудің ықпалын күшейтетін немесе төмендететін факторларды талдаумен байланысты.

Мақалада жұмыс уақытынан тыс еңбек етудің қанағаттануға әсері біркелкі емес және бірнеше фактордың өзара әрекеттесуіне тәуелді екені атап өтіледі. Олардың қатарына жұмыс уақытынан тыс еңбек ету көлемі, оның ерікті немесе міндетті болуы, сондай-ақ жеке өмірге тигізетін ықпалы жатады.

Осы мәселелерді зерттеу үшін жүйелі әдеби шолу жүргізіліп, зерттеулер бес негізгі тақырып бойынша жіктелді: өтемақы, жұмыс уақытынан тыс еңбек ету жүктемесі, жұмыс уақытынан тыс еңбек етудің жағдайы, араласу және ықпал. Шолу әртүрлі салалардағы көлденең зерттеулерге негізделген.

Нәтижелер көрсеткендей, жұмыс уақытынан тыс еңбек етуді басқаруда бірыңғай тәсіл тиімсіз, өйткені әртүрлі факторлардың өзара әрекеттесуі күрделі және контекстке тәуелді. Мақала болашақ зерттеулерде оқшауланған факторларды ғана қарастырудан бас тартып, көпқырлы көзқарасты қолдануға шақырады.

Түйін сөздер: жұмыс уақытынан тыс еңбек ету, қанағаттану, денсаулық, жеке өмір, өтемақы.

М. Маммадзада
Азербайджанский государственный экономический университет, Баку, Азербайджан
e-mail: mammadzada.matanat@unec.edu.az

Сверхурочная работа и удовлетворенность: обзор и направления для будущих исследований

Связь между сверхурочной работой и удовлетворенностью остается важной, но недостаточно изученной научной областью. В данной обзорной статье рассматриваются противоречивые результаты исследований о влиянии сверхурочной работы на удовлетворенность трудом, удовлетворенность жизнью и показатели, связанные со здоровьем. Цель статьи – провести всесторонний анализ существующей литературы и выявить исследовательские пробелы для направления будущих исследований.

Ключевые вопросы исследования связаны с классификацией существующей литературы на основе различных подходов к изучению связи между сверхурочной работой и удовлетворенностью, влиянием сверхурочной работы на удовлетворенность трудом, удовлетворенность жизнью и другие сопутствующие факторы, а также их воздействием на эту взаимосвязь.

В статье подчеркивается, что влияние сверхурочной работы на удовлетворённость является неоднозначным и определяется взаимодействием множества факторов, таких как объём дополнительной нагрузки, добровольный или принудительный характер переработок, а также степень их вмешательства в личную жизнь.

Для изучения этих вопросов был проведен систематический обзор литературы, в ходе которого исследования были структурированы по пяти ключевым темам: вознаграждение, нагрузка сверхурочной работы, состояние сверхурочной работы, вмешательство и влияние. Обзор преимущественно основан на кросс-секционных исследованиях в различных отраслях.

Результаты показывают, что универсальный подход к управлению сверхурочной работой неэффективен, так как взаимодействие различных факторов носит сложный и контекстуальный характер. В заключение статьи подчеркивается необходимость комплексного подхода в будущих исследованиях, призывая ученых выйти за рамки изучения отдельных факторов и применять многомерную перспективу.

Ключевые слова: сверхурочная работа, удовлетворенность, здоровье, личная жизнь, вознаграждение.

Introduction

The relationship between overtime work and satisfaction, especially job and life satisfaction (Hamermesh et al., 2017), has been a central topic in organizational psychology and labour studies. Satisfaction, described as a positive emotional state stemming from the evaluation of one's job or life conditions (Locke, 1976), is shaped by multiple factors, including work hours. Overtime work, generally defined as working beyond the standard full-time workweek, introduces a complex dynamic in this relationship.

The connection between overtime work and employee satisfaction is a multifaceted issue that extends beyond simple job fulfilment to encompass a broader range of factors. A comprehensive literature review is necessary to provide a clearer understanding of how overtime shapes various aspects of satisfaction, particularly in light of its potential to affect health (Matsumoto & Gopal, 2019), personal life (E. Kim et al., 2024) and long-term engagement with work.

One of the primary reasons for conducting a literature review on this topic is the wide range of conflicting evidence regarding the effects of overtime. A thorough literature review can help identify patterns, contradictions, and gaps in current knowledge, providing a clearer understanding of when and why overtime leads to satisfaction or dissatisfaction.

Examining the impact of overtime on satisfaction is also crucial in the context of broader organizational outcomes, such as employee retention, productivity, and health. This not only affects the individual worker but also has significant implications for organizational performance (Tadesse et al., 2015). A literature review can help identify key findings that may inform better management practices, such as flexible work schedules (Chen et al., 2023) or compensation strategies that mitigate the negative effects of overtime on satisfaction (R. F. Syed, 2020).

Given these interconnected factors impact on satisfaction cannot be understood in isolation (L. Zhang & Seo, 2016). It affects multiple dimensions of employee well-being (Núñez-Elvira, 2023) that

collectively shape both job and life satisfaction. Thus, a literature review that synthesizes findings across these areas is essential for clarifying how overtime contributes to satisfaction, dissatisfaction, or broader workplace issues. Understanding these relationships will help inform both future research and the development of policies (Fastje et al., 2022) aimed at promoting healthier work environments (Sone et al., 2024), where overtime does not erode employee satisfaction.

Methodology

This study employed a systematic literature review methodology to examine the relationship between overtime and satisfaction, ensuring a comprehensive and rigorous synthesis of empirical research. The search was conducted using the ISI Web of Knowledge database, which consolidates high-impact journals across multiple disciplines. A combination of targeted keywords such as "overtime" AND "satisfaction" was used, alongside Boolean operators to refine the results and capture a broad range of relevant studies. No restrictions on publication date were applied to ensure inclusion of both historical and contemporary research. This approach ensures that the review captures long-term trends, changes in overtime policies, and evolving perspectives on satisfaction over time. The database search was conducted in September 2024, using a combination of targeted keywords such as "overtime" and "satisfaction" to ensure broad coverage of studies examining this relationship. As a result, an initial 428 articles were identified as potentially relevant for inclusion.

To ensure methodological rigor, a multi-stage screening process was implemented to assess the eligibility of the retrieved studies. The goal was to narrow the selection to the most relevant, empirically grounded research while maintaining linguistic accessibility and thematic relevance. The following three primary inclusion criteria were applied:

Language Accessibility: The article must be published in one of the four working languages of the author–English, French, Russian, or Turkish–to allow for an in-depth reading and analysis of the study's content. This criterion ensures that the author can accurately interpret the methodology, findings, and theoretical frameworks used in the studies.

Empirical Nature: To maintain the focus on data-driven research, only studies presenting original empirical findings were included. This meant that the review excluded:

Literature reviews summarizing existing research.

Theoretical essays and conceptual papers without empirical data.

Book reviews, editorial commentaries, letters, or journalistic articles that did not contribute original quantitative or qualitative analysis.

By focusing exclusively on empirical studies, the review ensures that the findings are grounded in real-world observations and research methods.

Thematic Relevance: The study must explicitly investigate the relationship between overtime and satisfaction. Satisfaction was broadly defined to encompass:

Job satisfaction, referring to employees' attitudes toward their work environment, responsibilities, and overall engagement.

Life satisfaction, reflecting the broader implications of overtime on personal well-being and quality of life.

Work-life balance and well-being, considering the extent to which extended work hours affect employees' ability to manage personal responsibilities and maintain a healthy lifestyle.

Burnout, stress, and workplace dynamics, given that overtime is often linked to employee exhaustion, reduced productivity, and organizational outcomes.

Articles were excluded if any of these dimensions were not clearly addressed in their abstract, results, or discussion sections.

Applying these criteria, the initial sample was reduced from 428 to 243 studies, as many articles either lacked empirical data, were not available in an accessible language, or did not explicitly discuss the link between overtime and satisfaction.

Following the initial screening, a third phase of in-depth content analysis was carried out, where the full text of each remaining article was carefully examined. This phase served two key purposes:

1. Ensuring Direct Relevance: Some studies, despite mentioning "overtime" and "satisfaction" in their abstracts, primarily focused on adjacent issues such as general work conditions, compensation structures, or labour market policies without a direct analysis of how overtime influences satisfaction. These articles were excluded to maintain a sharp focus on the core research question.

2. Assessing Study Quality and Rigor: Articles with insufficient methodological transparency (e.g., those lacking a clear description of research design, sample size, or statistical analysis) were also excluded. Preference was given to peer-reviewed journal

articles, as well as highly cited studies recognized for their contributions to the field.

As a result of this rigorous multi-step filtering process, the final sample consisted of 83 high-quality empirical studies, forming the foundation for the subsequent analysis. These studies collectively provide a diverse, multi-perspective examination of how overtime influences various facets of satisfaction, including job engagement, personal well-being, stress levels, work-family conflict, and employee retention.

This systematic review methodology ensures that the findings presented in this paper are based on robust, empirical evidence, rather than anecdotal reports or theoretical speculations. By implementing three levels of filtering (language, empirical basis, thematic relevance) and conducting a final qualitative assessment of study content, this review achieves a high degree of precision and reliability.

Furthermore, by not limiting the search by publication date, the analysis captures both historical trends and modern shifts in how overtime and satisfaction are understood in workplace settings. This approach offers a longitudinal perspective, allowing the identification of patterns, inconsistencies, and emerging research gaps that warrant further investigation.

The selected studies cover a range of industries, occupational groups, and geographic regions, making the findings broadly applicable across different labour market contexts. However, it is important to acknowledge that most of the included research is cross-sectional, with fewer longitudinal studies available. This limitation is discussed further in the future research directions section.

By employing this methodologically rigorous approach, this literature review offers a solid foundation for advancing scholarly understanding of the relationship between overtime and satisfaction, ultimately informing both academic discourse and policy development in the field of labour studies.

Literature Review

Organizing Framework for Review

To determine organizing framework for literature review, inductive approach was used – a method that allows the themes to emerge organically from the data (Thomas, 2006). Instead of starting with predefined categories, analysing the studies' findings helps to identify major perspectives (Glaser, 1992, 2015). Based on inductive approach five categories emerged from current study. The five categories of recompense, overtime load, state of overtime, interference, and impact are summarized in Table 1.

Table 1 – Summary of categories

Categories	Key idea	Representative examples of category	Key perspectives
Recompense	Potential for increased earnings, provision of compensatory leaves due to overtime hours, faster career growth opportunities influence employees' approach to overtime work.	R. F. Syed et al., 2024, He, Chen, Wang, & Wang, 2023, Tromp & Blomme, 2012.	Employer support acts as moderator between overtime and job satisfaction. Overtime directly affects intention to leave. Overtime directly affects job satisfaction. Overtime directly impacts health.
Overtime load	Effect of overtime changes according to amount and frequency of extra hours.	Nguyen & Giang, 2019, Shi et al., 2023, Mousazadeh et al., 2018.	Overtime directly affects job satisfaction. Overtime directly affects well-being. Overtime directly impacts burnout. Overtime directly impacts retention.
State of overtime	Satisfaction is affected by the fact whether overtime work is voluntary or compulsory.	Meischke et al., 2024, Arsalani et al., 2012, Alharbi & Alkhamshi, 2024.	Overtime directly affects job satisfaction. Overtime directly affects intention to leave. Overtime directly impacts mental health. Overtime directly impacts depression.
Interference	There are challenges on integrating overtime with personal life.	Christopher, 2021, Erdoğan et al., 2020, Asayesh et al., 2019.	Employer support acts as moderator between overtime and work-life balance. Overtime directly impacts work-to-family conflict. Social life acts as mediator between overtime and intention to leave. Overtime directly affects social well-being.

Continuation of the table

Categories	Key idea	Representative examples of category	Key perspectives
Impact	Overtime may have an impact on physical and mental health.	Azemi et al., 2022, Tsuyuguchi, 2023, Nakata, 2017.	Trust relationship acts as moderator between overtime and well-being. Job satisfaction acts as moderator between overtime and depression. Overtime directly impacts mental health. Overtime directly impacts burnout.
Note – compiled by the author based on inductive approach to current literature review			

Recompense Category

In recompense category it is posited that the potential for increased earnings, the provision of compensatory leaves as a response to extended work hours, and the perception of accelerated career advancement opportunities significantly shape employees' satisfaction with and behaviours toward overtime work. These studies suggest that when employees perceive tangible rewards, such as financial benefits (R. F. Syed et al., 2024) or compensated day-off (He, Chen, Wang, & Wang, 2023) incentives, as direct outcomes of overtime, they are more inclined to view the additional hours as advantageous rather than burdensome and react to it with reduced stress. Furthermore, the prospect of faster career progression (Tromp & Blomme, 2012), often linked to increased visibility and responsibility gained through overtime, can serve as a factor that mitigates the negative effects typically associated with extended work hours (Tan et al., 2023). In this view, overtime is reframed as a strategic investment in one's professional development and financial well-being, thereby influencing individual decision-making processes and work engagement.

In this category of empirical research, overtime work is examined through several key perspectives.

First, these studies suggest that different kinds of recompense, e.g., employer support can function as a moderating variable in the relationship between overtime and job satisfaction. Employer-provided childcare and fitness programs independently protect against nurses' job dissatisfaction – which is created by unpaid overtime – even after accounting for workplace factors and personal characteristics (Wilkins & Shields, 2009). So, the negative impact of overtime on job satisfaction may be mitigated, or even transformed into a more positive experience.

Additionally, overtime has been found to exert a direct influence on employees' intention to leave. The accumulation of extra work hours may heighten employees' consideration of turnover (Bae, 2023), especially when there's overtime payment related problems (Kitila et al., 2021). The ability to compensate for overtime within the same month was linked to a reduced intention to leave the profession early, suggesting that the key factor may not be the overtime itself, but rather the opportunity for prompt compensation (Peter et al., 2021). It is worth to note that in this category of research, certain exceptions to the general findings have been observed. For instance, in a study examining boutique hotels, no significant relationship was identified between unpaid overtime and employees' intention to stay. This anomaly may be attributed to the widespread prevalence of long workweeks and unpaid overtime within the hospitality sector, which normalizes such practices among employees, as well as due to the absence of robust job security provisions in the country's labour legislation (Unsal-Akbıyık & Zeytinoglu, 2018). Consequently, in this specific context, unpaid overtime may not function as a significant predictor of employee retention.

Moreover, overtime has been shown to have a direct and measurable effect on job satisfaction itself. Employees who worked more overtime were more satisfied with their current positions than those who did not, possibly due to the increased earnings from overtime enhancing satisfaction (Bragadóttir et al., 2020). Employees' overtime facility has a significant positive impact on increasing workers' level of satisfaction by 50% if a worker receives an additional one hour of overtime (R. F. Syed et al., 2024). At the same time workers place significant importance on receiving proper overtime payment. If they receive adequate overtime benefits, their job satisfaction increases by 44% (R. Syed et al., 2021). Another interesting fact is that high earners work five times as much overtime as low earners, implying that they prefer to work more. This trend may be attributed to the fact that the additional income from overtime is relatively minimal for low earners, while high earners receive significantly greater rewards, whether in terms of income or personal satisfaction, for their extra working hours. (Shao, 2022)

Finally, overtime, especially unpaid, directly contributes to poorer mental health levels among employees (Kevric et al., 2017).

Overtime Load Category

Overtime load category of empirical studies emphasizes that the impact of overtime on employees is contingent upon the amount and frequency (Gao et al., 2023) of extra working hours. These studies suggest that the effect of overtime is not uniform but varies according to the intensity and regularity with which employees engage in additional work beyond standard hours. This body of research highlights the importance of distinguishing between different overtime patterns and examines overtime work through following perspectives: First, empirical studies suggest that the amount and frequency of overtime work can exert both positive and negative (Gümüş et al., 2021) effects on employees, depending on the intensity of extra hours worked. Overtime often leads to diminished job satisfaction, as employees tend to feel exhausted when required to work additional hours frequently (Nguyen & Giang, 2019). For example, firm overtime may negatively affect employee satisfaction, with subsequent findings indicating that this reduced satisfaction indirectly decreases firm productivity. This occurs when overtime exceeds optimal levels, leading to a situation where the associated costs outweigh the benefits (Ko & Choi, 2018). Furthermore, employees working more than 6–9 overtime shifts per month reported lower levels of satisfaction compared to those working fewer than 5 shifts (Shi et al., 2023). However, certain groups, such as nurses working over 100 hours of overtime per month, reported higher job satisfaction than those with fewer overtime hours, primarily due to the increased income associated with extended work hours, which can positively influence satisfaction (Mousazadeh et al., 2018). Nonetheless, other studies confirm that continuous shift work or frequent overtime results in lower job satisfaction, highlighting the need to identify optimal working hours to maintain both employee well-being and productivity (M. Li et al., 2023). These findings suggest that while overtime can offer financial rewards, the long-term impact on work quality and job satisfaction may be negative if not carefully managed (Nishimura et al., 2019).

Second, research on overtime reveals a clear link between overtime level and frequency and diminished overall well-being (Zijlstra & Verhetsel, 2021). As the number of overtime hours increases, employees report a decline in their work-related quality of life, accompanied by an intensification of workload (Abbasi et al., 2019). This reduction in quality of life is closely tied to work-life conflict, which has been shown to significantly increase the frequency of musculoskeletal disorders (MSD) in both men and women. However, the impact of overtime on MSD appears to be more pronounced among male workers, with those frequently working overtime exhibiting a higher prevalence of such disorders, whereas no significant difference was found among female workers (Y. Kim & Cho, 2017). Additionally, the demands of excessive overtime lead to elevated stress levels (Seo et al., 2016). This is particularly evident in professions like nursing (Albelbeisi et al., 2024), where extended overtime correlates with heightened stress and an increased likelihood of sick leave, a risk that escalates as the duration of overtime rises (Kane, 2009). These findings highlight the significant toll that prolonged and frequent overtime can take on employees' health and well-being.

Third, the authors discovered that individuals working 4–6 hours of overtime per week were 4.11 times more likely to experience burnout compared to those with no overtime. Interestingly, only the 4–6 hours of overtime was identified as a significant risk factor for burnout, with those working more than 6 hours showing a lower risk. The authors suggest that individuals working more than 6 hours of overtime may struggle to maintain their jobs without support for child-rearing. In contrast, the 4–6 hours of weekly overtime averages to about 1 hour per day, which can be managed without additional child-rearing support (Maruyama et al., 2015). However, this amount may lead to physical and mental (Marina et al., 2023), as well as emotional exhaustion (L. Li et al., 2024) due to the accumulation of time-related and emotional stress.

Empirical evidence suggests that the amount and frequency of overtime work significantly impact employee retention, with excessive overtime contributing to a greater intention to leave. Studies have shown that as the frequency of overtime increases, so does the likelihood of employees considering turnover (Jiang et al., 2022), whereas higher levels of job satisfaction are linked to lower intentions to leave (Noh et al., 2018). For instance, research on community nurses highlights excessive overtime as a key factor driving turnover intention (Senek et al., 2023). Additionally, employees who work prolonged overtime periods are more likely to express a desire to leave, particularly when they feel socially isolated, time-pressured, or unable to manage their tasks effectively (Nemteanu & Dabija, 2020). One study found that willingness to stay in a position for less than five years was closely associ-

ated with the burden of excessive overtime (Matsuo et al., 2021). These findings underscore the need for organizations to carefully monitor overtime practices, as the frequency and intensity of extra work hours can have a profound influence on employee retention.

State of Overtime Category

State of overtime category emphasizes that the distinction between voluntary and compulsory overtime plays a critical role in shaping employee attitudes and develops this idea analysing the relationship between different variables.

First, studies suggest that involuntary or mandatory overtime is linked to negative outcomes (Allemann, Siebenhüner, & Hämmig, 2019), such as higher levels of fatigue and lower job satisfaction. Workers subjected to compulsory overtime often experience a misalignment between their actual and desired work hours, contributing to dissatisfaction and reduced well-being (Beckers et al., 2008).

Moreover, nurses required to work mandatory overtime report significantly higher turnover intentions compared to those without such obligations (Bae, 2024). Compulsory overtime has been identified as one of the most detrimental work-related factors, increasing stress (Meischke et al., 2024) and risk of burnout (Posada-Quintero et al., 2020). Studies also highlight negative effects of mandatory overtime on mental-health (Arsalani et al., 2012). In contrast, voluntary overtime, where employees have autonomy over their decision to work extra hours, is associated with relatively higher satisfaction and lower fatigue, even when additional compensation is absent (N. Zhang & Chai, 2020). State of overtime is linked to compassion satisfaction too (Alharbi & Alkhamshi, 2024). These findings suggest that granting employees control over their overtime hours could mitigate negative effects on overall satisfaction.

Interference Category

Interference category comprises studies which focus on challenges on integrating overtime with personal life (Kovner et al., 2007). Overtime has been shown to directly impact work-to-family conflict (Christopher, 2021), as extended working hours reduce the time and energy available for personal and family responsibilities (Mash et al., 2022). This imbalance can strain relationships and disrupt the harmony between professional and personal spheres (Alotaibi & Aldossry, 2023). However, employer support plays a moderating role in this dynamic, helping to mitigate the negative effects of overtime on work-life balance. When organizations provide resources, flexibility, or recognition for employees working extra hours, the detrimental impact of overtime on personal life may be lessened, fostering a more manageable integration of work demands (Haar, Sune, Russo, & Ollier-Malaterre, 2018).

Furthermore, social life serves as a critical mediator between overtime and an employee's intention to leave. Due to overtime working conditions, a small percentage of nurses are able to dedicate time to social life or participate in social activities, which may contribute to the high number of nurses considering leaving their jobs (Erdoğan et al., 2020). Overtime can erode social well-being by reducing opportunities for social interaction and leisure, which in turn increases feelings of dissatisfaction (Wheatley, 2014). As a result, employees working extensive overtime hours may be more likely to consider leaving their jobs (Steinmetz et al., 2014). This highlights the broader implications of overtime on employee retention (Asayesh et al., 2019), as maintaining a healthy work-life balance becomes challenging ("PBRI," n.d.).

Although most studies talk about negative overtime experiences of employees reporting insufficient time for themselves and their family members (Lederer et al., 2018) or increased overall work-family conflict because of practicing overtime among dual-career couples (Kundu et al., 2016), there are studies that found no significant effect of overtime hours on social well-being (Taheri et al., 2018) or work-to-family conflict. This lack of correlation between work hours and work-to-family conflict may be due to the limited range of work hours, which are legally capped at an average of 40 hours per week. It could also be attributed to how nurses' schedules are organized; they are required to work overtime at least once a week as part of their shifts, which may lead them to view it as a routine obligation rather than an additional demand impacting their family responsibilities. Alternatively, the selected measure of overtime work might have obscured a significant relationship because it was based on nurses' perceptions rather than their actual reported overtime hours (Yildirim & Aycan, 2008).

Impact Category

Overtime work has been widely recognized as having significant implications for both physical (Azemi et al., 2022) and mental health (Marić et al., 2022). Impact category analyses these implications based on below perspectives.

The relationship between overtime and well-being is complex and influenced by several factors (Song & Gao, 2019). One key factor is the trust relationship among colleagues, which acts as a moderator between overtime and overall well-

being. Trust relationship helps protect teachers' well-being from the negative impact of increased overtime. Teachers with stable or improved trust levels were not affected by changes in overtime hours, indicating that strong trust relationships can buffer against adverse work environment changes. In contrast, only teachers with declining trust experienced a decrease in well-being due to increased overtime. The study suggests that when overtime is expected to rise, special attention should be given to the psychological well-being of teachers lacking strong trust relationships with their colleagues (Tsuyuguchi, 2023).

Job satisfaction also plays a crucial moderating role, particularly in the relationship between overtime and depression. Employees who derive satisfaction from their work may be better equipped to cope with the demands of overtime, thereby reducing the risk of developing depressive symptoms. The findings indicate that long working hours are linked to a higher risk of depression only when job satisfaction is low, emphasizing the need to enhance job satisfaction, especially for individuals working excessive hours (Nakata, 2017).

Furthermore, overtime has a direct impact on life satisfaction, with excessive work hours often leading to a decline in overall life contentment (Li & Ren, 2021). While overtime pay positively impacts mental health, working overtime negatively affects it. Job satisfaction and life satisfaction are key factors influencing the mental health of business professionals (Uman et al., 2020). The same negative effect is valid for employees' physical health (Liu et al., 2022).

Lastly, findings reveal employees' dissatisfaction about prioritization of wellness (Yeager et al., 2022). Overtime is also identified as a common cause of stress (Väärikkälä, Hänninen, & Nevas, 2020) leading to job dissatisfaction (Nakata et al., 2011), one of the reasons for burnout (Pergol-Metko et al., 2023) which can be reduced by reducing extra hours (Atkins et al., 2023), significantly linked to both biomechanical and psychosocial factors (Bao et al., 2015). Overtime work may elevate physicians' intentions to leave their current practice, jeopardizing the continuity of patient care (Tsai et al., 2016).

Results and Discussion

Directions for Future Research

In this section, a future study agenda was set based upon research gaps and opportunities by analysing similarities and differences across the five categories on how overtime shapes satisfaction. Based upon examination of the current literature categorization, we recommend five key directions for future research.

First, in analysing the existing body of literature on the relationship between overtime and various dimensions of satisfaction, it is clear that studies have predominantly approached this complex issue from five distinct perspectives: the role of compensation, the number and frequency of extra hours worked, the voluntary or mandatory nature of overtime, the extent to which overtime interferes with personal life, and the impact of overtime on health and wellness. While each of these categories contributes valuable insights, a more comprehensive and integrative approach is needed to fully understand how these factors interact and influence overall satisfaction.

The interdependencies between these dimensions are critical. For example, compensation may mitigate the negative effects of overtime on job satisfaction but might not counterbalance the adverse effects on health or personal life interference. Similarly, voluntary overtime may have different implications for life satisfaction compared to mandatory overtime, particularly when considering how these extra hours affect family life and personal well-being. Cross-sectional studies, which dominate the literature, often fail to capture these dynamic interactions over time, limiting the depth of understanding of these complex relationships.

Thus, future research should adopt a holistic and multi-dimensional approach, taking into account the interplay among these factors. Longitudinal studies could provide a more nuanced understanding of how these elements evolve over time and their cumulative effects on job and life satisfaction, as well as health outcomes. In addition, research should explore diverse industries to assess whether findings are generalizable across sectors, or if there are industry-specific factors that moderate the relationship between overtime and satisfaction.

Second, although extensive research has investigated the influence of overtime on job and life satisfaction, there is a significant gap in understanding how technological progress has altered these relationships. With the proliferation of digital tools, remote work, and flexible working arrangements, the line between work and personal life has become increasingly blurred, potentially changing how employees perceive and experience overtime. Much of the existing research is based on traditional overtime models that do not account for the new complexities introduced by technology, such as constant connectivity and the ability to perform work outside regular hours. Future studies should examine how digitali-

zation influences the connection between overtime and satisfaction, with particular focus on:

- The sense of autonomy provided by technological tools
- The role of asynchronous communication in shaping work experiences
- The psychological effects of being constantly available

Conducting longitudinal and cross-industry research would offer deeper insights into how these variables evolve over time and differ across sectors, providing a more comprehensive understanding of how technology redefines the relationship between overtime and satisfaction. Moreover, analysing how technological advancements affect diverse demographic groups – such as employees of different ages, job roles or career stages – could inform the development of targeted strategies to mitigate the adverse effects of overtime in a technology-driven work environment.

Third, despite growing interest in the gig economy and non-traditional work arrangements, limited research has explored how overtime in these contexts shapes job and life satisfaction. Most studies on overtime and satisfaction have focused on traditional, full-time employment, leaving a gap in understanding how flexible, temporary, or project-based work affects these dynamics. Gig workers and freelancers often experience irregular work schedules and lack formal overtime compensation, which could differently influence their satisfaction levels compared to employees in more structured work environments. Moreover, the voluntary nature of many non-traditional jobs blurs the line between work and personal time, potentially altering the traditional relationship between overtime, work-life conflict, and satisfaction. Future research should examine how these emerging work arrangements impact the perception and effects of overtime, considering variables such as autonomy, income stability, and the potential for burnout in the absence of formal work-hour regulations. Longitudinal studies would be particularly valuable in capturing the evolving experiences of gig and non-traditional workers over time. Additionally, cross-industry comparisons could provide deeper insights into sector-specific challenges and opportunities related to overtime in non-traditional employment.

Fourth, there is a notable gap in examining the experiences of displaced workers, such as those affected by war or conflict, and underemployed individuals. These groups, increasingly present in the global workforce, may face distinct challenges and stressors related to overtime. For workers displaced by war, overtime may intersect with trauma, uncertainty about the future, and adaptation to new labour markets, potentially heightening feelings of instability and burnout. Underemployed individuals, on the other hand, may experience overtime as both an opportunity and a burden, balancing the desire for more work with the potential for exploitation or diminished job satisfaction. Both groups often face precarious employment conditions that may not align with the conventional definitions of voluntary or mandatory overtime, complicating their relationship with additional work hours. Future research should explore how these workers perceive and experience overtime, considering factors like financial necessity, mental health, and job security. Longitudinal studies could provide deeper insights into their lived experiences, informing policy and organizational practices aimed at supporting these vulnerable populations.

Based on above mentioned four directions, below table shows primary and secondary research questions that could guide future research:

Table 2 – The Impact of Overtime on Job and Life Satisfaction Across Different Work Contexts

Key idea of the direction	Primary research questions	Secondary research questions
Adopting a holistic and multi-dimensional approach, taking into account the interplay among different factors.	To what extent does financial compensation for overtime moderate the relationship between extra hours worked and negative outcomes such as burnout, stress, or work-family conflict? Can non-monetary benefits (e.g., time off, flexibility) serve as an effective alternative to traditional overtime pay in improving employee satisfaction?	What organizational practices or policies (e.g., flexible working hours, managerial support, clear overtime policies) are most effective in mitigating the negative effects of overtime on employee health and personal life interference? How do employees' perceptions of control over their overtime (e.g., voluntary vs. mandatory) influence their experience of stress and job satisfaction, and what role do personal coping mechanisms play in this process?

Continuation of the table

Key idea of the direction	Primary research questions	Secondary research questions
Understanding how technological progress has altered the influence of overtime on job and life satisfaction.	How does the psychological impact of constant availability through technology influence long-term job satisfaction and well-being for employees who regularly work overtime? Are there significant differences in how technological advancements affect overtime-related satisfaction across industries or demographic groups (e.g., age, gender, job role)?	How does the interplay between voluntary and involuntary overtime shift in a technology-enhanced work environment, and how does this affect employee well-being and satisfaction? How do varying levels of technological integration in the workplace (e.g., low-tech vs. high-tech environments) alter the relationship between overtime and both job and life satisfaction?
How overtime in gig economy and non-traditional work arrangements contexts shapes job and life satisfaction.	How do income stability and financial insecurity in gig work influence the relationship between overtime and satisfaction? How does the perception of overtime differ between workers in non-traditional roles (e.g., freelancers, temporary workers) and those in traditional employment, particularly in terms of control and compensation?	How do digital platforms and algorithmic management in gig work shape workers' ability to manage overtime, and how does this affect their satisfaction? How do workers in hybrid employment (part-gig, part-traditional) experience overtime and its effects on satisfaction compared to purely gig or traditional roles?
Understanding the nuanced and complex experiences of displaced workers	To what extent do psychological factors, such as trauma or displacement-related stress, influence the relationship between overtime and well-being for workers displaced by war? How do cultural and social integration challenges faced by displaced workers influence their attitudes toward overtime in host countries?	What is the impact of job security and future employment prospects on overtime satisfaction among underemployed individuals? How do overtime practices intensify or reduce work-family conflict for displaced workers and the underemployed?

Note – compiled by the author based on directions of future research emerged from current literature review

Fifth, numerous studies investigating the link between overtime and employee satisfaction rely predominantly on subjective evaluations of key variables, including the amount of overtime worked, whether it was voluntary or mandatory, overtime compensation, and the degree to which it disrupts personal life. This dependence on self-reported data presents a major limitation, as these perceptions are influenced by individual differences such as personality traits, stress tolerance, and personal circumstances, which vary among employees (Beckers et al., 2008). For example, while one worker may view overtime as a chance for career growth or financial benefit, another may perceive it as a source of stress or work-life imbalance. These subjective interpretations can lead to inconsistent findings and limit the generalizability of the results. Future research should mitigate this issue by adopting more objective methods, such as measuring actual overtime hours, applying standardized work-family conflict scales, and assessing overtime's impact on observable health outcomes.

Conclusion

This article has explored the intricate relationship between overtime work and employee satisfaction, shedding light on its multifaceted impact across various dimensions, including job satisfaction, life satisfaction, health and wellness, work-family conflict, and intention to stay. While previous research has largely focused on isolated factors–such as the distinction between voluntary and mandatory overtime, the compensation received, and the extent of extra hours worked–this study underscores the need for a more holistic approach.

A key takeaway is that overtime should not be analysed solely as a matter of hours worked but rather as a complex phenomenon influenced by contextual, individual, and organizational factors. The interplay between compensation, perceived autonomy, and work-life balance highlights that employee satisfaction is shaped not just by workload but also by the degree of control and support they experience. Furthermore, the health and wellness implica-

tions of excessive overtime reinforce the necessity for sustainable work practices that prioritize employee well-being.

Future research should aim to address gaps in existing studies, particularly by considering longitudinal analyses and underrepresented demographic groups, such as displaced workers and the underemployed. Additionally, industry-specific insights could provide a deeper understanding of how overtime policies influence different labour markets. Policymakers and organizations must recognize that overtime, when managed strategically, can be a tool for enhancing productivity and satisfaction rather than a source of burnout and disengagement.

By adopting an integrated perspective that considers economic, psychological, and social factors, scholars and practitioners can develop more nuanced approaches to managing overtime, ensuring that both employees and organizations thrive in an evolving labour market.

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Information about author:

Matanat Mammadzada – lecturer, UNEC Business School, Faculty of Business Administration, Azerbaijan State Economic University, (Baku c., Azerbaijan, E-mail: mammadzada.matanat@unec.edu.az).

Автор туралы мәлімет:

Маммадзада Матанат – лектор, UNEC Бизнес мектебі, Бизнес әкімшілігі факультеті, Әзірбайжан мемлекеттік экономика университеті, (Баку қ., Әзірбайжан, e-mail: mammadzada.matanat@unec.edu.az).

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АВТОРЛАРҒА АРНАЛҒАН АҚПАРАТ

Авторлар болуы мүмкін:

- докторанттар, жетекшісімен соавторлықта;
- ғылыми дәрежесі бар тұлғалар;
- ғылыми-педагогикалық қызметпен айналысатын тұлғалар.

Магистранттармен бірлескен авторлықтағы мақалалар жариялауға жіберілмейді.

ҚазҰУ Хабаршысы. Экономика сериясында материалдарды жариялау Open Journal System, онлайн жіберу және рецензиялау жүйесі арқылы жүзеге асырылады.

Корреспонденция авторы журналға жариялау үшін ілеспе хат ұсынуға міндетті.

Авторларға қойылатын талаптар: Редакциялық коллегия журналдың ғылыми бағыттары бойынша бұрын жарияланбаған мақалаларды қабылдайды. Мақала журналдың функционал сайтына жүктеу арқылы ғана (Open Journal System) электронды форматта (doc, .docx, .rtf форматында) қабылданады. Шрифт кеглі – 12 (аңдатпа, түйін сөздер, әдебиеттер тізімі – 10, кесте мәтіні – 9-11), шрифт – Times New Roman, мәтін беттің ені бойынша тегістеу арқылы теріледі, аралығы – бір, абзац бойынша шегініс – 0,8 см, шеттері: үстіңгі және астыңғы – 2 см, сол және оң жақ – 2 см. Сурет, кесте, графика, диаграмма және т.б. мәтін ішінде нөмір және атаумен белгіленеді (мысалы, 1-сурет – Сурет атауы) және және ескерту түрінде дереккөз көрсетіледі (мысалы, Ескерту – ... дереккөзі негізінде автормен құрастырылған). Суреттердің, таблица, графика мен диаграммалардың саны мақала көлемінің 20% -нан (кейбір жағдайда 30%) артық болмауы керек. Мақала көлемі (атауы, авторлар бойынша ақпарат, аңдатпа, түйін сөздер, әдебиеттер тізімін қоспағанда) әлеуметтік және гуманитарлық бағытта 3 000 сөзден кем емес, 7 000 сөзден артық емес болуы шарт.

Мақаланы жариялау үшін ақы төлеу тәртібі мен құнын «Қазақ университеті» баспасы белгілейді және оны рецензенттер мен ғылыми редактор мақұлдағаннан кейін автор жасайды.

Мақала құрылымы: Бірінші бет: Бірінші жол – ҒТАХР нөмірі, мәтін беттің сол жақ шетімен тегістеледі, қаралау шрифт. Мақала автор(лар)ы – аты-жөнінің бірінші әріптері және тегі, жұмыс істейтін орны (аффилиация), қала, мемлекет, e-mail, ORCID ID – орыс, қазақ және ағылшын тілдерінде жазылады. Авторлар туралы ақпарат қалыпты шрифтті кіші әріптермен жазылып, беттің ортасында тегістеледі.

Мақала атауы (Тақырып) мақаланың мәні мен мазмұнын көрсетіп, оқырманның назарын аудару керек. Тақырып қысқа әрі ақпараттық, жаргондар мен аббревиатурасыз жазылуы тиіс. Тақырыптың орташа ұзындығы 5-7 сөз (кей жағдайда 10-12 сөз). Мақаланың тақырыбы орыс, қазақ және ағылшын тілдерінде берілуі керек. Тақырып қаралау шрифтті кіші әріптермен, беттің ортасымен тегістеледі. Аңдатпа көлемі – 150 сөзден кем емес, 300 сөзден артық емес орыс, қазақ, ағылшын тілдерінде жазылады.

Аңдатпа құрылымында келесі ақпарат міндетті түрде болуы керек: Зерттеу тақырыбы бойынша кіріспе сөз; Ғылыми зерттеудің мақсаты, негізгі бағыттары мен идеялары; Жұмыстың ғылыми және практикалық маңыздылығы бойынша қысқа ақпарат; Зерттеу әдістемесі бойынша қысқа ақпарат; Ғылыми зерттеудің негізгі нәтижелері, талдау және түжырымдама; Жүргізілген зерттеу жұмысының маңыздылығы (аталған жұмыстың ғылымның сәйкес саласына енгізген үлесі); Жұмыс қорытындысының практикалық маңыздылығы.

Түйін сөздер/сөз тіркестері – орыс, қазақ, ағылшын тілдерінде 3-5 сөз аралығында.

Кіріспе келесіде берілген негізгі элементтерден тұрады: Таңдалған тақырыптың негіздемесі; тақырып өзектілігі мен зерттеу проблемалары. Таңдалған тақырыптың негіздемесінде алдыңғы зерттеушілердің тәжірибелері негізінде проблемалық жағдайдың (зерттеу жұмыстарының жоқтығы, жаңа зерттеу нысанының пайда болғаны және т.б.). бар екендігі айтылады. Тақырыптың өзектілігі аталған зерттеу нысанының қойылған сұрақтарға толық жауаптардың болмаған жағдайда, тақырыптың теориялық және практикалық маңыздылығы арқылы дәлелденіп жалпыға ортақ мүдде арқылы анықталады. Жұмыстың нысанын, пәнін, мақсаттарын, міндеттерін, тәсілдерін, әдістер, гипотезасын анықтау. Зерттеудің мақсаты тезисті дәлелдеумен, яғни зерттеу тақырыбын автор таңдаған аспектімен көрсетумен байланысты.

Әдебиеттерге шолу бөлімінде – зерттеу тақырыбы бойынша ағылшын тілінде шетелдік авторлардың іргелі және жаңа еңбектер (кемінде 15 жұмыс), оларды ғылыми үлесі түрғысынан талдау, сондай-ақ сіздің мақалаңызда толықтырылған зерттеу кемшіліктері беріледі.

Әдістеме – материалдар мен жұмыс барысының сипаттамасынан, сондай-ақ қолданылатын әдістердің толық сипаттамасынан тұруы керек.

Нәтижелер мен Талқылау бөлімінде сіздің зерттеу нәтижелеріңізді талдауы және талқылауы беріледі. Зерттеу барысында алынған нәтижелер туралы қорытынды беру арқылы негізгі мәні айқындалады. Бұл мақаланың маңызды бөлімдерінің бірі болып саналады. Онда жұмысыңыздың нәтижелерінің талдауы және алдыңғы жұмыстармен, талдаулармен және түжырымдамаларымен салыстыру арқылы сәйкес нәтижелерді талқылау беріледі.

Қорытынды – жұмыстың осы кезеңдегі нәтижелерін жалпылау және қорытындылау; автор алға қойған түжырымның растығын және алынған нәтижелерді ескере отырып, ғылыми білімнің өзгеруі туралы автордың қорытындысын растау. Қорытынды абстрактілі болмауы керек, оларды ұсыныстарды немесе одан әрі жасалатын жұмысты сипаттай отырып белгілі бір ғылыми саладағы зерттеу нәтижелерін жалпылау үшін қолдану керек.

Пайдаланылған әдебиеттер тізімі немесе библиографиялық тізім жаратылыстану және техникалық бағыттарға кем дегенде 15 атаулардан тұрады, ал ағылшын тіліндегі жалпы атаулар саны 50%-дан кем болмауы керек. Егер сілтемелер тізімінде кириллицада берілген еңбектер болса, сілтемелер тізімін екі нұсқада ұсыну қажет: біріншісі – түпнұсқада, екіншісі – романизацияланған алфавитте (транслитерация – translit-online.ru).

Әлеуметтік және гуманитарлы бағыттағы мәтіндерде дәйексөз келтірілген сілтемелер жұмыстың бірінші авторы, шыққан жылы: бет нөмір(лер)і жақша ішінде көрсетіліп беріледі. Мысалы, (Залесский, 1991: 25). Әдебиеттер тізімінде бір автордың бір жылда жарық көрген бірнеше жұмысы келтірілген жағдайда, шыққан жылдың түсына «а», «б» және т.б. әріптерді қосып жазу керек. Мысалы, (Садуова, 2001а: 15), (Садуова, 2001б, 22). Мақала жариялау құны – 2000 теңге / бет

ИНФОРМАЦИЯ ДЛЯ АВТОРОВ

Авторами могут быть:

- докторанты, совместно с руководителем;
- лица, имеющие ученую степень;
- лица, занимающиеся научно-педагогической деятельностью.

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Порядок оплаты и стоимость за публикацию статьи устанавливается издательским домом «Қазақ университеті» и производится автором после одобрения рецензентами и научным редактором.

Структура статьи Первая страница: Первая строка – номер МРНТИ, выравнивание – по левому краю, шрифт – полужирный; Автор(ы) статьи – Инициалы и фамилия, ученая степень, звание, место работы (аффилиация), город, страна, e-mail, ORCID ID – на русском, казахском и английском языках. Сведения об авторах представляются обычным шрифтом строчными буквами, выравнивание – по центру;

Название статьи (Заголовок) должно отражать суть и содержание статьи и привлекать внимание читателя. Название должно быть кратким, информативным и не содержать жаргонизмов или аббревиатур. Оптимальная длина заголовка – 5-7 слов (в некоторых случаях 10-12 слов). Название статьи должно быть представлено на русском, казахском и английском языках. Название статьи представляется полужирным шрифтом строчными буквами, выравнивание – по центру;

Аннотация объемом не менее 150 и не более 300 слов на русском, казахском и английском языках. Структура аннотации включает в себя следующие обязательные пункты: Вступительное слово о теме исследования; Цель, основные направления и идеи научного исследования; Краткое описание научной и практической значимости работы; Краткое описание методологии исследования; Основные результаты и анализ, выводы исследовательской работы.

Ключевые слова/словосочетания – количеством 3-5 на русском, казахском и английском языках;

Введение состоит из следующих основных элементов: Обоснование выбора темы; актуальность темы или проблемы. В обосновании выбора темы на основе описания опыта предшественников сообщается о наличии проблемной ситуации (отсутствие каких-либо исследований, появление нового объекта и т.д.).

Актуальность темы определяется общим интересом к изученности данного объекта, но отсутствием исчерпывающих ответов на имеющиеся вопросы, она доказывается теоретической или практической значимостью темы.

Определение объекта, предмета, целей, задач, методов, подходов, гипотезы и значения вашей работы. Цель исследования связана с доказательством тезиса, то есть представлением предмета исследования в избранном автором аспекте.

В секции обзор литературы – должны быть охвачены фундаментальные и новые труды по исследуемой тематике зарубежных авторов на английском языке, анализ данных трудов с точки зрения их научного вклада, а также пробелы в исследовании, которые Вы дополняете в своей статье.

Методология – должны состоять из описания материалов и хода работы, а также полного описания использованных методов.

В разделе Результаты и Обсуждение – приводится анализ и обсуждение полученных вами результатов исследования. Приводятся выводы по полученным в ходе исследования результатам, раскрывается основная суть. И это один из самых важных разделов статьи. В нем необходимо провести анализ результатов своей работы и обсуждение соответствующих результатов в сравнении с предыдущими работами, анализами и выводами.

Заключение – обобщение и подведение итогов работы на данном этапе; подтверждение истинности выдвигаемого утверждения, высказанного автором, и заключение автора об изменении научного знания с учетом полученных результатов. Выводы не должны быть абстрактными, они должны быть использованы для обобщения результатов исследования в той или иной научной области, с описанием предложений или возможностей дальнейшей работы.

Список используемой литературы, или Библиографический список состоит из не менее 15 наименований, и из общего числа наименований на английском языке должно быть не менее 50%. В случае наличия в списке литературы работ, представленных на кириллице, необходимо представить список литературы в двух вариантах: первый – в оригинале, второй – романизированным алфавитом (транслитерация – translit-online.ru).

Ссылки на цитируемые работы в тексте даются в скобках, с указанием первого автора работы, год издания: номер страниц(-ы). Например, (Залесский, 1991: 25). Стоимость публикации – 2000 тенге/страница

INFORMATION FOR AUTHORS

The authors can be:

- doctoral students, together with the supervisor;
- persons with an academic degree;
- persons engaged in scientific and pedagogical activities.

Articles co-authored with undergraduates are not allowed for publication.

Submissions to the journal are made using Open Journal System, the online submission and peer review system. Registration and access is available at Submissions. The author for correspondence is obliged to provide a cover letter for publication in the journal.

The requirement for authors: The editorial board accepts previously unpublished articles on the scientific directions of the journal. The article is submitted in electronic format (in the formats .doc, .docx, .rtf) ONLY by downloading it through the functionality of the journal's website (Open Journal System); Font size – 12 (abstract, key words, literature – 10, text of tables – 9-11), font – Times New Roman, alignment – width of text, interval – single, indented margin – 0,8 cm, margins: upper and the bottom – 2 cm, left and right – 2 cm. Figures, tables, graphs, diagrams, etc. are presented directly in the text indicating the numbering, title (For example, Fig. 1 – Name of the figure) and the source as a note (For example, Note – compiled by the author based on the source ...). The number of figures, tables, graphs and diagrams should not exceed 20% of the total volume of the article (in some cases up to 30%); The volume of the article (excluding the title, information about authors, abstract, keywords, references) must be at least 3,000 words and not exceed 7,000 words;

Authors in a mandatory order should indicate in a covering letter in the Open Journal System or the Editorial Manager that the article / manuscript has never been published anywhere, and that the article does not contain borrowed text fragments from other works without reference to them.

Structure of the article: First page: First line – IRSTI number (international rubricator of scientific and technical information), alignment – left, font – bold. Author(s) of the article – Initials and surname, place of work (affiliation), city, country, e-mail, ORCID ID. Information about authors is represented in ordinary type in lowercase letters, alignment in the center. The title of the article should reflect the essence and content of the article and attract the reader's attention. The title should be short, informative and not contain jargons or abbreviations. The optimal length of the title is 5-7 words (in some cases 10-12 words). The title of the article is shown in bold in lowercase letters, alignment – in the center. Abstract – at least 150-300 words.

The structure of the annotation includes the following obligatory items: Opening remarks about the research topic, purpose, main directions and ideas of scientific research, brief description of the scientific and practical significance of the work, brief description of the research methodology, main results and analysis, conclusions of research work, the value of the research carried out (contribution of this work to the relevant field of knowledge).

Keywords – 3-5 words.

Introduction consists of the following main elements: Justification of the choice of topic; relevance of the topic or problem. In substantiation of the choice of topic based on the description of the experience of predecessors, the presence of a problem situation (the absence of any research, the emergence of a new object, etc.) is reported.

The relevance of the topic is determined by the general interest in the knowledge of this object, but the lack of comprehensive answers to the questions, it is proved by the theoretical or practical significance of the topic.

In the literature review section, fundamental and new works on the subject matter of foreign authors in English should be covered (at least 15 works), analysis of the given works in terms of their scientific contribution, as well as research gaps that you supplement in your article.

Methodology should consist of a description of the materials and the progress of the work, as well as a complete description of the methods used.

In the Results and Discussion section an analysis and discussion of the research results you received is provided. The conclusions on the results obtained during the study are given, the main essence is revealed. And this is one of the most important sections of the article. It is necessary to analyze the results of their work and discuss the relevant results in comparison with previous works, analyzes and conclusions.

Conclusion – synthesis and summarizing the work at this stage; confirmation of the truth of the statement put forward by the author, and the author's conclusion on the change of scientific knowledge, taking into account the results obtained. Conclusions should not be abstract, they should be used to summarize the results of research in a particular scientific field, with a description of the proposals or opportunities for further work.

References consists of at least 15 titles, and from the total number of titles in English must be at least 50%. style of the list of references – American Psychological Association (http://www.apastyle.org/). The list of references is presented in alphabetical order, and ONLY those works that are cited in the text. References to cited works in the text are given in brackets, indicating the first author of the work, year of publication: the number of pages. For example, (Zalessky, 1991: 25). Publication cost – 2000 tenge/page

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