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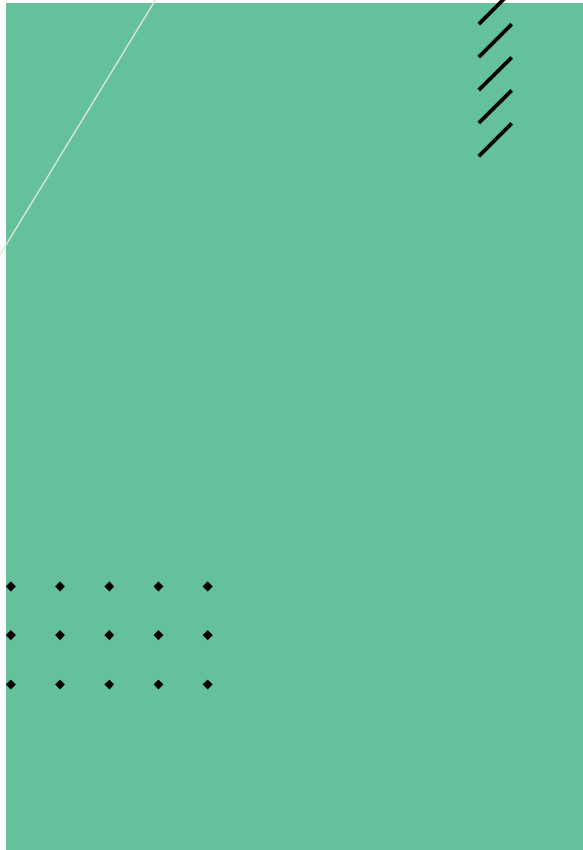
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Key topics covered in the journal: economic theory and economic growth; innovation and technological development; human resources and the labor market; world economy; regional economy; sustainable development and environmental management; business and entrepreneurship; management and marketing; finance and accounting; public administration.

CONTENTS

The Study of Higher Education in the Regions of Kazakhstan: Analysis of Tools and Indicators

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Abstract

This study aimed to analyse the state of higher education in the regions of Kazakhstan based on an integrated approach according to use of statistical methods and aggregation of empirical data. In this study, the focus is on assessing the level of development of higher education institutions in Kazakhstan based on the selected three groups of variables: enrollment in higher education institutions; subjects and objects of higher professional education (number of teaching staff, number of students, number of universities); provision of services (budget, population, enterprises). The research design was divided into three stages: data collection, analysis and recommendations. The data sample from 2010 to 2021 was taken from the annual statistical yearbooks of the Republic of Kazakhstan. In this study based on a comprehensive review of the above variables, it is proposed to conduct an analysis at the following three stages: data collection, definitions of the initial data and evaluation of the time period; sampling of initial data, analysis of collected data and interpretation; description of the results obtained; conclusions and recommendations. The practical results of the study and conclusions can be used by government agencies in the analysis and forecasting of the development of the education system in the region. The data obtained showed that there are differences in the availability of higher education in different regions of Kazakhstan. High rates in the cities of Astana and Almaty may be associated with their status as the capital and the largest city, respectively.

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1. INTRODUCTION

Today, special importance is attached to the role of education as one of the most important elements of the economic system. In addition, there is a fundamental tightening of the requirements for the activities of educational institutions, cultural and economic attitudes of members of society. An adequate response to new challenges is possible provided that scientific research tools are developed to provide solutions to the tasks of organizing and managing the educational industry. Since higher education contributes to the development of innovation, scientific research, technological progress and the manufacturing sector, highly qualified specialists educated in the regions can create and implement new ideas, stimulating economic growth and attracting investment.

A modern university, representing the unity of education, science, business, industry and innovation, plays the role of a centre in developing an innovative ecosystem of the regional economy. Universities play a role in regional development by contributing to the economy, society, and culture. However, there needs to be more understanding of the relationship between policy institutions and universities' contributions to regional development. Some studies are focused on the influence of national and regional policies on university contributions to regional development (Miller, 2013; Trippl et al., 2015). There are a relatively large number of approaches to assessing the effectiveness of the interaction of universities with the real sector of the economy. Some consider it an essential indicator of teaching staff and students since teaching staff of higher educational institutions in the regions play a crucial role in teaching and preparing students. They pass on their knowledge, experience and professional skills, developing students' academic knowledge and the practical skills necessary for a successful career. In addition, those engaged in scientific activities play an essential role in developing scientific research in the regions (Woo et al., 2017).

Universities stand out as catalysts for innovation and information technology and electronics research. Some studies have focused on assessing the development of entrepreneurial skills, the creation of a community to promote and develop the commercialization process, as well as the importance of business and university cooperation (Fitjar & Gjelsvik, 2018; Kitagawa et al., 2019; Castro et al., 2019). They attract talented students and scientists worldwide, creating their start-ups and companies in the region. In this context, the need to study educational processes in foreign countries is becoming most relevant (Thune, 2011; Fonseca, 2019; Kenzhaliyev et al., 2021). This creates a favourable ecosystem for developing new technology companies and attracting talent (Bölling & Eriksson, 2016; Etzkowitz, 2019; Šereš et al., 2019). There are a relatively large number of approaches to assessing the effectiveness of the interaction of universities with the real sector of the economy.

The territorial development tools used in Kazakhstan's practice recently do not take into account the duration of depressive trends and are also based on an analysis of the current situation. Already today, high-status national institutions and organizations should be integrated into the regions, and a higher level of connectivity between regional and republican development programs should be achieved. This will ensure the full implementation of strategic initiatives related to intensifying the development of border areas and regions with a high index of problems. Based on the results obtained, a strategy will be developed to improve the effectiveness of regional institutions to overcome regional disparities in the cultural and economic development of territories. Therefore, this study will focus on assessing the level of development of national education systems, analysing the level of regional differences and identifying a set of problems to reduce regional differentiation. In this context, the need to study educational processes in Kazakhstan acquires the most significant relevance and improves the processes of higher education development.

Therefore, it is essential to consider and analyse the state of higher education in the regions of

Kazakhstan based on an integrated approach based on the use of statistical methods and aggregation of empirical data. So, this paper consists of the following essential parts. The first part of the study contains a detailed analytical review of the literature on scientific views, theories and concepts. The second section describes the data sampling, the description of the research methodology and the data. The third part consists of three main parts of the study. Section 4 presents the findings and policy recommendations.

2. LITERATURE REVIEW

Today, the region's economic growth largely depends on the level of development of the education system and, in particular, higher education, based on which the intellectual potential of the region is formed. The most valuable asset among developed and developing countries is higher education institutions (hereinafter referred to as HEI), which are recognized as a critical factor in the development of sustainable societies. There are increasing numbers of studies devoted to research on the role of higher educational institutions in the regional development of a country. Various studies consider the part of universities from different angles. In their research, Etzkowitz et al. (2000) emphasized the tripartite cooperation between the business environment, higher education and government structures, which is achieved through the process of university transformation. They noted that such trilateral partnership pursues a common main goal - the country's economic development. However, this cooperation is preceded by two crucial modifications in the activities of universities. They first introduce academic research as an obligatory part of the university's activities when research becomes its culture. Secondly, it is the expansion of education. Thus it includes expanding the scope and focus of education and expanding the research focus of the university. The University of Berkeley in the USA was one of the pioneers in introducing a self-financing system for developing scientific research, using the profits from patents. Thus, they highlight the patent system as one of the successful ways to commercialize HEIs (Etzkowitz et al., 2000).

Nevertheless, there is still the case of informal cooperation between higher education institutions and the private sector. These are usually verbal agreements which reflect in the organization of training courses and professional education. Usually, such partnership is kept through the academic staff, who establish informal agreements for students, for instance, to pass internship or training. It must be mentioned that the nature of businesses collaboration with higher educational institutions varies depending on the nature of industry development (Thune, 2011; Al-Rahmi et al., 2019). Moreover, they expect that the role of higher educational institutions is to improve regional development. However, the role of the higher education sector is much more complex. Higher educational institutions affect the migration rate in the region as it provides professionals and therefore is dependent on the employment rate. Next, private and public sectors involvement play a crucial role in the process of universities' participation in the process of regional development. Therefore, the stakeholders' willingness and the region's industrial context to cooperate with universities in the regional development affects the utility rate of higher educational institution's products (Fonseca, 2019).

However, successful cooperation is not observed in all universities. Studies differ in factors affecting productive collaboration. Lambert (2003) stated that the effectiveness of collaboration depends on two main elements: relationships and people. Relationships depend on people, so everything, in fact, depends on the quality, skills, experience and character of the people involved (Lambert, 2003). Gulbranson and Audretsch (2008) consider the cooperation of universities with expert organizations not subject to state structures. Moreover, publicly funded R&D projects must be known for successful implementation or follow-up. At the same time, expert organizations are interested in full consultation and securing funding for selected projects. An essential condition is that they should be located and operate at universities that excel in research, with robust

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research staff. Such organizations aim to innovate in research delivery and fruitful collaboration with the private sector (Gulbranson & Audretsch, 2008). Peer and Penker (2015) relate the impact of higher educational institutions on regional development to political expectations by the government. Precisely, the form of government predicts the institution's distribution and the profile of universities. They mainly rely on the main contribution or product of private and higher education institution's collaboration results which is qualified graduates (Peer & Penker, 2015).

Galushko and Sagynbekov (2014) noted that government-funded projects are primarily not implemented. One of the reasons is that universities are becoming more interested in cooperation with the private sector, which is characterized by the implementation of short-term projects, which is not particularly beneficial for the long-term development of the state's economy. Moreover, universities are forced to cooperate with the private sector, as the state funds less fundamental research or is less interested in implementing projects (Galushko & Sagynbekov, 2014). There are a relatively large number of approaches to assessing the effectiveness of the interaction of universities with the real sector of the economy. For example, Bölling and Eriksson (2016) developed a model for assessing universities' cooperation with the Swedish Federal Agency for the Development of Innovation Systems society. Šereš et al. (2019) identified indicators to assess the interaction between universities and enterprises.

According to the research of some authors, higher education has a better impact on economic growth, and colleges and universities are the most important components of national and regional strategies of innovation systems (Miller, 2013). Another study examines the level of contribution of universities to regional economic and social development in various national contexts and the political institutions that support them (Trippl et al., 2015). In addition, Korean scientists who investigated the impact of investment in education and R&D on regional economic growth in South Korea (Woo et al., 2017).

Fitjar and Gjelsvik (2018) found that (Norwegian) firms sometimes prefer to partner with local universities rather than better universities at a distance. The choice of firms is based not only on the fact that knowledge transfer at a distance is expensive but also on the fact that local cooperation reduces the risk of information loss during knowledge transfer and costs. Other reasons could explain the observed patterns of cooperation. For example, if a local university can make a valuable contribution, this could be considered "good enough" by local firms. Firms may also view partnerships as a long-term investment, thereby helping to improve the quality of research at a local university with the hope of future benefits. Firms may also want to contribute to the local community by supporting local/regional universities.

According to a study by Kitagawa et al. (2019), the development of entrepreneurial skills among students can also be considered positive, which has a positive impact on the growth of satraps among graduates. The study discussed the contribution and impact of the level and quality of teaching in universities (Kitagawa et al., 2019). Moreover, Castro et al. (2019) emphasized the importance of developing entrepreneurial skills among students. They also note the importance of cooperation between teachers and students, which has a beneficial effect on creating a community to promote and develop the commercialization process. Using the example of Latin American countries, they note that the development of innovative capacity plays a significant role in the development of the economy (Castro et al., 2019).

University staff involved in research and in the commercialization process notes the importance of ensuring the continuity of research income and the fact that this function should be considered more critical than income derived from any other source, such as commercialization. Of course, commercialization should protect the university's sources of income from research. This view is understandable due to the importance of university-led research and its significant size compared to commercialization revenues. Two functions should not be mutually exclusive, i.e. funding research and commercializing new ideas. Thus, separating

the functions of generating income from research and commercialization is unnecessary for success in either area (Kenzhaliyev et al., 2021). Namely, universities must adhere to market conditions, and the state does not manage internal processes (Turmaganbet, 2021). In recent years, to improve the quality of training of specialists, the state has focused on reducing the number of universities and strengthening qualification requirements for licensing higher education institutions (Kudaibergenova et al., 2022).

The interaction of universities with the private sector, with professionals and specialists, requires business knowledge in the sectors under consideration. As mentioned earlier, only sometimes the commercialization process can have a positive impact. Namely, not always an expert opinion on the implementation of scientific projects. The research development can be competent enough to successfully implement the intellectual potential (Heng et al., 2012). The commercialization of universities is also seen as an active development of entrepreneurship, which is beneficial for the development of the economy. Thus, Herrera et al. (2018) note that the commercialization of higher educational institutions stimulates innovation, increased academic entrepreneurship, the provision of human capital and collaboration in creating new knowledge transfer products, etc. (Herrera et al., 2018).

When studying the state of the level of development of higher education, regional differences related to the level of economic and social factors should be considered. The above discussion suggests that knowledge interaction with universities depends on whether the collaborating firms are embedded in the globalized knowledge economy, have developed strategies and practices for their learning, and have the quality and ability to create and improve their teaching and research. In general, based on the review, it can be concluded that there is a need for a comprehensive statistical study of the state and development of higher education in Kazakhstan based on the selected indicators. Knowledge of the objective laws of the development of the regional higher education system will increase the efficiency of its functioning, taking into account the demographic and economic situation in the region, taking into account changes in the education system. Moreover, there have been no similar studies before.

3. METHODOLOGY

The methodological basis of the study was the work of domestic and foreign scientists on the development of higher education, statistics, regional economy, and demographic data. Statistical methods of classification of dependency studies, as well as tabular and graphical methods of data representation, were used as analysis research tools. In this paper, an important emphasis is placed on the analysis of the state of higher education in the regions of Kazakhstan based on an integrated approach based on the selected three groups of variables: enrollment in higher education; subjects and objects of higher education (number of teaching staff, number of students, number of universities); provision of services (budget, population, enterprises). A set of indicators for analyzing the performance of universities was determined based on a literature review.

The following statistical methods were used as analysis tools:

(a) Classification and dependency studies: the process of ordering or distributing objects (observations) into groups in order to identify the relationships between them. This set is called a sample of data for observation. This method is used for the analysis and demonstration of processed information for its subsequent interpretation.

(b) The method of analyzing time periods: this method of analyzing economic phenomena and processes is crucial to the principle of their mutual connection. This method is widely used in many fields of knowledge at the macro and micro levels to study the processes of economic development and assess their effectiveness. The time period helps to determine the sequence of observations of a certain parameter at different points in time, as well as to understand the change in indicators over time.

(c) Tabular and graphical data representation methods: this method allows you to visualize data and conditional images of statistical data using geometric shapes, lines, dots and various symbolic images. These data presentation methods demonstrate selected indicators based on data aggregation at the stage of primary descriptive analysis and are also described using conventional images or signs.

Based on a comprehensive review of the above variables, it is proposed to conduct an analysis at the following three stages (Figure 1).

First stage
- Selection of Methods
- Data Collection
- Processing Data

Second stage
- Sampling from Statistical Collections
- Data Analysis and Interpretation

Third stage
- Description of the Obtained Results
- Conclusion and Reccomendations
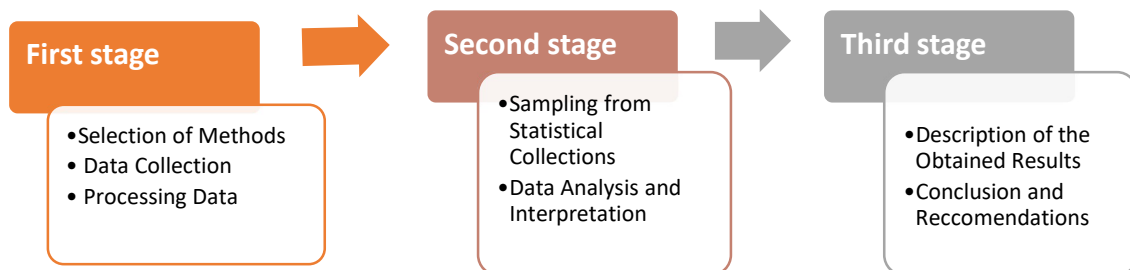
FIGURE 1. Algorithm for assessing the level of development of HEIs

Note: compiled by authors

In the first stage, data is collected from open sources, definitions of the initial data and evaluation of the time period. The second stage begins with defining a system of indicators for each region from statistical yearbooks. Then these data will be analysed using the abovementioned comparative and descriptive analysis methods. The growth rates of indicators in the regions will be revealed. Recommendations will be made in the third stage based on the findings.

The data sample was made based on the transformation and analysis of information from the annual statistical collections of the Bureau of National Statistics of the Republic of Kazakhstan, as well as periodical press data and various open resources on the research topic. Data from 2010 to 2021 were used for the analysis. A comparative analysis of the data obtained is used to identify specific characteristics in the regions regarding educational indicators and compare them with each other in different periods. Descriptive statistics were used for data processing, their systematization, visual presentation in tables and graphs, and a quantitative description of data using a system of statistical indicators.

In order to analyse and eliminate these shortcomings, indicators were selected based on an integrated approach. A full description of the variables we use is presented in Table 1.

TABLE 1. Variables used to estimate this research

No.	A variable of group estimation	Indicator	Measurement
1	Enrollment in higher education	The gross enrollment rate in tertiary education	In percentage
2	Subjects and objects of higher education	Number of teaching staff	count
		Number of students	count
		Number of universities	count

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3	Provision of services	Budget	thousands KZT
		Population	thousands KZT
		Enterprises	thousands KZT
Note: compiled by authors			

The quantitative indicators described in the table will be used for statistical analysis. Fourteen regions and three cities of republican significance will be considered. The significance of the study is to develop a methodology for a comprehensive statistical study of the state and development of higher education at the regional level, which allows for assessing the prospects for its development, taking into account the demographic and economic situation in the region. The practical significance of the research results lies in the fact that the obtained research results and conclusions can be used by government agencies when analyzing and predicting the development of the education system in the region.

4. RESULTS

Enrollment in higher education

The gross enrollment ratio in higher education by regions of Kazakhstan is defined as the ratio of the number of students, regardless of age, studying in organizations of technical and vocational education and universities to the total population aged 18-22 years. The data are described in Table 2.

TABLE 2. Gross enrollment ratio in higher education, in percentage

Region	2010	2015	2016	2017	2018	2019	2020	2021	Growth
Akmola	36,42	27,71	28,21	30,95	33,67	39,41	39,53	38,38	1,96
Aktobe	40,51	47,16	51,22	54,87	62,97	70,96	70,47	64,09	23,58
Almaty	10,51	12,59	11,70	12,30	13,63	14,29	13,27	13,49	2,98
Artyrau	38,32	34,12	35,39	39,67	42,61	42,09	39,60	37,87	-0,45
West-Kazakhstan	59,06	66,98	78,11	87,45	90,48	96,51	85,28	83,20	24,14
Zhambyl	41,83	32,31	34,95	38,31	41,57	44,17	43,25	38,20	-3,63
Karaganda	61,74	55,35	56,51	61,14	67,95	68,93	66,03	64,88	3,14
Kostanay	45,32	40,45	45,59	48,53	52,01	53,47	49,80	46,46	1,14
Kyzylorda	38,45	25,31	26,03	25,90	28,70	29,43	27,98	31,40	-7,05
Mangystau	34,70	23,07	25,02	24,84	27,31	33,64	26,52	23,20	-11,5
Pavlodar	46,81	39,76	46,26	47,35	52,80	56,19	58,39	56,07	9,26
North-Kazakhstan	34,88	21,84	24,78	25,22	30,99	31,97	32,22	29,78	-5,1
Turkestan	37,80	40,05	41,14	45,34	12,28	13,33	12,76	12,88	-24,92
East-Kazakhstan	49,70	45,31	49,97	50,49	57,26	57,10	58,68	59,27	9,57
Astana c.	63,34	123,31	102,93	99,81	106,89	114,32	116,30	118,84	55,5
Almaty c.	121,44	121,27	129,47	138,05	163,57	194,27	199,90	204,64	83,2
Shymkent c.	-	-	-	-	120,69	152,57	133,29	124,41	3,72
Note: compiled by authors based on the data from the Bureau of National Statistics (2022)									

The presented data reflect the gross enrollment ratio in higher education by regions of Kazakhstan. The gross enrollment ratio is defined as the ratio of enrollment in technical and vocational education (ICED-5) and universities (ICED 6-8) to the total population aged 18-22. From 2010 to 2021, the gross enrollment ratio in higher education in the Republic of Kazakhstan ranged from 48.37% to 66.98%. In 2021, the ratio was 62.64%. Approximately 62.64% of young people aged 18-22 study in technical and vocational education organizations or universities.

In different regions of Kazakhstan, the gross enrollment ratio in higher education also had different values. For example, in 2021, in the West Kazakhstan region, the coefficient was 83.20%, one of the highest rates among the regions. On the other hand, in the Mangistau region, the ratio was 23.20%, which is one of the lowest rates. The cities of Astana and Almaty show higher gross enrollment rates in tertiary education compared to other regions of Kazakhstan. For example, in 2021, in Astana, the coefficient was 118.84%, and in Almaty - 204.64%. Compared to 2010, the growth was 55.5% and 83.2%, respectively.

Some regions, such as Akmola, Aktobe, Karaganda and East Kazakhstan, also show relatively high gross enrollment rates in higher education. In addition, there are regions where the growth turned out to be in the red for ten years. These include the Turkestan region (-24.92), the North Kazakhstan region (-5.1), Mangistau (-11.5) and others.

Subjects and objects of higher education

Universities are one of the main objects of higher education; at the beginning of the 2021-2022 academic year in the Republic of Kazakhstan, the number of operating higher educational institutions was 122 organizations. The data is shown in Figure 2.
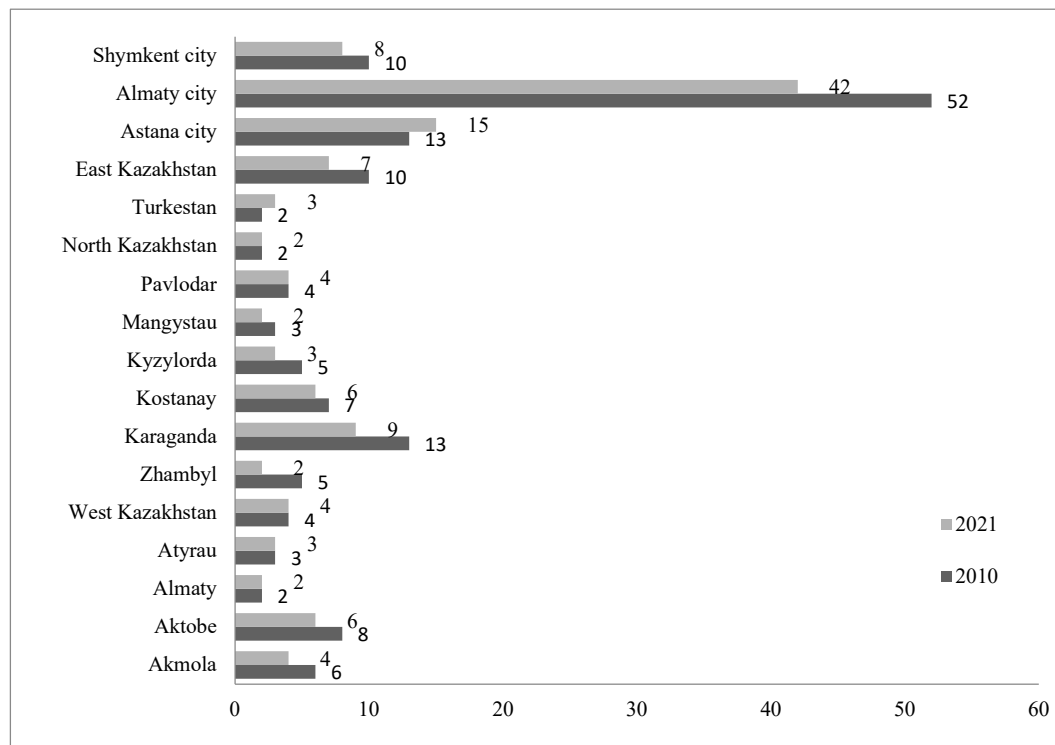
FIGURE 2. Number of universities in the regions of Kazakhstan

Note: compiled by authors

The data provided reflects changes in the number of higher education institutions in Kazakhstan from 2010 to 2021. In general, at the level of the Republic of Kazakhstan, a decrease in the number of higher education organizations was observed from 149 in 2010 to 122 in 2021, which is a difference of -27 (67%) organizations.

Changes are also observed among individual regions. Some regions, for example, Akmola, Aktobe, West Kazakhstan, Pavlodar and North Kazakhstan, maintain relative stability in the number of higher education institutions without significant changes over the specified period. At the same time, some regions, including Zhambyl, Karaganda, Kyzylorda and East Kazakhstan, are experiencing a decrease in the number of higher education organizations, with a decrease from -1 to -4 organizations.

Cities such as Astana and Almaty generally show an increase in higher education institutions over time, although there has been a slight fluctuation in some years. The city of Shymkent also shows a negative trend, with a decrease in the number of higher education institutions by two from 2010 to 2021. It should be noted that the data are presented at a general level and do not consider other factors such as the size and scale of organizations, their profiles, accreditation and quality of education.

The subjects of universities are students and teaching staff. They are the basis of any university. The total number of the contingent for 2021 was 575,511 people (see Table 3).

TABLE 3. Number of students and teaching staff by regions of Kazakhstan, people

Region	Number of students			Number of academic staff		
	2010	2021	Growth, %	2010	2021	Growth, %
Akmola	16 736	12 044	-28%	1 077	750	-30%
Aktobe	25 336	24 909	-2%	1 667	1 627	-2%
Almaty	10 057	11 572	15%	377	541	44%
Artyrau	15 481	11 775	-24%	356	612	72%
West-Kazakhstan	28 260	26 889	-5%	1 099	1 163	6%
Zhambyl	29 426	22 443	-24%	1 272	1 107	-13%
Karaganda	61 105	41 163	-33%	3 289	2 942	-11%
Kostanay	28 079	18 352	-35%	1 357	1 089	-20%
Kyzylorda	17 244	12 524	-27%	877	728	-17%
Mangystau	8 436	6 553	-22%	456	342	-25%
Pavlodar	21 755	16 713	-23%	1 296	999	-23%
North-Kazakhstan	9 405	7 338	-22%	744	528	-29%
Turkestan	14 044	13 173	-6%	1 796	1 147	-36%
East-Kazakhstan	48 381	32 211	-33%	2 769	1 926	-30%
Astana c.	40 817	62 788	54%	3 787	4 909	30%
Almaty c.	186 499	172 224	-8%	13 777	12 779	-7%
Shymkent c.	59 381	82 840	40%	3 604	3 189	-12%

Note: compiled by authors based on the data from the Bureau of National Statistics (2022)

Overall, there is negative growth in two indicators across the country over the period under study. The total number of students in the Republic of Kazakhstan decreased from 620,442 in 2010 to 575,511 in 2021, representing a decrease of 7%. Regarding the number of students, the increase was in Astana and Shymkent by 54% and 40%, respectively. Moreover, the most significant decrease was in the Kostanay region (35%).

The number of teaching staff in Kazakhstan also decreased from 39,600 to 36,378, which is an 8% decrease. Nevertheless, there are regions where there is growth. These include Atyrau region (72%), Almaty region (44%) and the city of Astana (30%). The most significant decrease is observed in the Turkestan region (36%), as well as in the East Kazakhstan region and Akmola region, where the decrease is 30%.

Higher education services are rendered at the expense of the budget, population and enterprises

In the fourth quarter of 2021, services in the field of higher education were provided in the Republic of Kazakhstan for 119.7 billion tenge, which is 603% more than in the fourth quarter of 2010. Including 1.035 billion tenge, services were provided at the expense of the budget (87% of the Republic of Kazakhstan), 133.3 million tenge - at the expense of the population (11%), 287 million tenge - at the expense of enterprises (2%). The share of providing services at the expense of the population has decreased by 10% since 2010, while the budget has increased by 11%, and at the expense of the enterprise, it has decreased by 1%.

The indicators for rendered services of higher education by regions are given in Table 4.

TABLE4. Rendered services of higher education at the expense of the budget, population and enterprises by region, in thousand tenge

Region	Budget		Population		Enterprises	
	2010	2021	2010	2021	2010	2021
Akmola	8071059	69663428	1162212	12361554	93140	303998
Aktobe	8565658	40642885	1760140	3834456	127871	687164
Almaty	10729516	103331990	1384310	4912450	141437	547233
Artyrau	4761868	29590876	1301548	2903100	1066850	3880890
West-Kazakhstan	7150336	30659573	1222731	3555216	187283	1094477
Zhambyl	9193224	51013471	1473533	3717590	17750	163658
Karaganda	13044140	140894012	3416437	7225670	469068	2343362
Kostanay	7104458	37001071	1689986	2621635	53153	229968
Kyzylorda	7251703	46588689	1051149	2383154	95110	308148
Mangystau	5550171	34818745	1674816	2698896	195920	1412298
Pavlodar	7053283	33995634	1651144	2349682	69304	396464
North-Kazakhstan	6592285	28995731	754605	1107107	33461	75168
Turkestan	20363744	97963258	3559191	3727178	54355	157417
East-Kazakhstan	11418336	55562088	2636439	4959039	95855	326643
Astana c.	8263660	89667618	3097302	21386894	1030079	7571167
Almaty c.	16568330	95705111	12756970	44955686	2435549	8220031

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Shymkent c.	-	49372613		8639141		996472
Note: compiled by authors based on the data from the Bureau of National Statistics (2022)						

Overall, there is positive growth in all three areas. For example, in the regional context, the largest increase in the volume of services in the field of higher education at the expense of the budget fell on Astana and the Karaganda region, and the smallest on the West Kazakhstan region. According to the financing of the population in the Akmola region, then in Astana city. And the smallest in Turkestan, Pavlodar and North Kazakhstan regions. In the regional context, the largest increase in the volume of services in the field of higher education at the expense of the enterprise was in the Zhambyl region and Astana city.

Let's consider this indicator by forms of ownership and by the dimension of enterprises (see Figure 3).
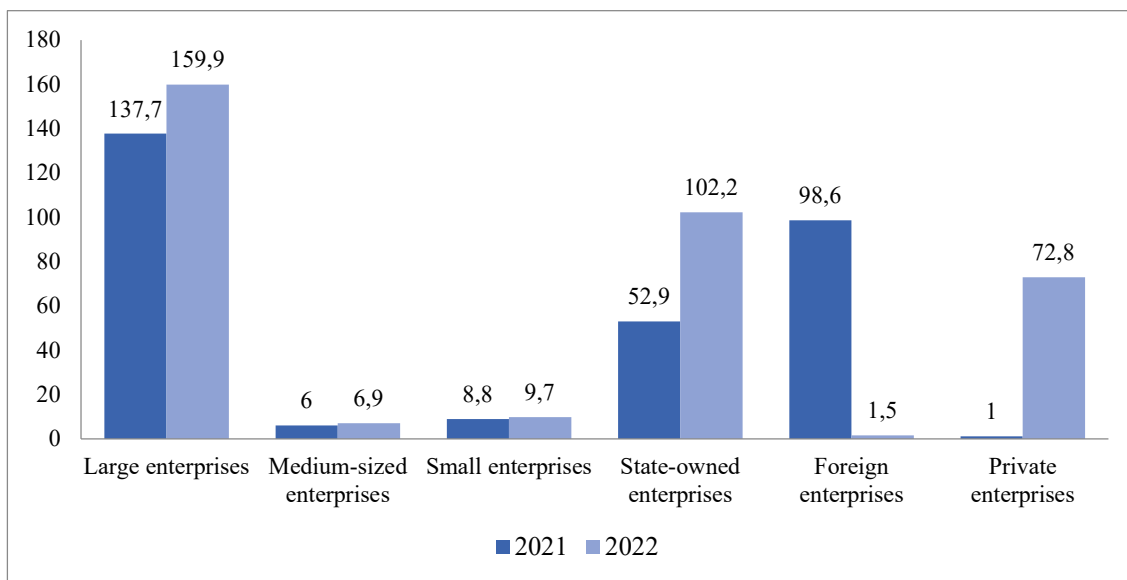
FIGURE 2. Services in the field of higher education in the context of the form of ownership and the size of enterprises, in billion tenge

Note: compiled by authors

Most of the services (90.6%) in the field of higher education in the fourth quarter of last year were provided by large businesses: 159.9 billion tenge, an increase of 16.2% over the year. Medium—sized enterprises accounted for 6.9 billion tenge (plus 15.3% for the year), small - 9.7 billion tenge (plus 10.1%).

In terms of ownership forms, state-owned companies provided the most services: 102.2 billion tenge - immediately 1.9 times more than a year earlier. The volume of services provided by foreign enterprises increased 1.6 times, to 1.5 billion tenge; the volume of services provided by private companies, on the contrary, decreased by 26.2% over the year, to 72.8 billion tenge.

5. DISCUSSION

Enrollment in higher education

From 2010 to 2021, the total tertiary coverage ratio in the Republic of Kazakhstan ranged from 48.37% to 66.98%. In 2021, this figure was 62.64%. Approximately 62.64% of young people aged 18 to 22 are enrolled in technical and vocational schools or universities. In different regions of Kazakhstan, the coefficient of total coverage with higher education also has different values. For example, in 2021, in the West Kazakhstan region, this figure was 83.20%, one of the highest values among the regions. On the other hand, in the Mangistau region, this ratio was 23.20%, which is one of the lowest rates.

The cities of Astana and Almaty show higher rates of total tertiary education coverage compared to other regions of Kazakhstan. For example, in 2021, in Astana, the coefficient was 118.84%, and in Almaty - 204.64%. This means that in these cities, the percentage of young people studying in higher education significantly exceeds the general population between 18 and 22. Compared with 2010, the growth was 55.5% and 83.2%, respectively.

Some regions, such as Akmola, Aktobe, Karaganda and East Kazakhstan oblasts, also show relatively high overall tertiary coverage rates. There are regions where the overall coverage rate has declined over ten years. These regions include the Turkestan region (-24.92), North Kazakhstan region (-5.1), Mangistau region (-11.5) and others.

These data reflect differences in the availability of higher education in different regions of Kazakhstan. The high performance in the cities of Astana and Almaty may be related to their status as the capital and largest city, respectively, as well as to the developed education infrastructure in these regions. However, there are challenges in underperforming regions, and more efforts are likely needed to improve the accessibility of higher education in these areas.

Subjects and objects of higher education

In general, at the level of the Republic of Kazakhstan, there was a decrease in the number of higher education institutions from 149 in 2010 to 122 in 2021. This indicates a general downward trend in the number of educational institutions in the country over the specified period. Some regions, such as Akmola, Aktobe, West Kazakhstan, Pavlodar and North Kazakhstan show relative stability in the number of higher education institutions with no significant changes over the period indicated. At the same time, some regions, including Zhambyl, Karaganda, Kyzylorda and East Kazakhstan, are experiencing a reduction in educational institutions.

The total number of students in the Republic of Kazakhstan decreased from 620,442 in 2010 to 575,511 in 2021, representing a decrease of 7%. At the same time, there is an increase in the number of students in Astana and Shymkent and a significant reduction in the Kostanay region. The number of teaching staff in Kazakhstan also fell from 39,600 to 36,378, a decrease of 8%. However, there are regions where growth is observed, such as the Atyrau region, the Almaty region and the city of Astana. At the same time, the most significant decline is observed in the Turkestan region, as well as in the East Kazakhstan region and Akmola region.

It is important to note that the data presented reflects the overall picture and does not consider other factors, such as the size and scale of educational institutions, their profiles, accreditation and quality of education.

The volume of services

The volume of services in the field of higher education in the fourth quarter of last year was the most significant in the region of Karaganda (12.6%) and Almaty (12.4%). Approximately a quarter of the volume of sector services falls on Astana - 118 million tenge. The smallest volume of services was provided in the North Kazakhstan region (2.5%) and the West Kazakhstan region (2.9%).

Most of the services (90.6%) in higher education in the fourth quarter of last year were provided by large enterprises for 159.9 billion tenge, an increase of 16.2% compared to the

previous year. Medium enterprises amounted to 6.9 billion tenge (an increase of 15.3% per year), and small enterprises - 9.7 billion tenge (an increase of 10.1%).

State-owned companies provided the most significant volume of services - 102.2 billion tenge, 1.9 times more than a year earlier. The volume of services provided by foreign enterprises increased by 1.6 times and amounted to 1.5 billion tenge. On the other hand, the volume of services provided by private companies decreased by 26.2% over the year and amounted to 72.8 billion tenge.

The analysis of the current state of higher education in Kazakhstan and the identification of directions for further development of the sector indicate a number of trends in higher education in Kazakhstan. For example, the growth in the volume of services in the Karaganda and Almaty regions may indicate a greater popularity of higher education in these regions. The increase in the volume of services provided by public companies may indicate the growing role of the state in the higher education sector. A decrease in the volume of services provided by private companies may indicate a worsening economic situation in the sector and possible problems faced by private educational institutions.

6. CONCLUSION

This study aimed to analyse the state of higher education in the regions of Kazakhstan based on an integrated approach based on the use of statistical methods and aggregation of empirical data. The significance of the study is to develop a methodology for a comprehensive statistical study of the state and development of higher education at the regional level, which allows for assessing the prospects for its development, taking into account the demographic and economic situation in the region. The practical significance of the research results lies in the fact that the obtained research results and conclusions can be used by government agencies when analyzing and predicting the development of the education system in the region.

The results can be used for further development of the country's regions in the field of higher education. In addition, the following points can be highlighted and recommendations made.The level of higher education in Kazakhstan can be assessed based on several factors, such as the number of higher education institutions, the availability of education, the number of graduates and the population's level of education. In Akmola region, there is an increase in budget funds for higher education and an increase in the number of enterprises. This may indicate active support for the development of higher education and an increase in the availability of educational opportunities for the population. In Aktobe region, a significant increase in budgetary funds and the number of enterprises indicates an increase in interest and investment in higher education in the region. This can help increase the accessibility of education and improve the quality of educational services.

Strong growth in budget funds, population and enterprises indicate significant support for higher education in the Almaty region. Almaty region, including the city of Almaty, is one of Kazakhstan's key centers of education and science. Atyrau region is also experiencing significant growth in budgetary funds and enterprises, which may indicate increased attention to the development of higher education. However, the population level for 2021 alone is not reported, so it is difficult to estimate the level of tertiary education in this region.

In general, based on the data provided, it can be said that higher education in Kazakhstan is developing and receiving significant support from the state and enterprises. However, a more accurate assessment of the higher education level in each region requires more detailed analysis, including data on the quality of education and the percentage of people with higher education in the population.

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RESEARCH ARTICLE

Geopolital and Geo-Economic Importance of the Middle Corridor: A Chompreshive Overview

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EJEBS

Abstract

The aim of the paper is to investigate the changing importance of the Middle Corridor in geopolitical and geo-economic contexts using analytical and case study methodology. The conflict in Ukraine has disrupted the traditional trade route between Asia and Europe via Russia, leading to the emergence of alternative transport options such as the Trans-Caspian International Transport Route (TITR), also known as the Middle Corridor (MC). This study examines the evolving importance of the Middle Corridor in the geopolitical and geo-economic context and highlights its potential as an alternative trade route for China-Europe trade. However, the corridor currently operates at only 10% of the capacity of the Northern Corridor, and significant efforts are needed to increase its capacity and ensure its efficient use. Successful corridor initiatives depend on effective management, trade facilitation and cross-border cooperation to overcome geographical disparities. As a result, the Trans-Caspian International Transport Route (TITR), also known as the Middle Corridor (MC), is emerging as a promising alternative for the foreseeable future. Overall, the growing importance of the Middle Corridor and other Asian economic corridors is changing regional trade and transport dynamics, requiring comprehensive management, trade facilitation and infrastructure development.

1. INTRODUCTION

The current war in Ukraine caused several difficulties in different fields and industries. One of these problems, which affects the regions outside of the conflict zone is the trade between Asia and Europe. The usual route from China to Europe passes through Russia, but the war has made this impossible. Thus, the Trans-Caspian International Transport Route (TITR), also known as the Middle Corridor (MC), seems to be a good option for the near future. TITR/MC is a rail freight and ferry system linking China with Europe. It starts from Southeast Asia and China, and runs through Kazakhstan, the Caspian Sea, Azerbaijan, Georgia and Turkey before reaching southern or Central Europe, depending on the cargo destination. Geographically, this is the shortest route between Western China and Europe.

Whilst providing a good option to avoid passing through Russia, the TITR currently only has about 10 % of the northern route's capacity. To develop the corridor's capacity and facilitate its use as the main transport route, mid-Asian countries have been investing billions of dollars in infrastructure. In our study, we investigate the changing importance of the Middle Corridor in geopolitical and geo-economic contexts using analytical and case study methodology. The main contribution of transport corridors to economic growth is subsequent to the reduction of logistics costs and transportation time along supply chains, which eventually help improve trade competitiveness. However, experience demonstrates that not all TC initiatives are successful and their success is much dependent upon the existence of proper corridor management mechanisms and trade and transport facilitation initiatives (PGlobal, 2011).

Today, Ukraine's economy is in disarray, as the supply chains of food, textiles and other goods, as well as equipment and materials, are either overloaded or disrupted. The conflict in Ukraine may further aggravate the transportation crisis. The conflict has also disrupted rail links between China and Europe, in which the corridor through Russia is used to transport many goods. Alternative sources of supply and transport routes require time before production can be scaled to the required level. In the context of globalization, the impact of economic corridors on international trade, investment, economic growth and logistics of countries and regions along them acquires special importance.

Despite the geopolitical upheavals of recent events and the disruption of logistics chains around the world, many countries are trying to cope with this challenge. The creation of regional supply chains requires new approaches to solving the problems that have arisen. Two levels of decision-making are needed to mitigate the effects of supply chain disruptions. First, governments must pursue policies that enhance the sustainability of critical supply chains. Secondly, it is necessary to study in detail the processes and possibilities of solving cross-border problems.

Under these conditions, interest in the route of the Middle Corridor increases. Now that global events have weakened the competitiveness of the Northern Corridor and new opportunities have emerged. The low interest in this direction to date can be attributed to the fact that the capacity of the corridor is insufficient to provide the entire volume of cargo, and the Middle corridor passes through the territory of many countries. However, in the face of increasing demand, countries have become more active in improving the infrastructure of the route and facilitating many customs processes. The concept of the Middle Corridor is that other participating countries can create a coordinated corridor that can not only facilitate interregional trade between China and Europe but also promote trade development within Central Asia, Caspian and adjacent regions. Most of the potential depends on the development of trade within the Middle Corridor, which is multimodal. For example, if Kazakhstan is able to increase trade with the European Union, then both regional and interregional trade will be able to use this opportunity. Thus, the aim of the paper is to investigate the changing importance of the Middle Corridor in geopolitical and geo-economic contexts using analytical and case study methodology.

2. THEORETICAL BACKGROUND

The main contribution of transport corridors to economic growth is subsequent to the reduction of logistics costs and transportation time along supply chains, which eventually help improve trade competitiveness. However, experience demonstrates that not all TC initiatives are successful and their success is much dependent upon the existence of proper corridor management mechanisms and trade and transport facilitation initiatives (PGlobal, 2011).

In the context of globalization, the impact of economic corridors on international trade, investment, economic growth and logistics of countries and regions along them, acquires special importance. The development of economic corridors is closely related to the changes in countries logistics performance (An et al., 2021; Li et al., 2021; Martí et al., 2014; Wang et al., 2018) Thus, the relationship between economic corridors and logistics performance raises a reasonable interest in the scientific community. Firstly, regional cooperation on infrastructure improvements based on economic corridors could strengthen connectivity and reduce trade cost while at the same time making trade easier and foster economic growth of corridor economies. It is known that removing barriers caused by national borders, and opening new transport markets, will lead to cross-border cooperation that significantly reduce geographical inequalities between countries. Secondly, the construction of new railways and roads creates added value for owner country. However, if the new connection is international, the value acquires not only by the owner country but also to the neighbouring countries that use this connection (Rakauskienė et al., 2022).

The objective of economic/development corridors is to leverage the infrastructure network and trade facilitation to promote economic and social development. Nevertheless, the corridors are not static; they may evolve over time in terms of their functional dimension. In Figure 1 presents thefunctional typology of corridors.
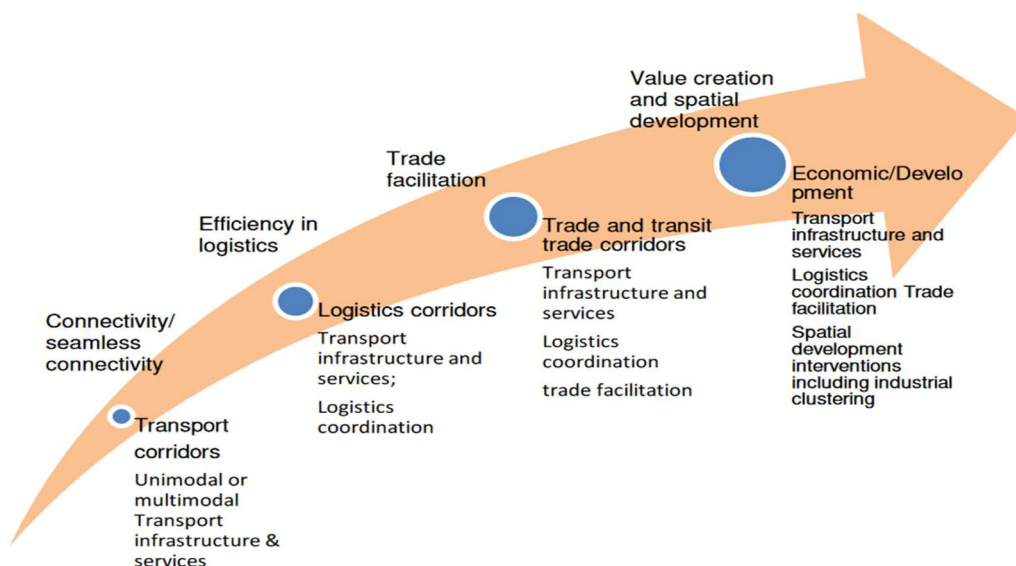
FIGURE 1. Functional typology of corridors

Note: compiled by authors based on Aggarwal (2020)

2.1 Economic corridors in Asia

In Asia, the concept of economic corridor was introduced in the Eighth Ministerial Meeting of the Greater Mekong Subregion (GMS) in 1998 to encourage economic activities along the major roads or the transport corridors through the establishments of industrial estates, special economic zones (SEZs) and border economic zones, drawing on the development corridors of Africa. The GMS countries were the first to adopt the economic corridor approach to regional integration in the subregion. Since then, there has been a series of corridor initiatives in Asia.

In South Asia alone a lattice of regional corridors has been proposed which includes 10 regional road corridors/gateways, 5 regional rail corridors/gateways,10 maritime gateways, and 7 aviation gateways (De and Iyengar, 2014). Southeast Asia is connected through Mekong, IMT-GT and BIMP EAGA subregional corridors. In addition, there are transregional corridors connecting South Asia with Southeast Asia. These are: the India–Myanmar–Thailand Trilateral Highway Project, the Mekong–India Economic Corridor (MIEC), the Kaladan Multimodal Transit Transport Project (India-Myanmar), and the Delhi–Ha Noi Railway Link. Further, there are mega transnational corridors such as 6 Belt and Road corridors and 6 CAREC corridors. BRI routes comprise of 30,000 km of new/upgraded railways and roads that have been constructed or are in the process of being constructed since 2013 and almost 15,000 km more in the planning stages (Reed & Trubetskoy, 2018). CAREC corridors as stated above cover 29,350-kilometer (km) transport network.

In North East Asia, trade and transit trade corridors are in different stages of development including Siberian Land Bridge, Dalian (China-Russia), China Land Bridge (North east Asia - Central Asia), Vanino – Taishet and Tianjin– Mongolia, and Korea-Russia corridors. The aim of these projects is 'to create a network in which trade and transportation can take place throughout the region as smoothly as it does within a single country' (Mitsuhashi, 2010). It must be noted that these corridors have overlapping geographies and are not mutually exclusive.

2.2 China Pakistan Economic Corridor (CPEC)

The China-Pakistan Economic Corridor (CPEC) is the most prominent and ambitious of the BRI corridors. Its development objectives are multifaceted and include infrastructure development; increased people-to-people contact for enhanced academic, cultural, and regional knowledge exchanges; and a higher volume of trade flows and business activity. In principle, the CPEC model should result in a well-connected, integrated and dynamic economic belt extending between China and the coast of Pakistan.

The CPEC is supported by a bilateral trade agreement between China and Pakistan (see Figure 2). Most of the investments, estimated at close to $50bn, are being spent on building and modernizing the overland connections between Xinjiang in western China to the Arabian Sea across the Himalayas. They are comprised of a network of roads extending almost 3,000 km, the port of Gwadar in Pakistan, a rail line and an oil pipeline between the two countries. The corridor will also see ancillary investments in solar power and a hydro power station.

The CPEC is part of a broader vision to enhance connectivity between China and the South and West Asia countries of India, Iran, Afghanistan, and the Central Asian Republics. When completed, the corridor should enable China's imports of oil to go through the pipeline and therefore avoid the busy routes through the Straits of Malacca as well as congestion in the coastal provinces of China itself. However, outside these benefits, the corridor is also one of the more controversial ones, as it cuts through disputed territory between India and Pakistan.

2.3 China-Mongolia-Russia Economic Corridor

The China-Mongolia-Russia Economic Corridor is the most direct route between north-eastern China and its economic centres and markets in Russia and Europe. The Corridor builds
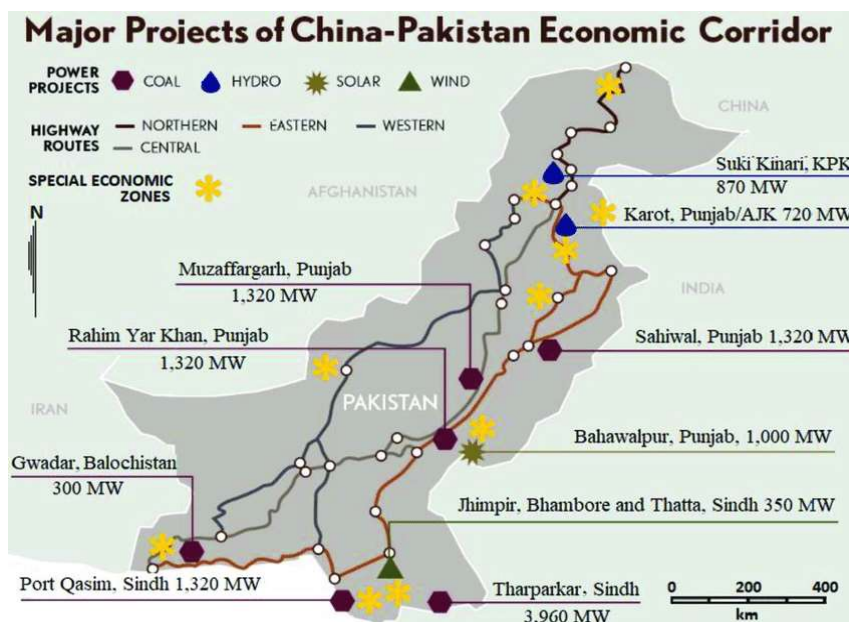
FIGURE 2. China-Pakistan Economic Corridor

on several years of efforts by Mongolia and Russia to improve connectivity to China and to their own more remote territories. The corridor is thus a convergence of the Eurasian Economic Community, championed by Russia, the BRI and Mongolia's initiative to improve connectivity with its two neighbours. For example, in 2013 Mongolia defined a new initiative to build roads between the borders with China in the south and Russia in the north, including 1,100 km of electrified railways and an oil and gas pipeline across Mongolia, which will cost a total of US$50 billion (Otgonsuren, 2015).

The three governments have agreed to build an economic corridor and strengthen cooperation in transport infrastructure connectivity, port construction, industrial capacity, investment, trade and business, cultural exchanges, and environmental protection, in order to enhance the economic benefits of each country. In 2015, the three governments agreed on rail freight transport and the establishment of a joint Mongolian-Russian-Chinese rail transport and logistics company. Rail transport is key to the CMREC (see Figure 3).

2.3 New Eurasian Land Based Economic Corridor

The New Eurasia Land Based Economic Corridor is an international railway line running from Lianyungang in China's Jiangsu Province through Alashankou in Xinjiang to Rotterdam in the Netherlands. The Chinese section of the line consists of the Lanzhou-Lianyungang Railway and the Lanzhou-Xinjiang Railway, passing through eastern, central and western China. After leaving Chinese territory, the new land bridge passes through Kazakhstan, Russia, Belarus and Poland to reach a number of coastal ports in Europe. Leveraging the New Eurasia Land Bridge, China has opened an international freight rail link between Chongqing and Duisburg (Germany); a direct freight train between Wuhan and Mělník and Pardubice (Czech Republic); a freight rail link from Chengdu to Lodz (Poland); and a freight rail link from Zhengzhou to Hamburg (Germany). All of these new rail routes offer rail-to-rail freight transport and the convenience of "one declaration,

FIGURE 3. China-Mongolia-Russia Economic Corridor

Note: compiled by authors based on Beltandroad (2023)

one inspection, one cargo release" for all cargo transported. They are based on the recognition that shippers are willing to pay a premium for faster service that allows them to respond quickly to changing market conditions.

FIGURE 4. New Eurasian Land Based Economic Corridor

Note: compiled by authors based on Nikkei Asia (2023)

2.4 China-Central Asia-West Asia Economic Corridor

The China-Central Asia-West Asia Economic Corridor will run from Xinjiang via Alashankou on the China-Kazakhstan border to connect with existing rail networks in Central Asia and the Middle East. The corridor covers the Central Asian countries of Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan and Afghanistan, as well as Iran and Türkiye. It could be

extended to run through Azerbaijan, Georgia and Russia to Ukraine. However, individual components of the corridor have already been implemented. For example, the Kamchiq Tunnel, the longest railway tunnel in Central Asia and a key project along the Angren-Pap railway line in Uzbekistan is already open, further improving connectivity between China and Central Asia. A rail link between China and Afghanistan was inaugurated in September 2016. Once completed, trains will be able to travel from eastern China to Iran in less than half the time of an alternative route by sea through the port of Shanghai.

2.5 China Indochina Peninsula Economic Corridor (CICPEC)

The corridor, also known as the Nanning-Singapore Economic Corridor, aims to connect eight major cities - Singapore, Kuala Lumpur, Bangkok, Phnom Penh, Ho Chi Minh City, Vientiane, Hanoi and the Chinese city of Nanning. From there, further hubs would be added to the major economic centres of Guangzhou and Hong Kong, creating a network linking ten cities with a combined population of over 50 million. In essence, the corridor links China and the neighbouring ASEAN states. ASEAN has one of the most interconnected transport networks of any developing region in the world. The network has been developed over time, but in particular through the initiatives of the Greater Mekong Sub-region.

2.6 Nanning-Singapore Economic Corridor

The Nanning-Singapore Economic Corridor connects major cities such as Nanning, Hanoi, Vientiane, Phnom Penh, Bangkok, Kuala Lumpur and Singapore. It is the most convenient passage connecting China with Southeast Asia. The linear distance between Nanning, the capital of Guangxi, and Singapore is about 3000 kilometres. If the two cities are connected by highways and railways, it will take only two days by land from Nanning to Singapore. The terrain through which this corridor passes is mostly flat with small hills, making it much easier to build the necessary transport infrastructure.

Now the Nanning railway is connected to Vietnam's North-South railway. From southern Vietnam, the railway can be extended to Cambodia, Thailand, Malaysia and eventually Singapore. The sections from Nanning to the Vietnam-Cambodia border and from the Cambodia-Thailand border to Singapore have been completed and are now operational. Only the 300-kilometre section from Phnom Penh to Hanoi remains to be built from scratch. The tracks from Nanning to Hanoi have already been standardised. To make the N-S rail link operational, the tracks on other sections need to be standardised to make them compatible with the Nanning-Hanoi tracks.

Building a highway between Nanning and Singapore is no great technical challenge. The highway between Nanning and Youyiguan (a Chinese city on the border with Vietnam) has been linked to Vietnam's No. 1 highway, which links the north and south of Vietnam to the road network in Laos, Cambodia and Thailand. The Nanning-Youyiguan highway was completed in 2005, and the Nongkhai-Bangkok-Kuala Lumpur-Singapore highway also exists. At present, only 500 kilometres of road remain to be built or upgraded from the China-Vietnam border to Vientiane. Once the entire Nanning-Singapore expressway is completed, it will be the most important transport link between China and the Indochinese countries. Before this N-S highway is completed, the alternative road is from Vinh City in central Vietnam to Vientiane in Laos, or the section from Quangtri, a city in central Vietnam, to Savanakhet in Laos and then to Khon Kaen in Thailand.

2.7. Central Asia Regional Economic Cooperation (CAREC) Corridors

In 1991, as a result of the collapse of the Union of Soviet Socialist Republics, five new independent states emerged in Central Asia - Kazakhstan, the Kyrgyz Republic, Tajikistan,

Turkmenistan and Uzbekistan. These countries have large reserves of hydrocarbons (oil and natural gas) and mineral resources, and thus a large export potential, which should be realised by means of a developed and modern transport infrastructure. The road network in Central Asia comprises some 66,000 kilometres of roads, of which 9,000 kilometres are used for regional and international transport. The railway system in Central Asia covers more than 22,000 km. Kazakhstan has the largest and most heavily used railway, accounting for 66% of the total length of railways in the region and carrying 84% of all freight. Uzbekistan has about 18% of the region's railways, which carry about 11% of total traffic. Turkmenistan has about 12% of the regional railways and 4% of the total transport. The slow development of the economies of these countries is due in large part to their significant 'economic distance' from world commodity markets. Consequently, it is important for the countries of the region to promote the development of transit routes as they seek to become a trade, transport and economic bridge between the People's Republic of China and Southeast Asia and the Russian Federation and the countries of the European Union, to provide these transport routes with modern infrastructure and to develop information, trade and industrial logistics centres.

The corridors reflect current and potential trade flow patterns. The selection of corridors is based on the inclusion rule of at least two CAREC countries and the following five criteria:

(1) current traffic volumes;

(2) prospects for economic and traffic growth;

(3) ability to increase connectivity between regional economic and population centres;

(4) prospects for reducing delays and other obstacles, such as the number of border crossings and gauge changes;

(5) and economic and financial sustainability of infrastructure, management and technology improvements.

3. FINDINGS

3.1 The growing importance of the Middle Corridor

East Asia is one of the most economically integrated regions in the world, with low barriers to trade and investment. It is openly linked to a network of suppliers based in neighbouring Southeast Asia. South Asia, on the other hand, is one of the least economically integrated regions in the world, with comparatively high barriers to trade and investment. Central Asia has historical links with the West, which are currently weakened, and emerging links with the East. Central Asia can become a transit region between East and West and further develop its role as a supplier of raw materials in both directions, including to the main production and manufacturing centres of East Asia. Europe is geographically and economically divided between North and South, whereas Asia is much more geographically and economically divided into Eastern, South-eastern, Southern and Central-Western spheres, separated by deserts, high mountains, climate and historical diversity far beyond what is found in other parts of the world. This can be seen in the Logistics Performance Index map (World Bank, 2018), which highlights the geographical divide between Asia's subregions. This makes integration more costly. Asia's economic networks are more concentrated and clustered around hubs, and these hubs are weakly connected by long-distance links (see Figure 5).

3.2 The Trans-Caspian International Transport Route (The Middle Corridor)

Central Asia lies at the centre of the Eurasian landmass. This offers the Central Asia Regional Economic Cooperation (CAREC) the opportunity to provide high-volume transit and to act as a value-added intermediary for East-West trade, particularly in bulk and containerised cargo by rail. In addition, CAREC could enhance the role of suppliers of raw and processed inputs to

FIGURE 5. New Eurasian Land Based Economic Corridor

Note: compiled by authors based on Intermodal (2023)

medium to high value-added economic centres in East Asia and Europe (including the Russian Federation). These opportunities have only been partially exploited by Central Asian economies, as investment has so far focused on improving the physical infrastructure of the corridors and on improving border and customs systems along the priority transport corridors.

The Trans-Caspian International Transport Route (TITR, Middle Corridor) is a rail freight corridor linking the People's Republic of China (PRC) and the European Union through Central Asia, the Caucasus, Türkiye and Eastern Europe. The non-PRC Middle Corridor consists of a coalition of port, logistics and transport companies, many of which are either state-owned or have strong links to state-owned network monopolies. These institutions, their industries and the states they represent lie between the European Union and the PRC, forming a contiguous transport bloc from which it is possible to develop a new transport and trade macro-region.

Compared to other transport modes, rail transport along the Middle Corridor has historically played a minimal role. However, even before China's Iron Silk Road and Belt and Road policies, there were long-term multilateral institutional development programmes for transport integration, the most prominent of which was the Transport Corridor Europe-Caucasus-Asia (TRACECA). The European Union initiated TRACECA, and the EU, the five Central Asian republics, the three South Caucasus republics, Türkiye and Moldova signed multilateral agreements in 1993, later joined by Iran and Ukraine. However, the development and use of the Central Asian and Caucasian transport corridors under TRACECA has been less than satisfactory. The TRACECA Caucasus-Black Sea corridor is still slower and more expensive than routes connecting Central Asia and the PRC to Europe via Kazakhstan and the Russian Federation. High costs and slower transit times make it practically uneconomical for commercial use (UNECE, 2017). The main problem with the corridor is that it involves slow and costly ferry legs to cross first the Caspian and then the Black Sea from Georgia to ports in Romania or Bulgaria, or using an underdeveloped rail route through Türkiye. Although the EU has funded 14 transport projects in the region since 1995, they have not had a significant impact on the development of regional corridors.

The rail transport corridors from the PRC to Central Asia via Kazakhstan to the Caspian Sea ports along the TRACECA corridors are well established, while a proposed new corridor via the Kyrgyz Republic does not seem feasible (Bucsky & Kenderdine, 2020; Kenderdine, 2017). The most important development in the last 25 years was the finalisation of the Baku-Tbilisi-Kars

railway in 2017, which reopened direct rail transport between the Caucasus region and Türkiye following the closure of the railway between Armenia and Türkiye due to the Armenian-Azerbaijani conflict in the early 1990s. Another major achievement was the completion of the Trans-Kazakh railway in 2014, a 988 km Zhezkazgan-Saksaulskaya-Shalkar-Beyneu line that shortened the east-west transport route between the Chinese border and the Caspian port of Aktau by about 1,000 km (Rodemann & Templar, 2014). This became important after the opening of the second Kazakhstan-PRC rail border crossing at Khorgos/Altynkol in 2011; however, the Khorgos crossing is still severely underutilised in normal economic operations and has also suffered from politicised bottlenecks (Ruehl, 2019; Bucsky & Kenderdine, 2020; Kenderdine & Bucsky, 2021).

The east-west crossing of the Caspian Sea from China to Europe is a major bottleneck, as ferry and port services are insufficient to balance rail throughput capacity on either side (Badambaeva & Ussembay, 2018). The rail ferry to Baku has been in operation for more than three decades, but container services were only introduced in 2019 (PortsEurope, 2018). The roll-on-roll-off (RoRo) vessel fleet has expanded in recent years and there are now 13 vessels serving the Baku-Aktau and Baku-Turkmenbashi routes (Azerbaijan Caspian Shipping Company, 2019). Azerbaijan has built a new port at Alat with a first phase capacity of 10-11.5 million tonnes of general cargo and 40,000-50,000 TEU containers, with plans for further expansion. On the rail side of the Caucasus, the Baku-Tbilisi-Poti/Batumi main line is an electrified, mainly double-track line with high freight capacity. Both Georgia and Azerbaijan have invested in track upgrades over the past decade and this section of the corridor is now in good condition. From Azerbaijan to the Georgian Black Sea ports, the line currently carries mainly hydrocarbon products, but container transport has become much more important on the return route. In total, 45% of Georgian Railways' traffic consists of petroleum products, while 38% is transit - almost exclusively to and from Azerbaijan (Georgian Railways, 2019). The development of a new deep-water port at Anaklia with a planned capacity of 100 million tonnes per year was due to be completed in 2021, but Georgia pulled out of the contract in 2020 (Lomsadze, 2020). There are two routes from western Georgia, one by ferry across the Black Sea and one overland through Türkiye. In both cases, reaching the targeted Central European markets is challenging, as the routes pass through either Ukraine or Romania, where rail infrastructure is in a relatively poor state (Popa & Schmidt, 2013; Miecznikowski & Radzikowski, 2017).

After crossing the Black Sea by ferry to Varna in Bulgaria, the onward rail corridors pass through Serbia, which is not a member of the EU, meaning that crossing the border is much more time-consuming due to customs procedures. The state of Serbia's transport infrastructure is also poor, with speed limits sometimes as low as 20-40 km/h and a largely single-track network. However, the entire rail corridor from the Bulgarian border to the Hungarian border is currently being upgraded, both to rehabilitate existing lines and to double-track most lines. Black Sea rail ferry services between Romania and Bulgaria to Georgia started in 1978. The Bulgarian state-owned shipping company Navibulgar provides services from Georgia to both Bulgaria and Ukraine. Navibulgar operates under a special tripartite intergovernmental agreement between the governments of Bulgaria, Ukraine and Georgia for the operation of direct rail ferry services between the ports of Varna (Bulgaria), Chornomorsk (Ukraine) and Poti and Batumi (Georgia). According to the timetable, there are monthly ferries between Poti and Varna. Navibulgar is the only company in the Black Sea region to provide rail ferry services between Georgia and the European Union, and it has two vessels for this purpose, both built in 1978. The ships' route forms a triangle between Varna, Poti and Chornomorsk. The rail ferry connection to the Romanian port of Constanța was in operation before 1990 and the infrastructure for rail ferries exists, but none currently operate. In 2003, there was a plan to launch a new rail RoRo ferry from Constanta to the Georgian port of Poti, but this never materialised (UNESCAP, 2003). Despite this limitation,

container transport between the two ports is currently possible, but there is a need for transhipment in both ports. As the rail gauge systems are different anyway, this is not a major problem, as containers can be loaded more cheaply and quickly than railway wagons. However, the capacity for rail wagons on ro-ro ferries is very limited, with vessels having a capacity of 50-106 wagons, which is one to two full trains (Viking Rail, 2015).

Transnational cooperation in transport and logistics has become more important than ever in the wake of Russia's invasion of Ukraine. Indeed, the attempts by Azerbaijan, Türkiye and Kazakhstan to secure a place in the ambitious China-led Belt and Road Initiative (BRI) prior to the war have given the Middle Corridor increasing momentum and the potential for further cooperative initiatives. Although relatively little progress has been made in harmonising and simplifying customs documentation and procedures through the above-mentioned initiatives, the optimisation of this multimodal transit corridor as a viable passageway has become a top foreign policy priority for all relevant actors in light of Russia's increasing isolation due to the imposition of the Western-led sanctions and export restriction regime.

4. CONCLUSIONS

The ongoing conflict in Ukraine is disrupting the traditional trade route between Asia and Europe via Russia. As a result, the Trans-Caspian International Transport Route (TITR), also known as the Middle Corridor (MC), is emerging as a promising alternative for China-Europe trade. However, the TITR currently operates at only 10% of the capacity of the Northern route. Central Asian countries are investing in infrastructure to increase the capacity of the corridor and promote its use as a primary transport route. Transport corridors such as the TITR reduce logistics costs and transport time, thereby promoting economic growth and trade competitiveness. Successful corridor initiatives rely on effective management, trade facilitation and cross-border cooperation to reduce geographical disparities between countries.

Asia has proposed and developed various economic corridors, such as the China-Pakistan Economic Corridor (CPEC), the China-Mongolia-Russia Economic Corridor, the New Eurasian Land-Based Economic Corridor, the China-Central Asia-West Asia Economic Corridor, the China-Indochina Peninsula Economic Corridor (CICPEC), the Nanning-Singapore Economic Corridor, and the Bangladesh-China-India-Myanmar Economic Corridor (BCIMEC). These corridors enhance connectivity, trade and socio-economic development in the region.

The Central Asia Regional Economic Cooperation (CAREC) corridors also promote economic integration and development. With abundant hydrocarbon and mineral resources, Central Asian countries can unlock their export potential through improved transport infrastructure. Central Asia's road and rail networks facilitate regional trade, connectivity and access to global markets.

In conclusion, the growing importance of the Middle Corridor and other Asian economic corridors is transforming regional trade and transport dynamics. These corridors improve connectivity, reduce trade costs and promote economic growth. However, realising their full benefits requires proper management, trade facilitation and infrastructure development

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Innovative Potential of the Oil and Gas Industry of Kazakhstan

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Abstract

The article is devoted to analysing the innovative potential of enterprises in Kazakhstan's oil and gas sector and developing ways for its effective implementation. In the current economic conditions, the issue of increasing efficiency, modernization, innovative activity and strategic partnership in the oil and gas sector is becoming especially relevant. This is since the raw material orientation of the industry poses a threat to the economic security of the country, which means that increasing the innovative potential of such an important sector for the country's GDP is an urgent problem. The authors of the article analyzed the relationship between the innovative potential of the oil and gas sector and the internal costs of innovation, and the volume of innovative products. An analysis was carried out on benchmark indicators of the country's global competitiveness index, as well as an analysis of measures to introduce innovation in Kazakhstan's oil and gas industry. The most significant technological innovations in the main segments of the oil and gas complex are given. On the basis of the research, proposals were made to increase the innovative potential of the enterprises of the oil and gas industry in Kazakhstan. The most critical strategic prospects for developing Kazakhstan's oil and gas sector are substantiated based on two directions: an increase in internal costs for innovation and an increase in the volume of innovative products.

1. INTRODUCTION

The raw material orientation of the industry will not be able to ensure the sustainable economic development of Kazakhstan. The general technical and technological backwardness of oil and gas enterprises, the need for a compelling connection between science and production, and the raw material orientation of oil exports threaten the country's economic security.

According to the Address of the Head of State Kassym-Jomart Tokayev to the people of Kazakhstan (2022), the primary vector of development of the economy of the Republic of Kazakhstan for the coming decades is defined as the transition from the export-raw material component of economic growth to the industrial-innovative stage of development. In this regard, the actual problems are the research of the essence of the processes affecting the increase in the efficiency of the national economy - diversification, modernization, innovation, identification of their subordination and interconnection.

In current conditions, the balance and strategic orientation of indicators is paramount for improving the national economy's efficiency. The system of performance indicators of the national economy should be based on the principles of balance and strategic orientation. The purpose of this project is to develop theoretical approaches to innovation, to analyze its current state, on the basis of scientific justification, to determine ways to organize and form a mechanism for a comprehensive assessment of innovative potential in the field of priority areas for the development of the economy of the oil and gas industry of the Republic of Kazakhstan. In the oil and gas sector this year, the share of domestic goods and services purchases amounted to 44%. In order to increase the share of production of local goods, it is necessary to monitor the purchase of goods on an ongoing basis and carefully control the existing manufacturing enterprises of the country. It is essential to pay special attention to creating working groups for developing domestic content in oil and gas projects, to expand the list of goods capable of import substitution (Maldynova, 2022).

According to the data of the Bureau of National Statistics (2022), the Republic of Kazakhstan belongs to the countries of the world that have significant development prospects through the development of identified oil and gas resources. Occupying the 12th place in the world in terms of explored reserves of oil and condensate, Kazakhstan ranks 23rd in the ranking of the leading oil-producing powers. Oil makes up about 30% of the total energy production in Kazakhstan, and gas - 13-15% of the total share. The main sources of increase in production at present and in the forecast period will remain the already explored fields of Western Kazakhstan involved in this stage. An increase in production from new sources on the Caspian shelf will make it possible to maintain the dominant role of the oil and gas industry in the national economy in the next 10-15 years (Asanov, 2021).

An analysis of the dynamics of the development of the economic potential in the oil and gas-producing regions of Kazakhstan allows us to state with complete confidence that the total volume of raw materials prepared for extraction in relatively new fields, forecasts regarding the oil and gas potential of structures that are at the stage of geological exploration, as well as the existing prerequisites for increasing reserves in the post-salt complex on the old areas, are a sufficient reason for the republic to become one of the countries of the near and far abroad that are attractive for investing in the oil and gas industry (Slepov, 2019).

Kazakhstan has a close relationship with the world market, and the dynamics of the country's development can be observed using the analysis of the Global Competitiveness Index (2022). The calculation of this index is based on 12 leading indicators, which are disclosed in more detail using 114 variables. One of the important indicators is the country's innovative potential. The dynamics of changes in the indicators of the global competitiveness index over the past three years is shown in Figure 1.
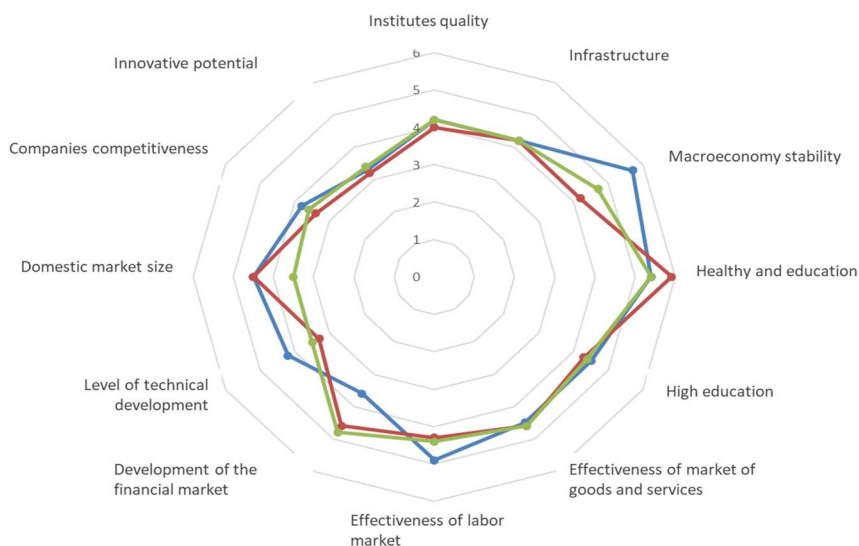
FIGURE 1. GCI Benchmarks of the Republic of Kazakhstan, 2019-2021

Note: Complete by authors Based on World Competitiveness Ranking (2022)

Unfortunately, the indicator of the innovative potential of Kazakhstan has a negative development trend. However, in 2021, Kazakhstan managed to improve its performance and take a worthy position in the ranking ahead of, for example, Russia and Turkey and taking 35th place. In Kazakhstan, when it is necessary to develop the demand for innovations, the market situation is developing so that only an innovative proposal is formed.

TABLE 1. Global Competitiveness Ranking 2019-2021

2018-2019	2019-2020	2020-2021	Country
5	3	1	Switzerland
2	10	10	USA
1	1	5	Singapore
4	4	4	Netherlands
7	17	15	Germany
3	5	7	Hong Kong
8	6	2	Sweden
9	19	18	Great Britain
6	34	31	Japan
11	13	11	Finland
28	20	16	China
43	50	45	Russia
61	46	51	Turkey
55	**42**	**35**	Kazakhstan
85	55	54	Ukraine
Note: comiled by authors based on World Competitiveness Ranking (2022)			

Data shows that the indicator of the development of innovative processes shows a low level. Analyzing the reasons, one can note a low number of innovative developments, the absence of an active process for issuing patents, and the lack of communication between business and science. At the same time, oil and gas sector experts argue that with innovation, it will be easier to achieve competitive positions and high profits. Logically, innovations should be prolonged, not just the presence of innovative activity, but its modernization.

Table 2 presents the most significant technological innovations in the four main segments of the oil and gas complex: exploration, drilling and completion of wells, production, and organization of good workover.

TABLE 2. The most significant technological innovations in the main segments of the oil and gas complex

Segments of the oil and gas complex	Technological innovation
Intelligence service	3D seismic; 4D visualization; Remote measurement; Subsalt Imaging.
Drilling and completion of wells	Hydraulic fracturing with a mixture of CO2 and sand coil pipes; Horizontal drilling; Telemetric system for determining parameters while drilling; Multilateral drilling; Offshore drilling; Pneumatic drilling; Drilling of small wells; Synthetic drilling fluids;
Mining	Gas purification from components; Artificial lift optimization; Coal seam gas production; Freeze and thaw/evaporation cycle; Gas to liquid conversion; Gas shrinkage by glycol injectionModern mining processes; Gas leak protection; Pneumatic equipment for reducing pressure in the well; Offshore platforms; Downhole separation of oil and water; Environmental protection programs; Installation for the return of vapors to the liquid phase.
Organization of well repair	Progressive approaches to organizing well workover; Drilling rig for offshore fields; Creation of infrastructure.
Note: compiled by authors based on reference (Afonin, 2022)	

The largest companies are doing their best to maintain technological barriers for as long as possible to maintain certain competitive advantages concerning national oil companies and independent companies.

2. LITERATURE REVIEW

Economic literature for many years of oil and gas sector development has been studying innovation problems. In the scientific works, the scientist Panagiotis (2019) concludes that it is

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possible to achieve profit in companies in the oil and gas sector using the "mix" method, that is, to combine marketing, production, supply of raw materials, and trade when managing a company. This approach is also innovative due to the coordination and synchronization of all departments of enterprises. Thus, innovation management becomes the basis for the successful functioning of the company.

According to Kusainov (2005), in order to meet the increasing energy needs of the national economy in Kazakhstan, it is necessary to develop the country's innovative potential in the oil and gas sector, which should be based on the introduction of innovations, the application of innovative technologies in geological exploration and mining. Many works by Russian and foreign scientists are devoted to the formation of an enterprise development strategy: Ansoff and McDonnell (1988), Schumpeter (1980), Timofeeva (2014). Kazakh scientist Zhumagulov (2009) considered the strategic ways of development of Kazakhstan's oil and gas industry in the conditions of integration into the world economic system, substantiated the need for the development of all parts of the industry, identified success factors in the development of innovative potential. Karenov (2015), in his research, revealed the trends in the development of the global oil industry, substantiated the crucial role of the oil and gas sector in the development of the country, and revealed the central role of innovation in the development of the industry. Kazakh scientists claim that the oil and gas sector is a driver for introducing and applying innovative solutions.

Arslanbekova (2019), having studied the innovative potential of Kazakhstan's oil and gas sector, concluded that modernisation and innovation are critical in developing and maintaining the competitiveness of oil and gas enterprises. Increasing the innovative potential of this sector will allow reaching a new progressive level throughout the country.

An essential scientific contribution was made by the scientist Kuandykov (2008), who determined the essence of innovative processes in Kazakhstan's oil and gas sector and revealed their features. The author, in his writings, substantiated the importance of introducing innovations for the further successful development of the country's oil and gas industry. At the same time, it is necessary to understand that the availability of qualified scientific and technical personnel, focus on long-term strategic economic indicators, investment in all stages of the company's activities, and taking into account risks, are paramount for innovative development of the oil and gas industry of the Republic of Kazakhstan.

According to Maldynova, there are three main directions for innovative development (Maldynova et al., 2022): (1) improvement of the personnel training system. When preparing specialists for production, educational institutions must ensure the dual nature of training and focus on practical activities; (2) investment in research institutes; (3) cooperation of research institutes with international partners and knowledge sharing. Thus, the analysis of the scientists' research showed that in economic science, the concept of innovation in the industrial market had significantly evolved. However, it should be noted that some problems in the development of the oil and gas sector of the Republic of Kazakhstan are insufficiently developed.

3. METHODOLOGY

The study's novelty lies in its use for the analysis of several factors that can explain the high innovative potential in the oil and gas sector. This article presents the basic principles of modeling used to form a structure with hidden variables. The conceptual framework is presented by internal factors (internal costs of innovation and the volume of innovative products) that affect the innovation potential in the oil and gas sector.

In preparation for the study, the following research questions are lined up:
1. How do internal costs affect innovation potential?
2. How does the volume of innovative products affect the innovative potential?

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Data analysis was carried out using programs for data analysis, the Smart PLS program designed for statistical calculations and graphical analysis. SmartPLS is a graphical user interface software for variance-based structural equation modeling (SEM) using the partial least squares (PLS) trajectory modeling method (Hair et al., 2014). In addition to estimating trajectory models with latent variables using the PLS-SEM algorithm, the software calculates standard performance criteria and supports additional statistical analyses. The research model proposes two types of structures, internal and external, both of which influence the innovation potential of the oil and gas sector. The research puts forward the following hypotheses:

H1: The higher the internal spending on innovation, the higher the innovation potential in the oil and gas sector.

H2: The higher the volume of innovative products, the higher the innovative potential in the oil and gas sector.

Hypothesis variables. To test hypotheses, it is necessary to define 2 types of variables: dependent and independent. A dependent variable is a phenomenon that is explained by something else. The independent variable is causal or explanatory. To test the hypotheses in the research, the following variables were defined (see Table 3).

TABLE 3. Research variables

Type	Variable	Variable Factors
Y	Innovation potential	Internal
		External
X1	Internal costs	Government sector
		Entrepreneurial sector
		Non-Profit Organizations
X2	Volume of innovative products	Product
		Service
Note: compiled by authors based on reference (Zwikael et al., 2006)		

To test the hypotheses, variables such as Innovation Potential will be used, which can be measured using internal and external factors. Internal innovation costs are assessed based on three factors: the public sector, the business sector, and non-profit organizations. The volume of innovative products is calculated according to two indicators: goods and services.

4. FINDINGS AND DISCUSSION

After analyzing the data using the Smart Pls program, for a model with a constant, the coefficient of determination equals a value from 0 to 1. A strong dependence is observed when the coefficient approaches 1, which, when evaluating regression models, is interpreted as the correspondence of the model to the data. The correlation coefficient R-square for the variable "Innovation potential" is 0.569; that is, the constructed model explains more than 56% of the variance of this design. For a detailed analysis of the test results, Table 4 shows the effect of the test.

TABLE 4. Results of the final testing in the SmartPls program

Variable	Original Sample	Sample Mean	Standard Deviation	T Statistics	P Values
internal costs -> Innovation potential	0,462	0,520	0,162	2,851	0,001

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volume of innovative products -> Innovative potential	0,482	0,570	0,178	2,901	0,001

Note: compiled by authors based on Smart Pls

To demonstrate the reliability of the instruments, indicators of internal consistency are given Table 5.

TABLE 5. Indicators of internal consistency

Variable	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Internal costs	0,435	0,331	0,311
Volume of innovative products	1,000	1,000	1,000
Innovation potential	0,763	0,637	0,652
Note: compiled by authors based on Smart Pls			

AVE. A construct has convergent validity if the average variance extracted is at least .50 (i.e., when the variance explained by the construct is greater than the measurement error). Composite reliability tests the possibility of assuming that a set of variables is based on one common factor. If the coefficient is less than 0.9, the value is excellent; less than 0.8 is good, less than 0.7 is sufficient, and less than 0.6 is doubtful. Hypothesis H1 assumed that the higher the internal costs of innovation, the higher the innovation potential in the oil and gas sector. Based on the results obtained: $\beta = 0.462$, $t = (2.851) > 2.005$, $p (0.001) < 0.05$, the conclusion is formed: the relationship indicated in the hypothesis is confirmed. Hypothesis H2 assumed that the higher the volume of innovative products, the higher the innovative potential in the oil and gas sector. Based on the results obtained: $\beta = 0.482$, $t = (2.901) > 2.005$, $p = (0.001) < 0.05$, a conclusion is formed: the relationship indicated in the hypothesis is confirmed.

As a result of the analysis carried out in the Smart PLS program, there is a relationship between such indicators as internal costs for innovation and innovative potential. The higher the internal innovation costs at the enterprise, the higher the innovation potential in the oil and gas industry.

Also, there is a relationship between such indicators as the volume of innovative products and the innovative potential of the market. Namely, the higher the volume of innovative products, the higher the innovative potential in the oil and gas sector.

There is a direct positive relationship between the variables indicated in the study.

However, providing financial and information support is essential to create a successful innovation system (see Table 6).

TABLE 6. Proposals for the successful formation of an innovation system at the enterprises of the oil and gas industry in Kazakhstan

Offer	Expected results
Financial support	Depending on the form of ownership, size and profile of the enterprise, a greater or lesser bias towards obtaining state subsidies, bank loans, venture financing, or creating and using the resources of its innovation fund is possible.
Information Support	It includes the creation of a local network, providing access to information for all responsible executors, as well as automating management processes and developing information channels for cooperation with elements of the innovation infrastructure.
Legal support	It includes the entire set of normative documentation that formalizes and regulates the business processes of the innovation system, as well as the activities of responsible executors.

Organizational and legal support	It represents the organizational structure of the innovation department built following business processes and operations and regulates information flows between departments.
Staffing	It aims to search for personnel within the enterprise and in the external environment, its training and horizontal rotation to increase creative potential.
Note: compiled by authors	

Thus, the level of internal costs and the volume of innovative products in the oil and gas sector influence the innovation potential (see Figure 2).
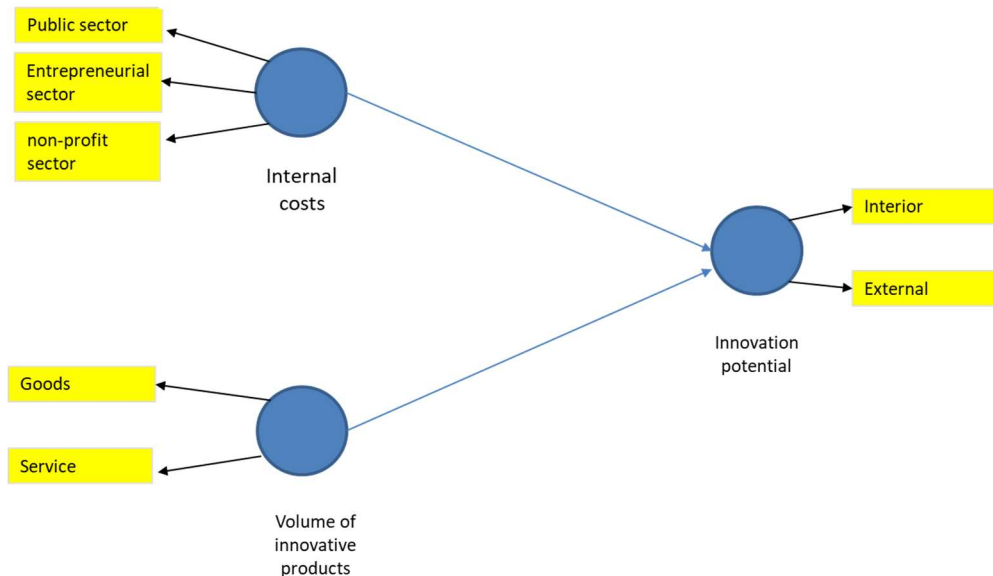
FIGURE 2. Results of PLS analysis in the Smart PLS package

Note: compiled by authors based on Smart Pls

People are the source of innovation in any company. Often, even an ordinary employee comes up with the idea that something in his activity could be improved. It is necessary to stimulate the emergence of innovations; first of all, these concerns work with personnel, which can be carried out in two directions. They were first fixing in the job descriptions of the relevant employees the obligation to study thematic literature and the experience of other companies. Secondly, moral and material incentives for all employees. At the same time, the system of material incentives should be built so that bonuses are explicitly paid for active, innovative activity.

Therefore, paying bonuses at the end of the year or as a percentage of profits is inappropriate. It is much more efficient to regularly hold competitions for the title of the most innovative employee and pay incentives according to the prizes won. In addition, it is advisable to organize a pyramidal incentive scheme, in which the department head receives the bonus, whose employees make the most significant contribution to the company's development in improving its organization. These provisions can be reflected in a separately issued regulation on innovation and in the provision of incentives (Maldynova et al., 2023).

To successfully improve the efficiency of an oil company, transparent and coordinated actions are needed, carried out within the framework of an innovative system that leads to an increase in the competitiveness of petroleum products; to create an innovative base for long-term sustainable

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growth of the company; to ensure the economic security of oil enterprises. The innovation system of an oil company should perform the following functions: market forecasting and selection of priority research areas; strategic planning of innovation activities; search, evaluation and selection of innovative ideas and inventions; implementation, monitoring of indicators, and adjustment of innovative projects (Bizhanova, 2019).

An analysis of Table 7 shows that innovation activity in the industrial oil enterprises of the country is still needs to improve, despite the process of introducing new technologies.

TABLE 7. Analysis of measures to introduce innovation in the oil and gas industry of Kazakhstan

Activities for the implementation of innovation	Results from the introduction of innovation	Problems
Construction of looping sections and Construction of the Opornaya compressor station.	are necessary to increase the capacity of the system, restore the balance of work, reduce the workload and improve the economic characteristics of gas transportation in general	Regions are insufficiently supplied with gas (with gas heating)
Construction of the main gas pipeline "Beineu - Bozoi - Shalkar - Akbulak (Samsonovka)".	The construction of the BBA will reduce the dependence of the southern regions of the republic on gas supplies from Uzbekistan, stabilize prices and volumes of blue fuel supplies to consumers in the region	Regions are not sufficiently supplied with gas (with gas heating)
Hydraulic fracturing	The hydraulic fracturing method increases oil recovery by 3 or more times.	Oil production has not increased
Re-injection of sour gas into an oil reservoir	This method allows increasing the oil recovery factor from 10 to 15 percent, depending on the geological characteristics of a particular field, by maintaining reservoir pressure	Oil production has not reached the world level
Reconstruction of the Atyrau Oil Refinery	The construction of new units will allow: to process light grades of oil in the amount of up to a million tons of oil per year; receive world-class oil products that meet EURO standards.	The share of imports of petroleum products increased
A special economic zone "National industrial petrochemical technopark" has been created.	Upon completion of the construction of these petrochemical complexes in Kazakhstan, three grades of polyethylene, polypropylene, benzene, paraxylene, ethylene glycol, terephthalic acid, polyethylene terephthalate, ethylbenzene, polystyrene, polyvinyl chloride, road bitumen will be produced.	High cost of petroleum products
Visualization Center JSC Exploration Production KazMunayGas	The KMG visualization center allows you to observe the entire process of oil production without leaving the central office in the capital of the republic. In a three-dimensional image, you can see a picture of any field located thousands of kilometers from the city of Astana.	Visualization center not used by private oil companies

Note: compiled by authors

However, such problems still need to be addressed: a shortage of petroleum products (gasoline, diesel fuel) in the domestic market and growth in the share of imports of petroleum products from Russia and abroad. For the system's effective functioning, close cooperation of enterprises with research institutes, universities, and technology transfer centres is necessary for

the search and acquisition of technologies, the search and hiring of qualified personnel, and orders for development. One of the areas of legal support for innovation activity is the protection of intellectual property, which is understood as a set of copyright and other rights to the results of this activity protected by state legislative acts (Ospanov, 2021). The tangible basis of intellectual property is an intellectual product as a result of the creative efforts of its creators (an individual or a scientific team), acting in various forms:

– scientific discoveries and inventions;

– results of research, design, technological and design work;

– samples of new products, new equipment and materials obtained in the process of R&D, as well as original scientific and production services;

– original consulting services of a scientific, technical, economic, managerial nature, including the field of marketing;

– new technologies, patents, etc.

5. CONCLUSIONS

The article presents scientifically substantiated results on identifying the innovative potential of Kazakhstan's oil and gas industry.

The study of topical issues of identifying innovative potential led to the following conclusions:

1. The indicator of the innovative potential of Kazakhstan in the calculation of the global competitiveness index has a negative development trend.

2. There is a relationship between the internal innovation costs and innovation potential.

3. There is a relationship between the volume of innovative products and innovative potential.

4. To develop the innovative potential in the oil and gas industry, it is necessary to ensure close interaction between science and business.

The critical element in reforming the management system of the innovation sphere is the improvement of financing mechanisms, the organization of scientific research and tax policy, namely:

– Allocation of funds from the budget to finance research and development work for civil purposes in the amount of 3% of its expenditure part with an annual increase in this amount as the economy stabilizes to the level characteristic of highly developed countries;

– ensuring sustainable public funding of the Kazakhstan Academy of Sciences, state universities and other higher educational institutions, scientific libraries and information centers;

– working in priority areas of science and technology, ensuring multiple sources of funding for research and development work through the active support of targeted state funds;

– creation of favorable conditions for investment in science by industrial enterprises, banks, international organizations and individuals;

– development of competitive principles in the distribution of funds for scientific programs and projects with the openness of decisions made and the involvement of the scientific community in control over the use of funds;

– stage-by-stage introduction of the contract system in the field of scientific and technical and experimental design developments;

– introduction of tax and customs benefits to stimulate and support scientific activity;

– creating conditions and providing the necessary resources for the participation of Russian scientists in international projects;

– creation of favorable conditions for the work of public scientific associations.

In order to increase the innovative potential of the oil and gas sector, it is necessary to increase the spending level on innovation and the volume of innovative products in the sector.

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Analysis of the Receipts of the National Fund of Kazakhstan

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Abstract

The article discusses the key factors determining the National Fund of Kazakhstan (NFK) accumulation from January 2005 to February 2017. As the main factors in this model, world oil prices, the share of deductions of oil companies' income to the fund, domestic oil production, the tenge exchange rate against the U.S. dollar and interest income on the fund's investments were considered. In order to explain these factors impact on the oil fund receipts, a relevant functional model was developed. The stationarity of the data series was checked using the Augmented Dickey Fuller unit root test. Verification of the model was conducted using different econometric methods, as the primary model used the least squares method (LSM). Using the generalized method of moments (GMM) helped overcome the problem of autocorrelation and heteroscedasticity and validate the model specification. The autoregressive conditional heteroscedasticity (ARCH) method and the Generalized Linear Model (GLM) were also used to test the basic models. The built econometric models confirmed that NFK's receipts positively depend on the tax rate on oil producing firms, world oil prices, and domestic oil production and negatively on the exchange rate of tenge. However, the increase in interest rates on the U.S. Treasury bonds did not increase the fund's income. This can mean either the ineffectiveness of its investments or the periodic withdrawal of the investment income. In general, the study should help understand the factors determining NFK's revenue and increasing its amount in the future.

Keywords: Oil Fund, Stabilization Rule, Savings Rule, Panel Data Analysis, Oil Production, Kazakhstan

EJEBS

1. INTRODUCTION

The creation of the NFK in 2001 was significant for Kazakhstan, as it allowed to solve the problem of the Dutch disease associated with the influx of petrodollars due to the intensive development of hydrocarbon resources, and also created a safety cushion for the country's economy, as well as accumulate resources for future generations.

If in 2000, all the oil inflows went to the budget, then in 2001, only 29.1 percent of oil revenues went to the needs of the Republican budget, and 70.9 percent went to the country's oil fund (World Bank, 2005). This immediately solved the problem of the Dutch disease associated with a large influx of foreign currency from the sale of hydrocarbons to the domestic market. The creation of the NFK also raised credit ratings and reduced the cost of foreign borrowing for the government and firms. For example, Standard@Poor's raised the credit rating of Kazakhstan in foreign currency from B + in December 1999 to BB- in July 2000 and to BB in May 2001. Similarly, other rating agencies have increased the country's credit ratings (Trading Economics, 2018).

Unfortunately, today 51% of all budget expenditures are financed by the NFK. This was a consequence of the global financial crisis of 2008-2009 when money from it began to flow into the state budget in ever-increasing volumes. Therefore, especially at present, revenue receipts to the NFK play an essential role in ensuring the sustainability of the state budget. The state budget without these transfers would run a large deficit, leading to a sharp reduction in budget programs and hyperinflation in the country.

Due to the almost two-fold drop in world oil prices in 2014, oil tax revenues to the NFK decreased from $19-26 billion in 2011-2014 to $3.4-6.4 billion in 2015-2017 or fell 4-6 times. This led to a rapid depletion of the fund's assets. The government authorities, aware of the risk of rapid depletion of their assets in the face of low oil prices, on December 8, 2016, adopted a new concept for its accumulation and use. Its implementation was supposed to prevent a further reduction in the assets of the oil fund in the medium term, resume its accumulation in the long term and reduce the state budget's dependence on oil from 46 to 20 percent in 2017-2030 (President's Decree, 2016). However, this concept, despite its relevance, turned out to be ineffective because it did not provide a reliable way to achieve the desired results.

As a result of the fall of global oil prices from $64.3 per barrel at the end of 2019 to $42 per barrel in 2020 and cutting the oil production from 90 million tons to 86 million tons under the revised OPEC++ agreement, NFK assets, which amounted to around $62 billion, or 34% of GDP, in 2019, declined to $59 in 2020, or 38% of GDP. However, from the end of 2020 to August 2022, the assets of the NFK further decreased from $59 million to $54 million, or by 8.3%, even though oil price's increased to $107 per barrel, or 2.5 times. The decrease in NFK assets is not due to a decrease in its income, since, on the contrary, they have grown enormously, but to an increase in transfers to the state budget caused by an increase in spending to support the economy and the population in connection with the pandemic in 2020-2021, as well as an increase in social spending ahead of the presidential elections held in November 2022. If these trends continue, by 2025, the falling financial assets under NFK will be at par with the rising government debt at 30% of GDP, a vital benchmark of the fiscal rules. This can also affect the sovereign rating of our country and increase refinancing costs, as well as make market access more sensitive to fluctuations in investor sentiment due to external factors. Further depletion of NFK also puts at risk the capacity of the authorities of the country to keep macroeconomic and banking stable.

In this regard, this article aims to find the key factors that impact the accumulation of the NFK, as well as the development of more effective methods and actions to improve its performance in the future.

This paper proceeds as follows. Section 2 provides a review of the literature. Section 3 discusses the research methodology. Section 4 discusses the data and econometric model build and validates them for adequacy and correctness. Section 5 sets out our findings and conclusions.

2. LITERATURE REVIEW

An optimal resource management system allows current spending to be increased sustainably, sustaining a higher public capital stock (IMF, 2012).

Alsweilem et al. (2015) conducted a comprehensive overview of the policies and institutional arrangements of leading SWF's in different countries such as Norway, Kuwait, Kazakhstan, Chile, and Abu Dhabi and identified the critical savings rules.

The analysis of Azhgaliyeva (2018) shows that an oil fund does not guarantee improvement in social welfare in oil-producing countries. The design of oil funds is crucial; appropriate rules can increase social welfare. In countries where the adjustment cost of government expenditure is high enough, expenditure-based rules with the fixed reference oil price or reference oil price following the moving average of oil prices are more suitable than revenue-based rules. In countries where oil production declines at a rate great enough, rules that yield the highest social welfare are the permanent oil income model (POIM) (at four and five percent) and the "Bird-in-hand" (BIH) rule (from six to ten percent). A budget deficit can be avoided if a fund follows a revenue-based rule because only a revenue-based rule is always affordable.

There are different rules which prevent governments from overspending resource revenues on current and non-productive expenditures (Campagne et al., 2020):

Non-resource primary balance rules or expenditure growth rules aim to limit expenditures' procyclicality by limiting government spending growth (in nominal or real terms or as a percent of non-resource GDP).

The Hartwick rule, which earmarks all revenues stemming from the exploitation of a depletable asset for the financing of capital expenditures only, which will generate returns in the future. This rule forbids the government to finance recurrent expenditures using a transient revenue stream.

Permanent income hypothesis rules mean that the resource-funded consumption level should not exceed the return on the NPV of future natural resource revenue. During the extraction phase, most revenues are saved to build up non-resource capital the return on these assets to compensate for the fall in revenue after extraction has ended.

An excellent example of effective management of oil revenues is the Norway fund. Its distinctive feature is that transfers into or out of the fund occur according to the non-oil budget deficit. The fund keeps the parliament fully informed of its activities. It also publishes complete audited statements while providing good returns (Bacon & Tordo, 2006).

Bergholt et al. (2017) study how the business cycle of an oil-exporting, small open economy is affected by international shocks. They developed a two-country New Keynesian model considers oil price shocks for Norway. Based on this model, they found that the oil price dynamic is an essential source of instability in an oil-producing country. The proper fiscal regime provides significant protection against external shocks.

In addition, various studies have been carried out about the National Fund of Kazakhstan, concerning its activities and financial sustainability.

Azhgaliyeva (2014), using data of Kazakhstan from January 1994 to July 2013, found positive but statistically not significant effect of produced oil on the real net revenue of the NFK's assets. Changes in oil taxation in 2009 significantly negatively impacted the actual net income of the oil fund.

Oshakbayev (2017) noted that the high dependence of the state budget on transfers from the oil fund indicates the vulnerability of budget revenues. In 2010, transfers accounted for 33 percent, and in 2017 - 46 percent of oil fund revenues.

ADB (2020) shows that the anti-crisis financing needs of the government in 2020 were $7 billion. This gap was financed by additional transfers from the NFK of $5 billion (18% of the accumulated assets of the NFK) and $2 billion through debt issuance. The rapid depletion of NFK

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jeopardizes the government's ability to maintain macroeconomic and banking stability. This situation is exacerbated by Kazakhstan's current financial volatility associated with dollarization, the lack of a developed non-mining economy, and significant exposure to terms-of-trade shocks.

According to the Chairman of the NBK, Galymzhan Pirmatov, in 2022, the NFK assets grew to \$55.8bn due to a rebound in the oil price and correspondingly high revenues, and its annualized yield since inception is 3.08% (Prime Minister, 2022).

Thus, a review of various literary sources shows that to ensure the successful operation of an oil fund, clear and straightforward financial rules governing its formation and use, as well as strict fiscal discipline, are necessary. At the same time, the best oil funds should be chosen as a benchmark to improve the activities of the NFK.

3. METHODOLOGY

3.1. Evaluation of the oil fund's stabilization policy (stabilization rule)

Suppose the government wishes to provide future generations with a permanent source of income financed by the revenues generated by its depleting natural assets. In that case, building up an investment fund during the years of resource extraction before it is depleted is necessary. The total receipts *(R)* of the oil fund will be equal to the product of the total revenues from the oil produced *(X)* by the share of deductions *(φ)* in the stabilization fund in a particular year *(k)*:

$$R_k = \varphi \cdot X_k, \tag{1}$$

In turn, total oil tax revenues *(X)* can be found as the product of a country's crude oil production *(q)*, world oil prices *(p)*, and the tenge to U.S. dollar exchange rate *(w)*:

$$X_k = q_k \cdot p_k \cdot w_k \tag{2}$$

In this case, the size of the stabilization fund *(S_t)* in the current year *(t)* will be equal:

$$S_t = \Sigma(R_k) = \Sigma \ (\varphi \cdot q_k \cdot p_k \cdot w_k), \tag{3}$$

where *k* takes values from *0* to *t* years.

The budget constraint of the stabilization fund is that its maximum size can't exceed 10 billion USD (President's Decree, 2016):

$$S_t \leq 10 \tag{4}$$

3.2. Evaluation of the oil fund's accumulation policy (savings rule)

If the stabilization portfolio at the end of the year exceeds U.S. \$10 billion, the excess amount will be transferred to the savings portfolio so the size of the savings fund *(Z_t)* is calculated using the formula (President's Decree, 2016):

$$Z_t = Z_{t-1} + (S_{t-1} - 10) \tag{5}$$

Or, using Equation 3, we can write:

$$Z_t = Z_{t-1} + [\Sigma \ (\varphi \cdot X_k) - 10], \tag{6}$$

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where k takes values from 0 to $t-1$ years.

The budgetary limit of the savings fund provides that its minimum balance should not be less than 30% of the projected value of GDP (Y) at the end of the current year (t):

$$Z_t \geq 0.3 \cdot Y_t \tag{7}$$

Over time the size of the savings fund (Z) will change according to the rule:

$$Z_t = (1+i_t)\ [Z_{t-1}+ \Sigma\ (\varphi \cdot X_k) - 10] - T_t, \tag{8}$$

where i is the return generated on the savings fund and T is the transfer obtained from the oil to the state budget.

The total amount of oil fund (A) will be the sum of stabilization and savings funds:

$$A_t = (1+i_t)\ A_{t-1} + \varphi \cdot X_t - T_t, \tag{9}$$

where A_{t-1} is the sum of savings fund and the excess amount of the stabilization fund transferred to the savings portfolio in the previous period.

The total oil fund receipts (X'), which include oil tax revenues and the investment return, depending on several macroeconomic factors, such as internal production of crude oil (q), world oil prices (p), the share of income deductions from oil companies to the oil fund (φ), as well as interest rate of tenge to USD (w), and rates on U.S. Treasury bonds (i).

$$X' = f\ (q,\ p,\ \varphi,\ w,\ i) \tag{10}$$

Oil fund receipts from oil companies increase with the production of crude oil (q) and an increase in world oil prices (p). Depreciation of the tenge to the U.S. dollar (w) will lead to a reduction in foreign exchange earnings of the oil fund in the short term since each tenge can change to a smaller amount of dollars. On the contrary, strengthening the tenge against the U.S. dollar increases the foreign exchange earnings of the oil fund since each tenge can be exchanged for a more significant amount of dollars. An increase in the rate on U.S. Treasury bonds (i), in which the oil fund typically holds its assets, should cause an increase in its income.

Thus, the following factors can be used as the main factors explaining the size of the oil fund since they correspond to theoretical expectations and statistical information is available for them (Table 1).

TABLE 1. The Methods of Variables calculating for the First Model

Sign	Name	Calculation method
X'	Receipts of the oil fund	In dollar terms, bln. USA dollars
p	World oil prices	U.S. dollars per barrel of oil, Brent
φ	Share of income deductions from oil companies to the fund	A share of total oil tax revenues (X) is saved every year into the oil fund, %
q	Oil production	Crude oil production (crude oil, NGPL, and other liquids) in Kazakhstan, million barrels per Day. EIA (2020)
w	Exchange rate	Exchange rate of tenge to U.S. dollar, on average for the period (NBK, 2020)
i	Interest return on the savings fund of the NFK	As a proxy variable used Yield rates on 6-month Treasury Bill of the USA. Federal Reserve Bank of St. Louis (2017)
Note: compiled by the author		

We examine the impact of the dependence of the income of the oil fund (X') on various internal and external factors using the following time regression model:

$$X'_t = \propto + \beta_1 q_t + \beta_2 p_t + \beta_3 \varphi_t + \beta_4 w_t + \beta_5 i_t + \varepsilon_t \qquad (11)$$

where X' denotes the income of the oil fund at time t. The variable q represents oil production in Kazakhstan, million barrels per day; p is world oil prices, U.S. dollars per barrel; φ denotes the share of income transfers from oil companies to the oil fund, %; w represents the exchange rate of tenge to U.S. dollar. Finally, i is interest return on savings fund (interest rates on U.S. 10-year Treasury bonds are used as proxy variables) and ε_t is error term.

3.3. Data

The data are monthly series covering the period from January 2005 to February 2017, because, from March 2017, the government has stopped publishing monthly reports on the activities of the NFK. The oil production and world oil prices are sourced from the U.S. Energy Information Administration (EIA, 2020), data on oil firms are taken from the Committee on Statistics of the Ministry of National Economy of Kazakhstan (2018), data on exchange rates are taken from the database of the NBK (2018), data on the 10-Year Treasury Constant Maturity Rate are received from the Federal Reserve of Saint Louis Economic Data database (Federal Reserve, 2017). All data are sufficiently stationary. Methods of calculating different variables are defined in Table 2.

TABLE 2. Methods of variables calculating

Name		Calculation methods
Oil fund receipts	X'	Trillion USD
Oil production in Kazakhstan	q	Million barrels per day
World oil prices	p	Dollar per barrel (Brent)
The share of revenues deductions from oil firms to the oil fund	φ	%
The exchange rate of the tenge to the U.S. dollar	w	Exchange rate at the end of the period
Interest rates on 10-year U.S. Treasuries	i	%
Note: compiled by the author		

The results of the Augmented Dickey Fuller unit root test on the stationarity of data series is presented in Table 3.

TABLE 3. Unit Root Test Results

Variable	Test for unit roots in	Adjusted t-statistics	p-value
X	level	-5.119840	1%
	1st difference	-14.31953	1%
p	level	-2.343812	20%
	1st difference	-8.740823	1%
φ	level	-1.955295	35%
	1st difference	-4.657797	1%
q	level	-1.256518	65%
	1st difference	-13.30425	1%
w	level	-0.206182	95%
	1st difference	-7.047610	1%
i	level	-1.596169	50%
	1st difference	-9.564622	1%
Note: compiled by the author			

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It examines the null hypothesis of unit root (non-stationary) in level and in 1st difference. A description of data for the considered variables is given in Table 4. It means that in order to eliminate the random walk of individual variables, it is better to use them in the form of a difference of the 1st order.

TABLE 4. Description of the variables used

Par.	X'	q	p	φ	w	i
Mean	7486.925	1568.609	80.39671	12.06201	167.7055	3.099452
Median	5121.649	1596.500	74.73500	10.10305	148.0000	2.865000
Maximum	37830.89	1867.000	140.4400	46.78907	362.0000	5.110000
Minimum	14.97711	1226.345	34.73000	0.124474	117.0000	1.500000
Std. Dev.	7404.178	151.0982	26.02363	9.063532	64.02868	1.060755
Skewness	1.510903	-0.174601	0.165044	0.922383	1.997487	0.293942
Kurtosis	5.215285	2.304764	1.738271	3.667816	5.691266	1.788075
Jarque-Bera	85.40266	3.682209	10.34725	23.41561	141.1500	11.03742
Probability	0.000000	0.158642	0.005664	0.000008	0.000000	0.004011
Sum	1093091.	229016.9	11737.92	1761.054	24485.00	452.5200
Sum Sq. Dev.	7.95E+09	3310446.	98198.27	11911.40	594452.3	163.1542
Observations	146	146	146	146	146	146
Note: compiled by the author						

The analysis of the correlation matrix (Table 5) shows that there is a positive relationship between the receipts of the oil fund *(X')* and oil production in Kazakhstan *(q)*, as well as world oil prices *(p),* and the share of revenues deductions from oil companies to the oil fund *(φ)*.

TABLE 5. Matrix of correlations between model variables

Par.	X'	q	p	φ	w	i
X'	1.000000	0.347361	0.415711	0.733889	-0.101714	-0.387576
q	0.347361	1.000000	0.087586	0.334249	0.561880	-0.730325
p	0.415711	0.087586	1.000000	0.320992	-0.434584	-0.135271
φ	0.733889	0.334249	0.320992	1.000000	-0.070021	-0.399073
w	-0.101714	0.561880	-0.434584	-0.070021	1.000000	-0.565845
i	-0.387576	-0.730325	-0.135271	-0.399073	-0.565845	1.000000
Note: compiled by the author The statistical significance is defined as *** $p< 0.01$, ** $p < 0.05$, * $p <0.1$.						

In turn, there is a negative correlation between the NFK's revenues *(X')* and the exchange rate of tenge to U.S. dollar *(w)*, as well as interest rates on 10-year U.S. Treasuries *(i)*. Almost all relationships were in line with expectations, with the exception of the relationship between oil fund receipts *(X')* and interest rates on 10-year U.S. Treasury bonds *(i)*.

Analysis for multicollinearity shows that there is a high correlation (74 percent) between the share of revenues transferred by oil companies to the oil fund and the growth in the NFK's revenues, as well as between interest rates on 10-years U.S. Treasury bonds and oil production in Kazakhstan (73 percent). The average correlation between interest rates on 10-years U.S. Treasuries and exchange rate of tenge to U.S. dollar is 57 percent, and between exchange rate of tenge to U.S. dollar and oil production in Kazakhstan is 56 percent. Despite this, there is no reason to talk about multicollinearity, since all variables are independent.

4. FINDINGS AND DISCUSSION

On the basis of monthly data from January 2005 to February 2017 (a total of 144 observations), a basic model of the impact of various factors on the receipts in the oil fund was constructed (see Table 6, Model 0).

TABLE 6. The impact of different factors on the oil fund's receipts (X')

Par.	Model 0	Model 1		Model 2		Model 3
	LS	LS	GMM	LS	GMM	ARCH
φ	9.06***	336.67***	292.10***	368.80***	384.95***	244.04***
w	-1.51	-25.13*	-23.79**			
i	-1.27	-1215.62	-1528.01**			
p	1.94*	44.44	46.81*	72.57***	85.97***	123.00***
q	1.56	10.00*	5.76*	9.38**	6.71**	8.55***
C	-0.82	-7870.23	-398.02	-17535.2***	-15043.2***	-18807***
$AR(1)$		0.41***	0.36***	0.41***	0.35***	0.39***
Obs.	144	144	144	144	144	144
Adjusted R-squared	0.595	0.626	0.619	0.623	0.618	0.610
S.E. of regression	4794.54	4526.49	4568.38	4543.67	4573.26	4686.14
F-statistic	41.16	41.20		60.58		
Akaike info criterion	19.83	19.72		19.71		19.11
Schwarz criterion	19.95	19.86		19.82		19.33
Durbin-Watson stat	1.38	2.05	1.88	2.06	1.93	1.74
J-statistic			8.76		6.60	
Note: compiled by the author The statistical significance is defined as *** p< 0.01, ** p < 0.05, * p <0.1.						

Our research has shown that the proposed model correctly describes the receipts of the oil fund to the state budget. The methods of econometric modelling carried out the verification. The least squares method (LS) was used as the primary method. However, autocorrelation and heteroscedasticity of the residuals could lead to ineffective estimates of the regression coefficients. The problem of solid autocorrelation was eliminated using the AR(1) first-order autoregressive model. We also used the Generalized Method of Moments (GMM) to overcome the problem of autocorrelation and heteroscedasticity and check the correctness of the model specification. It also provides for calculating variables using 1st order differences, which follows from the requirements of the data stationarity test. The ARCH method was used to validate the models, as the data fluctuated slightly around the mean, showing periodic spikes in values. The Generalized Linear Model (GLM) was used to help eliminate the autocorrelation and heteroscedasticity problem.

As a result of our research, we made the following contributions: First, a model of oil fund receipts was developed using five explanatory variables. Second, the model was tested on a sample spanning January 2005 to February 2017. Testing showed high results for the proposed model. It explains the behaviour of the oil fund by about 60-63 percent.

The least squares method (LS) was used as the calculation method. All coefficients for explanatory variables show theoretically expected signs and are significant. The only exception

is the 10-year U.S. Treasury bond interest rate, which shows the wrong sign but is of low value (t statistics is 1.26).

In this model, the significant factors are the share of transfers of oil companies to the oil fund and world oil prices. Other factors, such as the exchange rate of the tenge against the U.S. dollar, and the volume of oil production in Kazakhstan, showed weak statistical significance. The autocorrelation of residuals leads to the fact that the estimates of the regression coefficients, while remaining linear and unbiased, cease to be effective. In addition, there was a problem of residues heteroscedasticity, which led to a decrease in the effectiveness of the regression coefficients. For this reason, t and F-statistics, which determine the significance of the regression coefficients and the model's coefficient of determination, may be distorted.

The problem of strong autocorrelation was eliminated by using the AR(1) first order autoregressive model, which has the form: $y_t = \alpha y_{t-1} + \varepsilon_t$, where α – numerical coefficient satisfying the condition $|\alpha| < 1$; ε_t – a sequence of random variables forming white noise. As a result, the adjusted R-squared explaining the strength of the model increased from 59.5 to 62.6, the F-statistic – from 41.16 to 41.2, and the sum of the standard errors of regression decreased from 4794.5 to 4526.5 (Model 1, LS). We also used the Generalized Method of Moments (GMM) to overcome autocorrelation and heteroscedasticity in terms of errors and check the model specification's correctness (Model 1, GMM). This method allows for improving ordinary squares in the presence of both heteroscedasticity and autocorrelation (HAC) of the anonymous form (Newey and West, 1987; Arellano and Bond, 1991). All selected variables were found to be statistically significant. At the same time, using GMM method did not lead to a noticeable change in the regression coefficients for the variables.

Such variables as the share of revenues from oil companies to the oil fund (φ) and oil prices (p) were statistically significant. However, variables such as world and the interest return on the savings fund (i), the exchange rate of the tenge to the U.S. dollar (w), and oil production in Kazakhstan (q), showed low statistical significance. In the second model (Model 2, LS), we excluded such variables as a return of the savings fund (i) and the exchange rate of tenge to U.S. dollar (w), which had a strong autocorrelation of residuals. As a result, the statistical parameters of the model improved markedly. This is evidenced by a significant increase in the F-statistic to 60.58. The coefficient of determination of the model remained at the same level. The GMM method (Model 2, GMM) did not change the model. The statistics of the model remain the same, as well as the magnitude of the coefficients.

In order to check the correctness of the constructed models, the ARCH method (Model 3, ARCH) was also used since, in our case, the indicators slightly fluctuate around the average while showing periodic "bursts" of values. Using the ARCH method resulted in a high significance of all explanatory variables. However, the rise in standard errors over Model 1 and Model 2 suggests that the overall explanatory power of the model has remained the same.

Thus, summarizing the story, it should be noted that all the variable Equations 10 show the right and significant signs, except the return on saving funds. When using Model 1 (LS), which includes all the variables under consideration, an increase in the share of transfers of oil companies to the oil fund by 1% led to an increase in the revenues of the oil fund by $337 million. An increase in world oil prices by 1% led to an increase in revenues by $44.5 million, as well as an increase in oil production by 1% led to an increase in revenues by $10 million. On the other hand, the devaluation of the tenge against the U.S. dollar by 1% led to a decrease in receipts to the NFK by $25 million, and an increase in the interest rate on 10-year U.S. bonds by 1% led to a decrease in receipts to NFK by U.S. $1.215 million.

However, even though all relevant factors of the expected revenues of the oil fund were included in the model, it explains its receipts only by 63 percent. This means that some factors still need to be considered by ordinary methods.

First, the low explanatory power of the oil receipts model can be caused by model specification's errors when not all relevant factors are included. However, we tried to take into account all the relevant factors. Therefore, this hypothesis is not convincing.

Secondly, the oil receipts model's low explanatory power may also be associated with ineffective management. However, the National Bank of Kazakhstan (NBK) has invited reputable and experienced foreign management companies to manage the assets of the oil fund. Therefore, in current conditions, this hypothesis is not relevant.

Third, the model's low explanatory power may result from low transparency when not all of the receipts of the oil fund are fully reflected in its financial statements. Moreover, the observed negative relationship between the receipts of the oil fund and the interest rate on long-term U.S. Treasury bonds, in which the fund's assets are usually placed, cannot be explained unless it is assumed that the excess income is diverted from the fund's accounts to some secret government accounts. This is quite possible, since the history of the creation of the NFK begins with the transfer of money from such foreign secret accounts to the domestic account of the government in 2001.

Furthermore, according to the results of the research conducted by Aiman Tursynkan of the NFK, 8 trillion tenge "evaporated" in 2016. As the economist explained, the size of the expenditure part of the Republican budget was then less than 9 trillion tenge, which means that almost one annual Republican budget disappeared from the NFK (Glushkova, 2022). The NBK explained that this was caused by the exchange rate revaluation of the fund's assets in 2015 due to the transition to a floating exchange rate of the national currency since the main currency for investing the assets of the NFK is the dollar while reporting on the assets of the NFK is made in the national currency. However, this explanation is not convincing, as Kazakhstan has officially floated the tenge since 1999 (Beinoeva, 2021).

A slight decrease in NFK assets from 2020 to 2022 is of concern, despite a significant increase in world oil prices by 2.6 times. This means that the state continues to view the NFK not as a fund for future generations, as it was originally intended, but as a reserve wallet from which money can be drawn to address urgent current issues.

Another problem is the cessation of publication of monthly reports on the activities of the NFK from March 2017 to the present, which makes it impossible to conduct a deep analysis of the formation and use of the fund.

5. CONCLUSIONS

The creation of the NFK in 2001 was a critical decision for our country. It helped solve the problem of overheating the economy due to the influx of petrodollars due to the intensive development of hydrocarbon resources. Also, it created a safety cushion for the country's economy and accumulated resources for future generations.

Based on official government documents, the oil fund's accumulation policy (savings rule) model was developed, which has the following form: $X' = f(q, p, \varphi, w, i)$. The total oil fund receipts (X'), which include oil tax revenues and the investment return, depends on a number of macroeconomic factors, such as internal production of crude oil (q), world oil prices (p), the share of income deductions from oil companies to the oil fund (φ), as well as interest rate of tenge to USD (w), and rates on U.S. Treasury bonds (i).

A regression model was also built, which has the following form:

$$X'_t = \alpha + \beta_1 q_t + \beta_2 p_t + \beta_3 \varphi_t + \beta_4 w_t + \beta_5 i_t + \varepsilon_t, \tag{11}$$

where X' denotes the income of the oil fund at time t. The variable q represents oil production in Kazakhstan, million barrels per day; p is world oil prices, U.S. dollars per barrel; φ denotes the

share of income transfers from oil companies to the oil fund, %; w represents the exchange rate of tenge to U.S. dollar. Finally, i is interest return on savings fund (interest rates on U.S. 10-years Treasury bonds are used as proxy variables) and ε_t is error term.

As a result of our research, we made the following contributions. A model of oil fund receipts was developed using five explanatory variables. The model was tested on a sample spanning January 2005 to February 2017. Testing showed high results of the proposed model. It explains the behaviour of the oil fund by about 60-63 percent.

The most significant factors in the model of receipts of the NFK are the share of income deductions from oil companies to the oil fund (φ), world oil prices (p) and oil production in Kazakhstan (q). Their growth of these indicators by 1 percent led to a growth in receipts of the oil fund by $336 million, $44.5 million and $10 million, respectively. Thus, almost all hypotheses regarding NFK's income were confirmed, namely, a positive relationship between the share of transfers of oil companies to the oil fund, world oil prices, oil production and oil fund income, as well as the negative impact of tenge devaluation on NFK's income.

Only the hypothesis of the positive impact of the interest rate on 10-year U.S. bonds on NFK's income was not confirmed. Our hypothesis is that the income received for the savings fund can be unofficially withdrawn from the fund's accounts. However, this assumption requires verification, which is difficult in the current conditions due to the incomplete transparency of its activities, since detailed information on the objects, sizes, terms and conditions for placing the fund's savings has not yet been published.

Thus, filling the NFK from the side of income positively depends on the height of the tax rate from oil enterprises, on the value of world oil prices, the volume of domestic oil production and the strengthening of the tenge. At the same time, the increase in interest rates on U.S.Treasury bonds did not lead to an increase in the fund's income, which means either the ineffectiveness of the fund's investments, which is very doubtful, or the periodic withdrawal of the fund's investment income as soon as it is received.

Future research will be possible if the National Bank resumes the publication of monthly NFK's reporting, which it stopped starting in March 2017. In addition, the reporting should be supplemented with new indicators relating to using all income from the placement of the fund's assets, including investment income. Then it will be possible to check why the hypothesis of the positive impact of the interest rate on 10-year U.S. bonds on NFK's is not met. As recommendations for the government to increase revenues to the National Fund, we propose the following measures. The most effective tools are an increase in the share of income deductions from oil companies to the fund, as well as an increase in oil production. In addition, it is necessary to ensure the stability of the tenge exchange rate, since the 1% devaluation of the tenge against the U.S. dollar led to a decrease of its receipts by $25 million. With regard to investment income from NFK's assets placed abroad, the lack of a positive relationship between the increase in the interest rate on U.S. bonds and its receipts is a mystery and requires a fiscal review of the legality of the use of the NFK's assets.

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Project Management in Strategic Planning of Enterprises at the Present Stage

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Abstract

In this article, the authors consider project management in the strategic planning of energy industry enterprises. The purpose of the article is to analyze and calculate indicators in order to identify the effectiveness of energy enterprise modernization. The authors thoroughly analyze the literature review on project management in the enterprise's strategic planning. The authors also revealed that strategic planning in the project management framework is considered a dynamic set of six interrelated management processes that logically follow each other. Results: the authors calculated the degree of factors influenced to identify the decreased degree in the enterprise efficiency by the method of chain substitutions. As a result, heat energy was underdeveloped due to the reduction in the number of operation hours of boiler units. As a result of the conducted research, it was revealed that a change in the values of the main factors, namely the number of boiler units operating and due to heat losses from external pipelines affecting the production process, entails a change in the generated power of boilers, the amount of load and the valuable heat released, and hot water transferred to the consumer. Conclusion: the presented data and their analysis make it possible to effectively assess that a well-chosen and successfully implemented business management strategy is the key to its effective functioning in a market economy. Of course, a good strategic plan and its good execution do not guarantee that the company will be able to completely avoid periods of recession and uncertainty.

Keywords: Project Management, Strategic Planning, Enterprises, Sustainable Development, Factors, Modernization, Enterprise Goals, Resources, Analysis, Economic, Business

1. INTRODUCTION

Ensuring energy security is one of the main tasks. The pace of energy consumption in Kazakhstan is growing from year to year. However, the new energy sources being launched must match the growth rates. The country's development directly depends on the stability of the energy industry. Kazakhstan is one of the most energy–intensive countries in the world. Kazakhstan's economy is 3 times more energy intensive compared to the OECD countries. Even though the services sector occupies the leading share in the structure of our GDP. This suggests that fixed assets and equipment at industrial enterprises do not meet the modern standards of the OECD and other advanced countries. Often there is an imitation and not a fundamental modernization of the fixed assets of our industry (Akorda, 2021). Therefore, today it is essential for the country to modernize energy enterprises, which is carried out within the framework of project management in strategic planning at the enterprise.

Today, strategic planning development is one of the most critical tasks for a top manager. Strategic planning provides the basis for all management decisions. The organisation's functions, motivation and control are focused on the strategic plans development. The dynamic process of strategic planning is the umbrella under which all management functions are sheltered; taking strategic planning advantage is necessary for organizations and individuals to assess corporate enterprise's goals and direction.

Today, project management is a set of tools and methods of effective management at the enterprise, which differs from the traditional management model in flexibility and consistency. It is worth noting that today the technology of project implementation should be based on the effective use of material, labor and financial resources and rational management decisions to ensure the most excellent effectiveness in project management (Polunin, 2020; Tumpa, 2023).

Strategic planning is becoming increasingly relevant for Kazakhstani enterprises that conduct or seek to conduct a fierce competition, both among themselves and with foreign corporations. At the same time, a feature of the strategic approach will be the ability to combine specific goals of the enterprise into a single, all resources divided by activity type during the production process implementation (Tatenko, 2017; Akbar et al., 2023). At the present stage, strategic planning is becoming increasingly important for Kazakhstani companies trying to compete aggressively both with each other and with foreign companies. Consequently, creating an enterprise's organizational plans is closely connected with adopting current and long-term decisions. The different solution is to optimize tasks and choose an effective action plan with resource constraints.

One of the significant directions contributing to an accelerated exit from a difficult economic situation is foreign experience study in project management of innovative processes with the further determination of its effective application in enterprises' practical activities. Since strategic planning is one of the most important tools that ensure the sustainable development enterprise and takes into account the combination of various business problems' interests and the identification and measures company's development, the development of various methods and programs, the development of projects by current needs and long-term development strategy in the company (Soltangazinov et al., 2019; Tanwar, 2022).

To date, much attention is paid in the literature to project management in the strategic planning of energy enterprises. Unfortunately, this topic has not been given attention in Kazakhstan for a long time. Therefore, one of the critical study aspects is effective project management from the point of view of strategic planning at the enterprise. The primary study aims to substantiate the transition of energy industry enterprises to methods based on strengthening innovation and investment activities using project management tools.

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2. LITERATURE REVIEW

It should be noted that for a short period of time of the country's development, a sufficient number of domestic and foreign scientists' papers in business planning and strategic enterprise planning field have been written, which address the issues of project management in enterprises' strategic planning. At this point in time, "strategic planning" concept at the enterprise has become widespread. Strategic planning is one of the essential responsibilities of the enterprise's top managers. Since managers ensure the achievement of the company's mission, goals and objectives, achieving real advantages over competitors (Vorobyev, 2021). Today, analysing and assessing organizations' readiness to adopt strategic planning is a significant modern aspect of strategic changes. For example, Ansoff and Alferova wrote in their works that strategic planning is a set of interconnected management processes that logically follow one another. It is worth noting that for strategic planning, it is necessary to have feedback through the stage of evaluation and control of previous stages to establish inconsistencies (Alferova et al., 2018; Ansoff, 2009). To date, the success of the company depends on how well the choice and application of such methods are made, taking into account the changes at the moment and the near future of the company's work.

In the works of Fomchenkov and Katkalo, the concepts of strategy are considered from the evolution of strategic management theory (Fomchenkova, 2019; Katkalo, 2008), which ultimately changes analytical goals and objectives. At the present stage, this concept represents the unity of its content, process and context, including the possibility of creation and further development during the project implementation. It is worth noting that today the strategy and plan, which are characterized by goals, deadlines, degree of complexity, and one-off, can be defined as a long-term project with its characteristics (see Table 1).

TABLE 2. The main characteristics of the strategy as a project management object

Characteristic	Essence	Strategy as a project implementation
The sign of the final goal	Set of project goals	The strategy focuses on the company's mission and goals for the long term
Sign of changes	Transfer of the project from the current state to the desired one	The process of strategy development during its implementation
A sign of limited resources needed	The existing need of the costs enterprise of variable, monetary, material, human and information resources for the project implementation, where it is not always possible to accurately allocate	In the process of conducting a strategic analysis, the company's resources are evaluated, which are necessary to ensure the further development and competitiveness of the company in the long term.
A sign of consistency	The implemented project is a system of interrelated activities	A strategy is a dynamic system that contains the structure, the process itself, and the content
A sign of novelty	The project is characterized by uniqueness and singleness	Availability of unique solutions that are strategically important and ensure the competitiveness of the enterprise
Note: compiled by authors		

In turn, Kirillova noted that the project approach in strategic planning is used with process, system and situational approaches. Within the framework of strategic planning, the process approach is a process of continuous actions in the company, which consists of control and regulation to achieve the goal. In turn, the system approach is a methodology for studying the external and internal environment, affecting the final goal's achievement. Also, it considers the

factors of influence from a single system (Kirillova, 2022). The situational approach allows for a more rational use of management methods, depending on the situation in the company.

In turn, Karkavin believed that "strategic planning is a set of actions and decisions taken by top managers that will lead to the development of strategies designed to achieve the goals set" (Karkavin, 2011). The fundamental principle of strategic planning is the principle from the future to the present, where the analysis of the company's prospects is of particular importance, in which the necessary trends, possible risks, opportunities, threats, force majeure that can change the established situation are established. Kurmayeva in her works, explores what is meant by the logic of strategic planning as an ordered sequence and the validity of procedures that are associated with solving planning problems, finding a starting point for making the necessary decisions: defining goals in the planning period, finding the initial level of company's development; determining the volume and structure of the company's needs in the planning period; consistency of necessary needs and resources on ranking basis and preparation of management decision projects (Kurmayeva, 2014).

Thus, many researchers note the importance of considering project management as part of strategic planning for an enterprise. Within the framework of this approach, many scientists note such standard characteristic features as a sign of unity, control, the evolution of strategic planning, the creation of possibility and further development, etc. However, it is worth noting that there are also differences in the consideration of project management within the framework of strategic planning at the enterprise; for example, ranking and preparation of management decision projects, some authors take into account ranking and preparation of management decision projects, etc.

2. METHODOLOGY

When writing the work, the methodological basis was the works of Kazakhstan and foreign scientists, whose works are devoted to the basics of the theory and practice of project management in the strategic planning of enterprises. This research is considered the example of LLP "NPP Sogrinskaya Teploelectrocentral". The enterprise main activity includes the process of electric production and thermal energy by a station with a combined generation scheme, also including the transmission and distribution of thermal energy to the end customer. The company carries out its work according to the thermal schedule. At the same time, the maximum load falls in winter. JSC Ust-Kamenogorsk Titanium-Magnesium Combine, a non-ferrous metallurgy enterprise (96%), can be attributed to the primary customer of electric energy.

The chain substitutions and indexes method determines the degree of primary factors influence acting as multipliers. The essence of the chain substitution method is that when determining the absolute influence of a factor, its reporting and planned values are compared with the reporting values of previous factors and the planned values of subsequent ones. At the same time, the factors are arranged in a certain sequence following their significance: first, quantitative, according to the priority of the influence on the result, and then qualitative, according to the priority of the influence on the factor. When calculating the degree of factors influence, it is necessary to take into account this requirement (Samsonov, 2012).

The calculation of the degree of factors influenced by the method of chain substitutions is carried out in the analytical Table 2.

TABLE 2. Working form for calculating the degree of primary factors influence on the generalizing indicator of the production program

Name of indicators,	Symbols	Initial data	Calculation of absolute influence	Calculation of relative influence

units of measurement		plan	report		
Factor 1	P_u	P_u^P	P_u^0	$\Delta E_{El(P_u)} = \left(P_u^0 - P_u^p\right) * Ch^P * (1 - K_P^P)$	$J_p = \dfrac{P_u^0}{P_u^P}$
Factor 2	Ch	Ch^P	Ch^0	$\Delta E_{El(Ch)} = (Ch^0 - Ch^P) * Ch^P * (1 - K_P^P)$	$J_{ch} = \dfrac{Ch^0}{Ch^P}$
Factor 3	K_p	K^P	K_p^0	$\Delta E_{El(P_P)} = [(1 - P_u^0) - (1 - K_P^P)] * P_u^0 * Ch^0$	$J_{K_p} = \dfrac{1 - K_p^0}{1 - K_p^P}$
Generalizing indicator	E_{El}	$E_{0\,El}^P$	$E_{0\,El}^0$	$\Delta E_{El(P_u)} + \Delta E_{El(Ch)} + \Delta E_{El(K_P)} = \Delta E_{El}^0 - \Delta E_{El}^P$	$J_e = J_p * J_{ch} * J_{K_P}$ $J_P = \dfrac{E_{El}^O}{E_{El}^P}$
Note: compiled by authors					

Also, to identify the degree of decrease in enterprise's efficiency, an assessment of the calculation of the factors' influence degree by the method of chain substitutions was carried out. The sum of the absolute factors influences should be equal to the absolute change in the generalizing indicator ($E_{El}^O - E_{El}^n$), which is produced by the factors' indices – this is the index of the generalizing indicator:

$$J_e = J_P * J_{ch} * J_k \tag{1}$$

Based on the data, conclusions were drawn about factors that have a significant impact on the change in the generalizing indicator. The authors also calculated the factors that determine the change in the release of heat energy:

$$\Delta E_{El} = \Delta E_p + \Delta E_{ch} + \Delta E_k \tag{2}$$

When writing the article, such methods as: empirical, abstract-logistic, economic-mathematical assessment, SWOT analysis were used, visual, graphical, statistical, etc. were also used in the study. The empirical part of the study consisted of analyzing the available enterprise's statistical information, which was then compared to whether they contributed to achieving the goals set.

3. FINDINGS AND DISCUSSIONS

Today, project management is a particular type of management that can be applied to managing project objects and other enterprise objects to one degree or another. It is worth noting that the formation of new opportunities and niches in the market is a temporary phenomenon - most projects have deadlines for creating and developing a specific product or service (Lyubushin et al., 2000; Shafiee et al., 2023). Therefore, strategic planning within the framework of project management can be considered as a dynamic set of six interrelated management processes that logically follow from each other. At the same time, there is constant feedback, and each process has an impact on the others.

LLP "NPP Sogrinskaya Teploelectrocentral" operates according to the thermal schedule. The maximum load falls on the winter period. The main consumer of electric energy is the non-ferrous metallurgy enterprise JSC "Ust-Kamenogorsk Titanium-Magnesium Combine" (96%). Consumers of thermal energy are JSC "Ust-Kamenogorsk Titanium-Magnesium Combine" – 68.8%, as well as the population, budget organizations and other consumers located in the residential settlements of Novaya Sogra, Solnechny and Raduzhny. Annual consumption is mainly accounted for by: JSC "Titanium Magnesium Plant" - 70%: in hot water - 112,750 Gcal, in steam - 97,000 Gcal; population - 59,964 Gcal - 25%; other -15,167 Gcal -5%.

The first steam boiler and turbine at the LLP "NPP Sogrinskaya Teploelectrocentral" were put into operation in December 1961, the final construction of the station, with the launch of the fourth boiler type E-160-14, was completed in July 1987.

The installed thermal and electrical capacity of the LLP "NPP Sogrinskaya Teploelectrocentral" is 315 Gcal or 1320 GJ/h and 50 MW, respectively. The available capacities are 216 Gcal and 50 MW, which are summarized in Table 3.

TABLE 3. LLP "NPP Sogrinskaya Teploelectrocentral", 2022

Indicator	Electric power, MW	Thermal power, Gcal/h
Design capacity	50	315
Installed capacity	50	315
Available power	60	216
Note: compiled by authors		

To identify the degree of decrease in LLP "NPP Sogrinskaya Teploelectrocentral" efficiency, we will perform calculations using the method of chain substitutions the degree of factors influence according to formula 1.

$$E_{El}^{P} = 216 \text{ Gcal/h} \times 1597 \text{ h} \times (1 – 0{,}0306) = 334457{,}4 \text{ Gcal};$$

$$E_{El}^{o} = 216 \text{ Gcal/h} \times 1552 \text{h} \times (1 – 0{,}03572) = 323322 \text{ Gcal}.$$

The total deviation for the release of heat energy was:

$$\Delta E_{El} = 323322 – 334457 = - 11135 \text{ Gcal}$$

That is, it is possible to observe a decrease in the release of heat energy. Now let's determine the factors that determine the change in heat output according to formula 2. It is also necessary to determine the absolute effects of each factor:
1) at the expense of P_u:

$$\Delta E_p (P_u) = (216 – 216) \times 1597 \times (1 – 0{,}0306) = 0$$

As a result, it is worth noting that neither growth nor decrease in installed capacity is observed in the organization.
2) by changing the number of hours of operation of boilers H:

$$Э_h (H) = 216 \times (1552 – 1597) \times (1 – 0{,}0306) = -9422{,}568 \text{ Gcal}$$

Thus, due to the reduction in the number of hours of operation of boiler units, there was an under-production of thermal energy.

3) due to changes in losses in heating networks K_p:

$E_к (K_p) = 216 \times 1597 \times (1 – 0,03572 – 1 + 0,0306) = -1713,15$ Gcal

4) total deviation for thermal energy:

$0 – 9422,568 – 1713,15 = - 11135,8$ Gcal

Thus, the reduction ΔE El it occurred by reducing the number of boiler operating hours (by 9422.568 Gcal) and increasing the number of losses in heating networks (by 1713.15 Gcal). As a result of the combined influence of factors, there is a general decrease in the usefully released heat energy by 11135 Gcal.

As a result of the conducted research, it was revealed that a change in the values of the main factors, namely the number of boiler units operating and due to heat losses from external pipelines affecting the production process, entails a change in the generated power of boilers, the amount of load and the valuable heat released and hot water transferred to the consumer.

Already today, with the latest examinations on hand, it is safe to say that the turbine unit № 1 will not pass the metal control tests. The consequence will be a ban on further operation of the turbine unit. Decommissioning of turbine unit № 1 will reduce the volume of electric energy production by more than 40%. Without doing anything, the station will be forced to continue working on one turbine unit № 2 without possibly putting it into repair, which significantly reduces the station's reliability, especially in winter. In turn, turbine unit № 2 currently has an excess of the park resource by 29 thousand hours and insufficient data on the control of the metal of the main parts.

Given the current situation with the leading equipment, the only way out is the new turbine unit's construction of greater capacity by replacing generating equipment and part of the auxiliary equipment. Therefore, based on the results, replacing the turbogenerator № 1 with a PT-40/50-90/10 turbogenerator was decided. Also, before the new turbine unit is put into operation, it is planned to reconstruct the boilers in order to bring their capacity to nominal. This will be the first stage of replacing the equipment of LLP "NPP Sogrinskaya Teploelectrocentral". After the replacement of the turbine generator № 1, it is planned to carry out the second stage of equipment replacement within the framework of which an analysis the thermal and electric energy market will be carried out and, depending on analysis' results, a decision will be made on the station's further development strategy. This may be the replacement of the turbogenerator № 2 with a turbogenerator of the PT or P type, or a decision to restore the boiler № 4 if the possibility of selling thermal energy increases.

Project advantages:
- The safety of people and power plant equipment is ensured
- The risks of social and political pressure are excluded, since when turbine № 1 is put out of operation in winter, there is thermal power shortage within 30%. This will negatively affect the heat provision in winter to 4,000 subscribers (about 12,000 people) receiving heat from the station, as from a monopolist, as well as other heat consumers.
- Repair costs will decrease from 0.05 tenge/kWh to 0.02 tenge/kWh.
- A modern fire extinguishing system will be installed on the new turbine unit, increasing the facility's fire safety due to the possibility of early fire detection and higher efficiency in fire elimination.
- Installing a modern microprocessor protection system and a vibration monitoring system for the turbine unit will minimize the risk of prolonged equipment failure in an emergency.

- Due to the use of modern systems and a user-friendly interface will simplify the operator's work and reduce the time spent on managing the turbine unit.

- The use of modern technologies will increase the inter-repair turbine unit period from 4 to 5 years.

- Switching to air cooling of the generator (instead of hydrogen-air) removes the need for oil shaft seals and the need to use hydrogen at the station, which leads to a reduction in fire hazard.

- The specific fuel consumption for electricity generation is reduced from 450 to 415 g.u.t. per Kwh.

Electricity generation is increasing from 240 to 277 million. Kwh per year without increasing emissions into the environment:

Eliminates the risks of receiving compensating tariffs from regulatory authorities in the future since the station already uses the marginal tariffs approved by the program of the Government of Kazakhstan "Tariff in exchange for investment".

List of equipment to be replaced:

1. Replacement of the turbine with a more efficient capacity of 40 – 50 MW;

2. Replacement of turbine auxiliary equipment "regenerative heaters, oil system, pipelines and fittings within the turbine";

3. Replacement of the DP – 225 high-pressure dearator;

4. Replacement of the generator with a more powerful 50 MW;

5. Installation of a modern generator excitation system;

6. Introduction of a modern automated process control system providing full control of all parameters of the turbine and generator technological process;

7. Complete replacement of relay protection devices and generator automation with microprocessor devices;

The payback period for full investment costs is 6.7 years from the start of the project.

Table 4 shows a SWOT analysis of the project for LLP "NPP Sogrinskaya Teploelectrocentral".

TABLE 4. SWOT analysis of the project

Strengths	Weaknesses
-Qualified personnel with special experience; - Experienced general contractor; - Strong owner control over subcontractors; - Powerful management tool (risk map); - Strong support from the Global Sourcing China team; - Strong support from AES senior management in Kazakhstan.	- Language barrier; - Weak management of general contractors over local subcontractors; - A new/unfamiliar market for the general contractor; - Codes and standards.
Threat	**Capabilities**
-Getting work experience under an EPC contract; - Working with Chinese equipment suppliers; - Obtaining modern equipment and mastering new technologies; - Staff development.	- Difference of cultures - Local laws and regulations - Busy schedule - Effects of TA-№2 - Transportation of equipment
Note: compiled by authors	

Thus, considering the current situation with the leading equipment, the only way out is to construct a new turbine unit of greater capacity by replacing generating equipment and part of the auxiliary equipment. Therefore, based on the results, replacing the turbogenerator №1 with a PT-40/50-90/10 turbogenerator. Also, before the new turbine unit is put into operation, it is

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planned to reconstruct the boilers in order to bring their capacity to nominal. This will be the first stage of replacing the equipment of Sogrinskaya NPP CHP LLP. After the replacement of TG №1, it is planned to carry out the second stage of equipment replacement within the framework of which an analysis of the thermal and electric energy market will be carried out and, depending on the results of the analysis, a decision will be made on the further development strategy of the station. This may be the replacement of the turbogenerator №2 with a turbogenerator of the PT or P type, or a decision to restore the boiler №4 if the possibility of selling thermal energy increases.

After the SWOT analysis of the LLP "NPP Sogrinskaya Teploelectrocentral" project, we will consider the CHP's leading technical and economic indicators as a whole before and after the project implementation, the data of which are presented in Table 5.

TABLE 5. The main technical and economic indicators before and after the implementation of the project, 2022

No.	Name of indicators	Unit of measurement	Before the Project implementation	After the implementation of the Project of the station turbine unit No. 1	Including installation of the station turbine unit No. 1
1	Installed capacity				
	-electric	MBт	50	80	50
	-thermal	Gcal/h	293	293	171
2	Available power				
	-electric	MW	60	80	50
	-thermal	Gcal/h	220	220	171
	including turbine selections	Gcal/h	80	138	97
3	Type of fuel		Coal of the Karazhyr / Maykuben section		
4	Maximum hourly thermal load (calculated, excluding losses in t/s)	Gcal/h	68,0	97,0	70,4
	- in a pair	Gcal/h	7,0	7,0	6,0
	- in hot water	Gcal/h	61,0	90,0	63,0
5	Annual electricity generation, total,	million kWh	271,7	428,7	283,6
	including thermal consumption	million kWh	175,4	328,8	183,7
6	Electricity consumption for own needs	million kWh	49,7 (18,3%)	59,9 (14,0%)	28,4 (10,0%)
7	Annual electricity supply from tires	million kWh	222,0	369,0	255,0
8	Useful heat release from collectors, total,	thousand Gcal	319,4	450,0	310,0
	- in a pair	thousand Gcal	52,4	73,8	45,5
	- in hot water	thousand Gcal	267	376,2	264,5
9	Annual consumption of conventional fuel	thousand т.у.т.	166,2	219,7	146,4
10	Specific consumption of conventional fuel				

No.	Name of indicators	Unit of measure ment	Before the Project implementati on	After the implementati on of the Project of the station turbine unit No. 1	Including installation of the station turbine unit No. 1
	-for the released electricity	g/kWh	476,8	389,2	372,9
	-for the released heat energy	kg/gcal	189,1	169,1	165,3
Note: compiled by authors					

As a result, the results obtained during the work can be applied to solve a significant scientific problem of an applied nature. Also, the obtained research results play a significant role in identifying and promoting promising sectors of economic sciences.

This will improve the reliability of the plant, replace the equipment with more modern, and introduce advanced technologies into the process control system. It will also extend the main equipment's service life, significantly increasing the plant's role as a reliable energy producer in this region. Implementing such projects strengthens AES company's image as a responsible investor. It once again confirms that the corporation, in its activities, is guided by the principles of striving for excellence and fulfilling its obligations to the society in which it operates.

5. CONCLUSIONS

Thus, the presented data and their analysis make it possible to effectively assess that a well-chosen and successfully implemented business management strategy is the key to its effective functioning in a market economy. Of course, a good strategic plan and its good execution do not guarantee that the company will be able to avoid periods of recession and uncertainty altogether. It is important to remember that strategic planning is part of the management process, not a separate event.

It is also worth noting that a good strategy paired with successful execution does not guarantee that the company can avoid periods of recession and instability altogether. Sometimes it takes time for managers' efforts to lead to positive results. Nevertheless, it should be remembered that it is the responsibility of the manager to prepare the company's strategy for unexpectedly harsh conditions through prudent strategic planning – perhaps the essential part of strategic management. It should be remembered that planning is organically included in the management process and does not represent a separate event for two significant reasons. First, although some organizations cease to exist after achieving the goal for which they were originally created, many strive to prolong their existence as long as possible. Therefore, they redefine or change their goals.

Thus, the authors conducted a study on the example of LLP "NPP Sogrinskaya Teploelectrocentral". According to the method of chain substitutions of the degree of influence of factors, the degree of decrease in the efficiency of the work of LLP "NPP Sogrinskaya Teploelectrocentral" was revealed - a decrease in the supply of heat energy. As a result, it is worth noting that neither growth nor decrease in installed capacity is observed in the organization. It is also worth noting that due to the reduction in the number of hours of operation of boiler units, there was an under-production of thermal energy.

It is also worth noting that at the enterprise, the operation of a turbine unit in this condition can lead to the destruction of the turbine housing during operation, which, in turn, will entail, at best, the final failure of the turbine, at worst, people may suffer. Also, due to the wear and tear (moral and physical) of the turbine oil system equipment, turbine oil leaks occur periodically, increasing the risk of environmental safety, as well as the risk of a major fire at the station,

because there are many heated surfaces near the turbine. As a result of the combined influence of factors, there is a general decrease in the usefully released heat energy.

Given the current situation with the leading equipment, the only way out is to construct a new turbine unit of greater capacity by replacing generating equipment and part of the auxiliary equipment. The payback period for full investment costs is 6.7 years from the start of the project. The leading technical and economic indicators for the LLP "NPP Sogrinskaya Teploelectrocentral" are also given before and after the project implementation. This will improve the reliability of the plant, replace the equipment with more modern, and introduce advanced technologies into the process control system. It will also extend the service life of the main equipment, and significantly increase the role of the plant as a reliable energy producer in this region.

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Guest Loyalty Programs of Chain Hotels: The Case of Turkey

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Abstract

The increasing competition among companies has forced them to adopt new marketing methods and develop new strategies to retain customers. One such strategy is the use of loyalty program cards, which were initially used as a benefits program but have now become a popular marketing strategy used by many hotel chains in Turkey. Loyalty programs are designed to encourage customers to continue using a company's services or products by offering rewards, discounts, and other privileged services. This study aims to conduct a content analysis of the websites of 10 hotels in Turkey to explore the facilities these hotels offer through their loyalty programs. The content analysis focuses on the services offered by these hotels, which are designed to retain customer loyalty. The data was collected by visiting the websites of the selected hotels and analyzing the content using the content analysis method. The findings were presented descriptively, highlighting the similarities and differences between the services offered by the hotels under the name of the loyalty program. The study found that the loyalty programs offered by hotel chains in Turkey have both common and different characteristics. Overall, this study provides valuable insights into the loyalty programs offered by international hotel chains in Turkey. By analyzing the content of the websites, the study highlights the key facilities offered by these hotels to retain customer loyalty. The findings of this study could be useful to hotel managers and marketers in designing effective loyalty programs that meet the needs and expectations of their customers.

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1. INTRODUCTION

Identifying client needs and preferences, researching market trends, and formulating a plan for distributing goods or services to the target market are all steps in the development of a marketing strategy. Although marketing methods vary, they are generally customer-centric. Companies believe there should be a typical interaction with the customer to determine better their marketing methods (Sayman and Bayram, 2019). Although there are many products available to customers today, they tend to choose the product that satisfies their emotional and cognitive aspects of the customer. Companies are in closer contact with customers to achieve emotional and mental satisfaction. Businesses aim to sustain their connections with their clients not just during the point of sale but also over an extended period of time (Ayyıldız & Dinler, 2020). Loyalty programs are a system that ensures that people who regularly purchase companies' products are financially and morally rewarded for their purchases (Özer, 2015). The key goal of loyalty programs is not only the search and attraction of new customers but also the establishment of long-term relationships with existing customers (García Gómez, 2006)

Businesses may keep one step ahead of the competition and maintain their success over the long term with the aid of a well-developed business strategy. The role of customer loyalty in the strategy of businesses is widely accepted and it is thought that there is a positive relationship between customer loyalty and profitability (Hofman, 2016). How competently the loyalty program is used and how carefully the program itself is worked out directly depends on the degree of commitment of hotel customers and, consequently, the enterprise's competitiveness.

It is not easy to provide customer satisfaction for businesses in limited competition. As Deniz (2016) mentioned, in high season, businesses can achieve success. In such a season, increasing competition and changing demands of consumers will make it difficult to achieve customer satisfaction. Therefore, businesses should diversify their products and services to avoid falling into this situation. Moreover, they should create excellent service and loyal customers. In this way, businesses will be able to attract customers not only during the high season but also during the low season.

The customer becomes loyal to a business only to the extent that the business offers the most appropriate values and finds these values satisfactory. At this point, loyalty can be seen as the customer's repetition of the purchase or as a psychological concept such as emotional closeness, habit, harmony and emotional connection between the business and the customer. The formation of this dimension may also be related to the understanding and behavior of the business in the relationship and communication with the customer, apart from the quality of the product (Çakır & Eğinli, 2010).

The loyalty program allows consumers to earn rewards when making recurring purchases in the company. Such programs encourage consumers to contact the company regularly and aim for long-term engagement with consumers rather than once. In the first stage, the client earns bonus points when registering for the program (Nastasoiu & Vandenbosch, 2019). It provides economic benefits after sufficient points have been accumulated and exchanged for any equivalent. Studies have shown that earning and spending points have a significant psychological impact on the customer. As a result of the bonuses earned and the reward points spent, customers get a positive impression of the hotel itself. A positive perception or anticipation of reward and spending increases the likelihood of the consumer returning to the hotel. Receiving an award for accumulated points becomes an incentive to continue relations with the hotel (Deniz, 2016).

Customer loyalty has become more crucial than ever for chain hotels in the fiercely competitive hospitality industry. Hotels have put in place several initiatives and techniques to accomplish this goal and keep guests coming back. The guest loyalty program is one such tactic, which rewards repeat customers and encourages them to stick with the same chain in the future. As in many service sectors, the most important thing in the tourism sector is the quality of the

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services to its customers. For this reason, hotels should understand customer preferences very well and provide services that can satisfy guests. The services offered by the hotels are also aimed at gaining the loyalty of customers. In terms of the tourism sector, using loyalty programs to create loyal customers and closely monitor their preferences is one of the important ways to build brand loyalty. Hotels use loyalty programs to gain loyal customers and offer this to their guests as a privilege. Many hotel chains in Turkey implement the loyalty program and this study examines the loyalty programs of the top 10 hotels in Turkey and aims to investigate the facilities offered under the loyalty program.

2. LITERATURE REVIEW

The basis of subjects such as customer satisfaction and customer loyalty in businesses is the expectation and confirmation theory. Expectation confirmation theory is a cognitive explanation for how people's expectations shape their perceptions and evaluations of events or experiences. This theory suggests that individuals create expectations about a product or service before buying it, and their level of satisfaction with the product or service is based on how well the experience meets their expectations. If the post-purchase experience exceeds their expectations, they feel content and will likely purchase again. However, if the post-purchase experience fails to meet their expectations, they feel disappointed and may not buy again (Shigetani, 2021). This satisfaction or repurchase is related to customer loyalty. Researchers have taken a strong interest in the concept of loyalty in recent decades in an attempt to define it precisely. Hence, customer loyalty is presented in many different dimensions in the literature. Customer loyalty can be briefly defined as the frequency of customers choosing the same service and their desire to continue their relationship with the business they receive assistance from. In other words, it can be defined as a customer's repurchase of the goods and services that they prefer continuously and their dedication to being the customer of that business again (Çoban, 2005). Maintaining customer satisfaction is crucial for survival amid intense competition in the hotel industry. Tourists frequently evaluate a hotel's services compared to other hotels they have stayed in, and their level of satisfaction is often based on their expectations. Customers who receive personalized services that meet or exceed their expectations tend to become loyal to the hotel. Kotler (2009) discovered convincing proof of a connection between customer satisfaction and customer loyalty, while Denizci and Li (2009) affirmed that business expansion relies on customer satisfaction. Dick and Basu (1994) explain customer loyalty as a relationship defined by customers' attitudes towards the company and purchase repetition. They revealed that the strength of this relationship depends on social norms and situational factors. Bayuk and Küçük (2007), on the other hand, explained customer loyalty with the principle of retaining the business's existing customers. Still, they emphasized that potential customers should not be ignored either. According to another point of view, the quality of the service provided creates an emotional bond with the customers and makes the customers loyal to the business. It is the quality of the product or service that is important to create a loyal customer (Kandampully, 1998). Zeithaml et al. (1996) define customer loyalty as customers who hold positive attitudes towards a company are dedicated to purchasing its services again, and recommend them to others. Tourism companies should focus on improving their products and services to enhance customer satisfaction and loyalty. The American Marketing Association defines loyalty programs as "continuous incentive programs used by a retailer to reward customers and engage in repeat business with the business" (Dorotic et al., 2012).

The satisfaction, gratitude, and engagement customers feel when they participate in a loyalty program are referred to as the emotional advantages of loyalty programs. Several emotional benefits include a Feeling of community: Customers who participate in a loyalty program may experience a sense of community with others who share their interests and values. Recognition: Customers who participate in loyalty programs may receive special benefits, personalized offers,

early access to promotions, and other forms of appreciation. Personalized experiences: Experiences that are customized based on a customer's preferences and purchasing history are another benefit of loyalty programs. These experiences help customers feel valued and appreciated (Kim et al.,2013; Khan, 2014).

The tangible prizes or savings customers can obtain when they sign up for a loyalty program are referred to as the financial benefits of loyalty programs. These benefits can be Discounts and promotions: Loyalty programs frequently provide members discounts or promotions so they can save money on purchases. Points and rewards: Gaining points through purchases and redeeming them for prizes like free goods, gift cards, or special experiences are two standard features of loyalty programs. Cashback: Some loyalty programs provide consumers with cashback benefits for purchases, allowing them to receive a portion of their expenditures in the form of cash (Kumar et al., 2012). These experiences help customers feel valued and appreciated. Although the researches indicate that loyalty programs make customers happy financially, studies conducted in recent years mention the importance of emotional benefits as well as the financial benefits of loyalty programs (Khairawati, 2019; Zaelani & Ariyanti, 2019). Emotional benefits make customers feel special and offer customers a high status (Arbore & Estes, 2013). There are many research findings in the literature regarding the benefits of loyalty programs to customers (Kang et al., 2015). Although many of the studies carried out are expressed with different concepts, it is significant that the benefits of loyalty programs to customers take place in two dimensions "emotional benefits" and "financial benefits". It is noteworthy that loyalty programs can benefit customers financially and emotionally, fostering brand loyalty and engagement while offering practical benefits like cost savings and tangible prizes (Terblanche, 2015; Acatrinei & Puiu, 2012).

3. METHODOLOGY

This study utilizes a quantitative research design and employs content analysis as the research method. The study aims to analyze the content of the websites of the top 10 hotels (determined by Horwath HTL l European Hotels & Chains Report 2019) operating in Turkey to identify the types of services and amenities they offer under loyalty programs.

In recent years, marketing and management practices that will bring businesses to the forefront compared to their competitors in the increasing competition conditions and enable them to take one step ahead of their competitors are gaining importance daily. In this context, loyalty programmes can also help businesses in the marketing field to get ahead of the competition and gain an advantage. This study will contribute to the related literature by examining the practices of businesses for loyalty programmes.

The sample for this study consists of the top 10 chain hotels operating in Turkey, which were selected using purposive sampling. The selection criteria of the hotels were determined as the top 10 chain hotels (Table 1 shows the list of hotels included in the study) operating in Turkey.

TABLE 1. Top 10 chain hotels operating in Turkey

Rank	Chain Group	Number of Hotel	Number of room	Headquarter	Website
1	Wyndham	75	10.953	USA	www.wyndhamhotels.com
2	Hilton	63	12.674	USA	www.hilton.com
3	Accor	42	7.453	France	www.all.accor.com
4	Marriott	30	5.686	USA	www.marriott.com
5	IHG	27	5.026	UK	www.ihg.com
6	Rixos	26	8.721	Turkey	www.rixos.com
7	Anemon	18	2.210	Turkey	www.anemonhotels.com

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8	Divan	17	2.080	Turkey	www.divan.com.tr
9	Dedeman	17	2,784	Turkey	www.dedeman.com
10	Kaya Hotels	14	5.630	Turkey	www.kayahotels.com
Note: compiled by authors by HTL (2019)					

In order to provide diversity in the sample, not only local hotels but also international hotels were included in the study. The services offered by the hotels under the loyalty program specified on their websites were examined and classified between 10-25 January 2022. The data was collected by visiting the websites of the selected hotels and analyzing the content using the content analysis method. The analysis was conducted by identifying the presence or absence of specific elements on the websites and categorizing them accordingly.

To ensure the validity and reliability of the data, several measures were taken. First, the sample was selected using purposive sampling to ensure that the hotels represent the population of hotels operating in Turkey. Second, the coding sheet used for data collection was developed based on the research objectives to ensure that all relevant data is collected. Third, the analysis was conducted by three independent researchers to ensure inter-coder reliability.

The research does not involve individuals; the information gathered from the hotels' websites is accessible to the public. Nonetheless, the study considered ethical factors, such as ensuring that the analysis does not misrepresent the hotels and using the data solely for research purposes.

4. FINDINGS

The results of the frequency analysis performed on the data obtained in the study are presented in Table 2. The table has been created according to the available and not available services offered by the hotels. The table compares several membership categories that service providers offer, each with a unique set of services. The services offered by the top 10 hotels operating in Turkey under the name of loyalty programs were tried to be determined in this study. The services offered by the providers are listed in the first column, including free internet, special member prices, mobile check-in and mobile key, cash points, food and beverage discounts, room upgrades, welcome gifts, lounge access, early check-in and check-out, 48 hours warranty, collaborative programs, award overnights, and rollover nights. The second column lists membership categories: Member, Silver, Gold and Diamond. Member, Silver, Gold and Diamond. The table shows the number of service providers offering each service in each membership category.

After analysing the data presented in Table: 2, it is clear that the loyalty programs of the ten studied hotels have several similar characteristics and distinctive features. First, these loyalty programs are multi-tiered by the type of privileges for the guests. The essence of multi-tiered loyalty programs is that the number of points and privileges received by guests is directly proportional to the amount of money they spend in the hotel. Consequently, the higher the degree of customer loyalty, the higher the status of the hotel they have.

In Table 2, the services offered by hotel businesses within the scope of loyalty programs are given.

TABLE 2. Services offered by the hotel loyalty program

Services offered	Membership type											
	Member			Silver			Gold			Diamond		
	A	N/A	%	A	N/A	%	A	N/A	%	A	N/A	%
Free internet	8	2	80	8	2	80	8	2	80	8	2	80

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Special Member prices	8	2	80	8	2	80	8	2	80	8	2	80
Mobile Check-in and mobile key	5	5	50	5	5	50	7	3	70	8	2	80
Cash Points	6	4	60	7	3	70	8	2	70	8	2	80
Food and beverage discount	6	4	60	5	5	50	7	3	70	8	2	80
Room upgrade	1	9	10	1	9	10	7	2	70	8	2	80
Welcome gift	1	9	10	1	9	10	6	4	60	6	4	60
Lounge Access	1	9	10	1	9	10	6	4	60	8	2	80
Early check-in and check-out	3	7	30	3	7	30	8	2	80	8	2	80
48 hours warranty	1	9	10	-	10	10	6	4	60	6	4	60
Collaborative programs	1	9	10	2	8	20	2	8	20	8	2	80
Award overnights	-	10	0	4	6	40	8	2	80	8	2	80
Rollover nights	2	8	20	3	7	30	6	4	60	6	4	60
Note: compiled by authors												

Mobile check-in and mobile key services are self-service technologies for hotels that allow hotel guests to complete the check-in process on their mobile devices. Guests can use an app to select their rooms and complete the check-in process before arriving at the hotel, and mobile key services allow hotel guests to enter their rooms with a digital key via smartphone. While Mobile Check-in and mobile key services are offered to gold and diamond members at a rate of 70% and 80%, respectively the rate of receiving this service for member and silver memberships is around 50%.

The cash points service is a system that offers hotel guests the flexibility to mix points and cash while making online reservations. In this way, hotel guests have the opportunity to make discounted reservations. When the cash point service of the hotels is examined, it is seen that 60% of the hotels provide this service to their members, 70% of the hotels to their silver members, and 80% of the hotels to their silver and gold members.

When the food and beverage discounts offered by the hotels are examined, it is observed that 50% of the hotels offer discounts to their guests with member and silver memberships. This rate increases for guests with gold and diamond memberships. While 70% of the hotels provide this opportunity to their gold memberships, 80% offer it to their diamond memberships.

Hotels have different categories of rooms, from essential types to presidential suites, and the class varies for each hotel. An upgrade would be in the case when you check in. You can ask the hotel if they have a suite available. The hotel might charge an extra amount for this based on availability. In loyalty programmes, some hotels offer it free of charge. If you are a specific tier member, you might be automatically given an upgrade based on availability. When we look at room upgrade opportunities, 10% of the hotels offer this service to their members and silver members, while 70% provide room upgrade service to gold members and 80% to silver members.

Considering the welcome gift status of the hotels, the number of hotels that offer this opportunity to members and silver members is 10%. As can be seen, only 1 out of 10 hotels give

welcome gifts to their guests, and the rate of hotels offering this service to gold and diamond members is 70%.

Some hotels offer free lounge access for the top tier members. In this lounge, members may have complimentary snacks and drinks available at certain times. The number of hotels offering lounge access facilities to their members and silver members must be improved because only 10% of the hotels provide this opportunity to their guests. The rate of hotels that offer this opportunity to their gold members is 60%, and the rate of hotels that provide this opportunity to their diamond members is 80%.

Early check-in is a service that allows guests to check into the hotel and their room before the usual check-in time. Late check-out will enable guests to check out later than the hotel's standard check-out time. While the rate of hotels that offer early check-in and check-out service to members and silver members is 30%, the rate of hotels that provide this service for gold and diamond members is 80%.

Some hotels guarantee a room for any paid stay if you are a loyal guest. Guests can make a reservation 48 hours before arrival. This is called a 48-hour warranty. When we focus on this service of hotels, it is seen that the rate of hotels that offer this service to members and silver members is around 10%. This rate increases for gold and diamond members, and it has been determined that 60% of the hotels offer this opportunity to their guests.

Some hotels offer collaborative programs to their guests in addition to the facilities provided by their hotels. In this way, guests can find the opportunity to spend the points they have accumulated in another place other than the hotel. When we look at the opportunities offered by the hotels, only 10% of the hotels provide this service to their customers at the member level, 20% of the hotels provide this service of silver and gold memberships, and 80% of them offer this service for diamond membership.

Some hotel loyalty programs offer more than just points and valuable card benefits. Some help make the trip memorable for guests by extending their journey with a free night on the anniversary of the card account. This is called award overnights. When we look at the award overnights service offered by the hotels, we see that a member at the member level cannot use this service in any hotel. 60% of the hotels provide this opportunity for guests with silver memberships, while guests with gold and diamond memberships can use this opportunity only in 80% of these hotels.

Rollover nights are a way for hotel guests to earn elite status fast. With rollover nights, elite guests can accumulate points, get free nights and can roll over unused nights to count toward qualifying for status in the following years. When we look at the rollover nights offered by the hotels, 30% of the hotels offer this opportunity for member and silver memberships, while 60% of the hotels offer this service for gold and diamond memberships.

5. CONCLUSIONS

The hotel industry is a highly competitive market, and to stay ahead, hotel companies need to innovate and improve their offers continuously. This study focuses on the loyalty programs offered by chain hotels in Turkey and provides valuable insights into how these programs are designed to build customer loyalty. The study analyzed the loyalty programs of 10 chain hotels, evaluating them based on several criteria, such as membership benefits and membership tiers.

The study results indicate that loyalty programs are crucial in building customer loyalty in the hotel industry. The loyalty programs analyzed in the study were found to be focused on providing benefits to their members, including discounts on food and beverage, free internet, room upgrades, welcome gifts, lounge access, early check-in and check-out, cash points, and award overnights. These benefits were offered at different membership levels, with Diamond members

receiving the highest honours for most of the services listed. Additionally, some services, such as award overnights and rollover nights, were only available to members at the higher levels.

The study's scientific contribution lies in its analysis of loyalty programs in the hotel industry in Turkey. The study findings provide valuable insights for hotel companies designing and implementing effective loyalty programs. By understanding the benefits customers value and offering them at different membership levels, hotel companies can build stronger relationships with their customers and improve their competitiveness in the market. This approach is fundamental in the hotel industry, where high competition forces each lodging facility to offer products of perceived value to customers, providing the service efficiently and better than competitors. One effective way to achieve this is through loyalty programs, which provide customers with rewards, discounts, and privileged services (Xie & Kwok, 2017; Filho & Bogadão, 2022). By offering good quality performance, hotels can increase customer satisfaction and retain customers to stay in the hotel, which can lead to customer loyalty (Flores et al., 2020). The study also highlights the importance of incentivizing members to strive for higher levels of membership, as this can lead to increased customer loyalty in business.

In conclusion, the study provides important insights into the design and effectiveness of loyalty programs in the hotel industry in Turkey. The findings of the study can help hotel companies improve their loyalty programs, leading to increased customer satisfaction and loyalty, which ultimately contributes to the success of the hotel industry as a whole.

6. LIMITATIONS

This study was conducted on a limited number of chain hotels in Turkey. As a result, the findings may not be representative of the entire population of chain hotels in Turkey. In addition, the study only focused on guest loyalty programs in chain hotels in Turkey. It did not explore other types of accommodation such as independent hotels or boutique hotels. Therefore, the results may not be applicable to other types of hotels. Moreover, the research was conducted within a limited time frame, which may have prevented a more comprehensive investigation into the topic. In general, the study offers useful perspectives on the loyalty programs for guests in chain hotels located in Turkey. However, it is important to consider the limitations when interpreting the outcomes. Further investigations are required to verify the results and explore the issue in more detail.

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The Level of Development of the Socio-Economic Indicators of the Abay Region: Methods and Analysis

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Abstract

This descriptive work is aimed at studying at the micro level the socio-demographic indicators of the Abay region of Kazakhstan. The literature review highlights the importance of population dynamics, education, health care and internal migration for sustainable development in the region and in the country. The study also uses the fuzzy set method for several aspects of the selected indicators. Secondary data for 2010-2020 are taken from an open source - the Bureau of National Statistics and were used to identify negative trends and contradictions. The results showed that over the past 10 years there are negative trends in the region in terms of indicators: a high level of emigration, a shortage of able-bodied population, an increase in the number of schoolchildren with a constant number of schools, and a negative trend in hospital organizations. Beskaragai and Borodulikha districts natural population growth decreased by 62 percent. The number of schools in the region has slightly decreased, while in Semey (23%), Kurchatov district (30%) and Ayagoz (1.54%) district there is an increase in school enrollment. In Abay and Kokpekty districts, there is a decrease in the number of schools enrollment (-10% and -16%). The number of hospital beds has decreased significantly in most districts (more than 30 percent in half of the districts). In general, this article contributes to a deeper understanding of the socio-demographic dynamics of the Abai region. The results obtained can be used in making political decisions related to population regulation and economic development in each region.

1. INTRODUCTION

This research paper examines the socio-demographic indicators of the Abay region in Kazakhstan, focusing on the factors contributing to negative trends in these indicators. The study aims to provide a more nuanced understanding of the situation at the regional level, which needs to be adequately reflected in macro-level research. The research question is "What are the possible reasons for the socio-demographic indicators showing negative trends in the Abay region of Kazakhstan?" The paper utilizes secondary data from the National Statistical Committee of the Republic of Kazakhstan between 2010-2020 to describe the socio-demographic situation of the region.

The standard theory explaining this choice of indicators starts from the fundamental idea of human capital recently more developed and revised in terms of new emerging trends and economy by Deming (2022), Zhang et al. (2023), Tandrayen-Ragoobur & Narsoo (2022). In the context of Kazakhstan within the regional development Kazakhstani researchers, such as Temirova and Abdimomynova (2016) and Kireyeva et al. (2022), have exhibited significant interest in exploring theoretical approaches and methodologies for researching the regional economy of Kazakhstan. Numerous indices, including socioeconomic, ecological, infrastructural, cultural, and demographic ones, are covered by this investigation. Further, the research highlights depressed areas and their impact on social metrics as well as the reverse Kibayeva et al. (2022), Baydybekova and Sauranbay (2022). These publications mostly looked at the relationship between the macro-level socio-demographic variables of the region and population, healthcare, and education. Therefore, in order to analyse the results and explain the situation in the Abay region of Kazakhstan, this study analyzes socio-demographic parameters.

The literature review highlights the importance of education as a critical factor for sustainable development in Kazakhstan, but there are challenges related to access, quality, and relevance. Several researchers have analyzed the socio-economic development of regions in Kazakhstan, including the Abay region when it was known as the East Kazakhstan Region. Salzhanova and Gelashvili (2017) analysed socio-economic indicators such as GDP, population, and employment rates, revealing that the Abay Region has experienced positive economic growth. However, poverty and unemployment remain ongoing challenges in the region. This study highlights significant issues in migration rates, population growth, and the difficulties associated with raising children in the region. While migration can have benefits, policymakers must carefully consider potential negative impacts and implement policies that mitigate these effects while leveraging positive outcomes (Sermagambet et al., 2022; Sagadiev, 2004).

Despite the increasing recognition of the significance of human capital in achieving sustainable development, there remains limited literature on measuring human capital in Kazakhstan, particularly among school-age populations. Existing measures of human capital tend to focus solely on the educational dimension and neglect other dimensions contributing to human capital formation. Additionally, such measures tend to be presented at the macro level, making it challenging to analyze and understand the situation at the micro level. Given these limitations, this study employs the fuzzy set approach to measure the human capital of Kazakhstan's school-age population (aged 7-18 years old) while considering multiple dimensions of human capital investment. This approach aims to provide a more comprehensive and nuanced understanding of Kazakhstan's human capital and identify key determinants of its formation.

The study's practical significance is to identify the weaknesses and threats of the socio-economic indicators of the Abay region and recommend ways to improve the situation. The article follows a typical academic research format, including an introduction, methods, results and discussion, conclusion, and references.

2. LITERATURE REVIEW

This work is based on essential and relevant theories related to the relationship between the region's sustainable economic development and which are interconnected with the development of the country as a whole. There is a clear relationship between human capital wealth and economic prosperity. There are various theories in the literature on this issue. The following passages describe this from various points of view. The degree of development of the economy in the country can be determined using various methods. Scientists study indicators of human capital development to identify weaknesses and risks. "Depressed" regions of the country have lower rates compared to the average. The risks and problems existing in the regions may be subject to the snowball effect and increase in a larger volume, which will lead to an outflow of specialists in all areas of economic activity, a decrease in the birth rate, and poor quality of medical and educational services (Mansurova, 2015; Myers & Hansen, 2020).

Education plays a crucial role for children and their parents in the region where they live. According to the Constitution of the Republic of Kazakhstan, education at school (primary and secondary) is compulsory, and tuition fee is free, except for private schools. The problem in this context is related to the closure of schools in rural areas and cities. Lee and Lubienski (2017) researched the schools' closure and its impact on the criminal and socio-demographic rates. They further discussed societal inequality, especially for the students from lower-income families. Also, the closure of the schools is affecting female students more than male students, which might increase inequality in rural areas, especially economic inequality from a gender perspective. Mostly, support for female students in rural areas can be observed in developing countries where the vulnerable children are studying in private schools and give the results for teaching and training the next generation of students, therefore the local society itself.

Most research links the notion of human capital and education by highlighting social inequalities caused by a lack of access to education (Card et al., 2022). In the current environment, access to education may be seen through the inadequate number of students in a classroom, the lack of substitute teachers for many classes (subjects) within a school, and the overcrowding of the classes as a result of the distance between the students' homes and the school (Burde et al., 2017). While everyone in Kazakhstan has the legal right to attend school, the problem of having too many students in each district or school may prevent everyone from receiving the high-quality education they deserve. As a result, the students will not be interested in purchasing. Therefore the schoolchildren will not be interested in getting knowledge in higher educational institutions because they would have difficulties winning a scholarship to study due to the hardness of studying in uncomfortable conditions, or they will not be interested in getting a degree because of financial purposes or future thought about job diversification to work in that region (Piscitello et al., 2021). So the poverty of adults will lead to poverty of children, which would discourage theregion's development in socio-demographic perspectives.

The population has a significant impact on both the local economy and the overall economy of the country. Factors including population number, age distribution, and gender may statistically determine the functioning intelligence of the area. How many people are migrating will show how appealing an area is to live and work. However, encouraging families to have three or more children with financial and material support (once or briefly) cannot increase migration levels and population growth positively. This is because doing so has unfavorable consequences for the children, including poverty, filicide, and other issues if the family was unable to support them from the start (Stasiūnienė et al., 2015). The pro-natalist policy (Cook et al., 2022) was therefore ineffective or had very limited effects on the purpose. However, it was related to children's poverty, further damaging the region's and country's human capital.

Unfavorable living circumstances in the area or workplace are the following issue with population migration (Simonyan, 2017). Workers from Kazakhstan's mining sectors travel to the

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country's eastern region to work for a set period of time before returning to the city or neighborhood where they were born and raised. Therefore, due to the lack of economic diversification and the unattractive pay of the remaining occupations, the population of East Kazakhstan will look for employment opportunities in other districts. However, industrial production is increasing. Because the original theory was based on the economics of African countries and does not apply to Eurasian countries due to differences in economic structure, social structure, and demographics, this can be explained by the theory of revisiting spatial mismatch (Lyons & Ewing, 2021).

The idea is considered under the connection between poverty and migration due to work requirements, which is applicable to Eastern Kazakhstan in the mining industry, where people have to come and work from other regions or live in a city with ecological problems related to air pollution by mining companies. As for people who live in the city, it might cause several diseases because of ecological problems that show up over a longer period. Also, the problem of poverty or less development of social satisfaction might be related to showing on a macro level the productive numbers per industry services and products. In contrast, the satisfaction level of the civilians will be low, which can lead to riots as it was in 2022, starting from Western regions and spreading to all regions of Kazakhstan (Kudaibergenova & Laruelle, 2022).

Healthier people have higher productivity, cognitive function, and working longevity, which contributes to higher economic growth rates. According to (Anghelache et al., 2022) research, advances in public health have a major positive impact on economic growth. The quantity of waste generated by hospital bed occupancy during treatment is the focus of this study, as is the number of hospitals by region or city. However, the placement of these indicators is intimately related to the population's social and economic conditions, particularly its financial standing. According to Spankulova et al. (2020), many socioeconomic determinants and health inequalities are interconnected in Kazakhstan, resulting in considerable discrepancies in population health status. Living conditions and income levels are linked to poor health.

According to the OECD report titled "Health Systems Reviews: Kazakhstan 2018" (2018), the effectiveness of healthcare in Kazakhstan has been analyzed to be high. However, the methodologies used to determine effectiveness may not be suitable for Kazakhstan, as patients in Kazakhstan tend to be hospitalized with a wider range of sickness levels compared to other countries analyzed by the OECD, where patients with more serious illnesses, such as cancer, are more likely to be hospitalized. As a result, the death rate of patients in hospitals may be higher in these countries than in Kazakhstan, where only 0.92 deaths per 10,000 hospitalized patients occur.

As a conclusion of the literature review, we should note that socio-demographic and economic indicators might show the results only when it is considered from several perspectives because some regions will show high productivity but low level of citizens satisfaction, for example, Yemen (export is high, but the malnutrition problems in society) (Milenković et al., 2014). As a result, it is preferable to consider signs as a whole. Regional development research is vital for developing or suggesting strategies for sustainable development, including urban and rural development (Pou et al., 2021; Bacorn et al., 2022). Researchers also looked into how socio-demographic characteristics affected quality-of-life outcomes in adults with difficult-to-treat conditions like cancer and diabetes (Vigl et al., 2011; Lyratzopoulos et al., 2013; Khan et al., 2017).

3. METHODOLOGY AND DATA

The study makes use of a descriptive research methodology, which enables the collection of research data quantitatively on particular variables for statistical analysis. This paper collected data from 2010 to 2020 from official statistical yearbooks for districts and cities of the Abay

region (Bureau of National Statistics of the Republic of Kazakhstan). The data covered in the study include sociological indicators such as the number of schools and students, hospitals and demographic indicators such as the migration rate, population and birth rate. The growth rate between 2010 and 2020 was then analyzed to determine the percentage increase between values to identify trends. Negative trends were seen in the data, which include the trend in the number of schools, the number of pupils, the number of hospital beds and hospital organizations, the trend in the migration balance, the rate of natural increase and the birth rate and the trend in the population size.

Secondary data (data sampling)

The method of this study is based on descriptive economic analysis of secondary data to describe economic phenomena in the Abay region. In order to point out that this particular region has negative values, which is of concern and becomes relevant to the study. East Kazakhstan region was divided in 2022 into Abay and Ulytau regions, accordingly inheriting the cities and districts. Recently appeared Abay region consists of the following cities and districts: Semey city, Kurchatov city, Abay, Ayagoz, Beskaragai, Borodulikha, Zharma, Kokpekty and Urjar districts. Therefore, to analyse the situation in the Abay region, it is important to collect the data from the cities and districts separately and make an analysis for the whole region.

This study used existing data from 2010 to 2020 from the Bureau of National Statistics of the Republic of Kazakhstan to analyze the economic well-being of the Abay region. This study used the social and demographic indicators' dynamics to assess the regional well-being of the region (Capello, 2007; Fang et al., 2019). The method is described as a series of steps shown below in Figure 1.
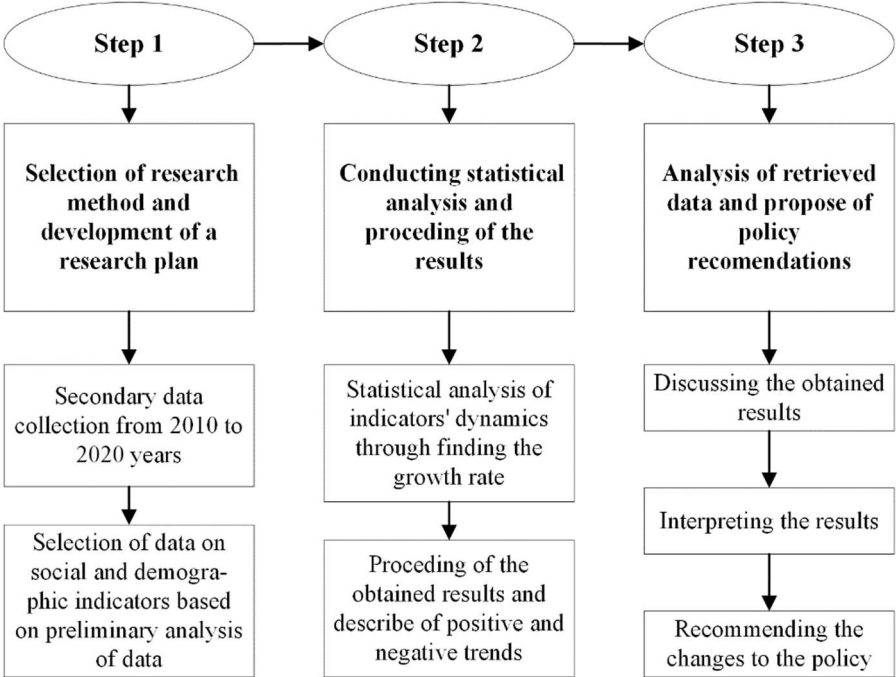
FIGURE 1. Steps of the method to conduct the research

Note: compiled by the authors

The preliminary statistical analysis (growth rate) on retrieved data assisted in estimating the indicators which were showing negative trends and were contradictory. Abay region was chosen

from the regions of Kazakhstan due to its appearance as a new region in 2022 in Kazakhstan. The region shows negative trends in sociological and demographic indicators. The paper does not engage with the Aksu district due to the absence of statistical data for this district. The method of examining the dynamics over 10 years was chosen for this research in order to assess the economic well-being of the newly formed Abay region, which comprises several cities and districts in Kazakhstan. The appearance of this new region in 2022 necessitated the collection and analysis of social and demographic indicators separately for each city and district. The study used existing data from 2010 to 2020 from the Bureau of National Statistics of the Republic of Kazakhstan. It analyzed the growth rates of various indicators to identify negative trends and contradictions. Table 1 provides a list of the retrieved data variables with their corresponding units of measurement.

TABLE 1. Retrieved data variables with units of measure

No.	Sphere	Variable	Unit of measurement
a	Dynamics of population	Balance of migration	count
		Population	count
b	Evolution of the number of schools and trends in school enrollment	Number of schools	count
		Number of school students	count
		School enrollment	count, in thousands
c	Evolution of the number of hospital beds and hospital organizations	Number of hospital beds	count
		Number of hospital organizations	count
d	Dynamics of regional distribution of population broken down by the balance of migration	Natural increase (decrease rate) of the population	per million
		Birth rate	per million
Note: compiled by the authors			

These variables were chosen based on their relevance to the economic well-being of the region and their potential relationship to education and human capital, as discussed in the literature.

The variables include the balance of migration, population count, number of schools, number of school students, school enrollment (counted in thousands), number of hospital beds, number of hospital organizations, natural increase (decrease rate) of the population, and birth rate. The unit of measurement for the balance of migration and population count is 'count', which refers to the number of people. The unit of measurement for school-related variables such as the number of schools, number of school students, and school enrollment is also 'count'. The number of hospital beds and hospital organizations is also counted in 'count'. The natural increase (decrease rate) of the population and birth rate is measured per million (ppm), which refers to a fraction of one thousand, usually used to indicate rates per thousand of the population. The data of the migration balance is shown in absolute units (number of people) and the growth rate was calculated as follows:

$$\text{Growth rate} = \left(\left(\frac{\text{Balance of migration 2020}}{\text{Balance of migration 2010}} \right) - 1 \right) * 100\% \qquad (1)$$

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Regarding migration balance for the Abay region, this indicator demonstrates difference of absolute number of people immigrating and emigrating (immigration minus emigration) to the particular city or district. In case of an increasing number of emigrating amount of people, the result will be shown in negative numbers.

3. ANALYSIS AND RESULTS

Dynamics of population

The problem of decreasing the population in the Abay region is discussed in the following section. The population of the Abay region is demonstrating decreasing trend through the demographic indicators a balance of migration and population as it is shown in Table 2.

TABLE 2. Dynamics of population, in people units

Region	Balance of migration in people			Population, in people		
	2010	2020	Growth rate, %	2010	2020	Growth rate, %
Semey city	-49	-2291	45,76	326 965	349 957	7,03
Kurchatov	533	2	-1,00	10 406	12 317	18,36
Abay district	-163	-212	0,30	15 314	14 147	-7,62
Ayagoz district	-1303	-1335	0,02	74 603	71 670	-3,93
Beskaragai district	-422	-354	-0,16	21 997	18 299	-16,81
Borodulikha district	-681	-459	-0,33	39 664	35 403	-10,74
Zharma district	-731	-921	0,26	44 835	37 042	-17,38
Kokpekty district	-950	-637	-0,33	34 241	27 597	-19,4
Urjar district	-1196	-1682	0,41	82 613	72 762	-11,92
Note: compiled by authors based on the data from the Bureau of National Statistics (2022)						

The research study analyzed the population dynamics in several regions over the course of a decade. The analysis showed that Semey city had a population growth rate of 7.03%, while other regions such as Beskaragai and Zharma district experienced negative growth rates of -16.81% and -17.38%, respectively. Additionally, the data revealed that Kurchatov had a positive migration balance of 533, while Semey city had a negative migration balance of -49. Furthermore, the data demonstrated changes in population sizes in different regions. For example, the population of Semey city increased from 326,965 in 2010 to 349,957 in 2020, while the population of Urjar district decreased from 82,613 in 2010 to 72,762 in 2020. The data also showed that some regions experienced significant decreases in population, such as Kokpekty district, which saw a decrease of -19.4%. These findings provide valuable insights into population dynamics and movement in different regions. The data can be used to make predictions about future population changes and inform policy decisions related to population management and development in each region. Overall, the research study contributes to a better understanding of population trends and can serve as a basis for further research in this area.

Therefore, another significant aspect of the demographic indicator that is shown in Table 1 is population. Before proceeding to examine the economic situation of the Abay region, it is important to note the situation with the population trend between 2010 and 2020 (Table 1). The overall trend for the Abay region cities and districts is negative. Only cities such as Semey (7%) and Kurchatov(18%) are showing the positive growth rate of the population. The three highest amounts of the population number decline are demonstrated in the districts as Kokpekty (-19%), Zharma (-17%) and Beskaragai (-16,8%). As discussed above, Kokpekty and Beskaragai districts showed a positive trend in migration balance, but the population of these districts are on top of negative trends.

Evolution of the number of schools and trends in school enrollment

The next table describes the results for the socio-demographic indicators as the number of schools and the number of school students' dynamics during 2010 and 2020 for the cities and districts of the Abay region (Table 3).

TABLE 3. Evolution of the number of schools and trends in school enrollment in the Abay region during 2010-2020

Region	Evolution of the number of schools in 2010 and 2020			Trends in school enrolment, in thousands		
	2010	2020	Growth rate, %	2010	2020	Growth rate, %
Semey city	89	77	-13.48	40.4	49.9	23.51
Kurchatov	3	4	33.33	1.3	1.7	30.77
Abay district	11	11	0	2.8	2.5	-10.71
Ayagoz district	50	39	-22	13	13.2	1.54
Beskaragai district	24	21	-12.5	3.3	3	-9.09
Borodulikha district	35	32	-8.57	5.1	5	-1.96
Zharma district	45	40	-11.11	7.3	7	-4.10
Kokpekty district	44	38	-13.64	4.9	4.1	-16.33
Urjar district	54	51	-5.56	13.6	12.3	-9.56
Note: compiled by authors based on the data from the Bureau of National Statistics (2022)						

Overall, there was a slight decrease in the number of schools in the region, from 325 in 2010 to 303 in 2020, with a growth rate of -6.77%. However, the trends in school enrollment were more varied. Semey city experienced a decrease in school enrollment growth rate from 40.4 thousand in 2010 to 49.9 thousand in 2020, with a growth rate of 23.51%. Kurchatov had a slight increase in the number of schools, from 3 in 2010 to 4 in 2020, with a growth rate of 33.33%, and a corresponding increase in school enrollment growth rate from 1.3 thousand in 2010 to 1.7 thousand in 2020, with a growth rate of 30.77%.

In contrast, some districts experienced a decline in both the number of schools and school enrollment growth rate. Ayagoz district had a decrease in the number of schools from 50 in 2010 to 39 in 2020, with a growth rate of -22%, but a slight increase in school enrollment growth rate from 13 thousand in 2010 to 13.2 thousand in 2020, with a growth rate of 1.54%. Similarly, Kokpekty district had a decrease in the number of schools from 44 in 2010 to 38 in 2020, with a

growth rate of -13.64%, and a corresponding decrease in school enrollment growth rate from 4.9 thousand in 2010 to 4.1 thousand in 2020, with a growth rate of -16.33%.

Evolution of the number of hospital beds and hospital organizations

Table 4 shows the evolution of the number of hospital beds and hospital organizations in the Abay region during 2010-2020.

TABLE 4. Evolution of the number of hospital beds and hospital organisations in units in Abay region during 2010-2020

Region	Number of hospital beds in units			Number of hospital organisations in units		
	2010	2020	Growth rate, %	2010	2020	Growth rate, %
Semey city	1865	1408	-24.50	17	14	-17.65
Kurchatov	55	40	-27.27	1	1	0
Abay district	50	27	-46	1	1	0
Ayagoz district	365	224	-38.63	5	2	-60
Beskaragai district	51	46	-9.80	1	1	0
Borodulikha district	155	93	-40	3	1	-66.67
Zharma district	160	69	-56.88	3	2	-33.33
Kokpekty district	135	80	-40.74	3	2	-33.33
Urjar district	265	188	-29.06	5	2	-60
Note: compiled by authors based on the data from the Bureau of National Statistics (2022)						

A negative trend is shown by the dynamics of the number of hospital beds (Table 3). The data indicate that there was a significant decrease in the number of hospital beds in most districts, ranging from -9.8% to -56.88%. The largest decline was observed in Zharma district (-56.88%), followed by Ayagoz district (-38.63%) and Borodulikha district (-40%). The only districts where the number of hospital beds increased were Kurchatov and Beskaragai, although the increases were relatively small (33.33% and 9.8%, respectively).

In terms of hospital organizations, there was a decrease in most districts, ranging from -66.67% to -17.65%. The largest decrease was observed in Ayagoz and Urjar districts, both with a decrease of 60%, followed by Borodulikha district (-66.67%) and Zharma district (-33.33%). The only districts where the number of hospital organizations remained the same were Abay and Kurchatov.

Overall, the data suggest a significant decline in the availability of hospital beds and hospital organizations in the Abay region during 2010-2020.

Dynamics of regional distribution of population broken down by the balance of migration

The balance of migration is the difference between the number of people moving into the region and the number of people moving out of the region. The natural increase (decrease) rate is the difference between the number of births and the number of deaths, expressed as a rate per thousand people. The birth rate is the number of births per thousand people.

Table 5 shows the dynamics of population distribution in different regions of Abay, Kazakhstan from 2010 to 2020, broken down by three indicators: balance of migration, natural increase (decrease) rate, and birth rate.

TABLE 5. Dynamics of regional distribution of population broken down by balance of migration, natural increase (decrease) rate, and birth rate, Abay region, 2010-2020

Region	Balance of migration in people			Natural increase (decrease) rate of the population, in ppm			Birth rate, in ppm		
	2010	2020	Growth rate, %	2010	2020	Growth rate, %	2010	2020	Growth rate, %
Semey city	-49	-2291	4575,51	6,49	7,24	11,56	16.71	17.65	5.63
Kurchatov	533	2	-99,62	0,32	7,6	2275	16.7	16.9	1.20
Abay district	-163	-212	30,06	14,66	5,89	-59,82	21.77	17.47	-19.75
Ayagoz district	-1303	-1335	2,46	15	12,86	-14,27	23.08	21.31	-7.67
Beskaragai district	-422	-354	-16,11	3,35	1,27	-62,09	16.82	16.49	-1.96
Borodulikha district	-681	-459	-32,6	2,64	0,99	-62,5	15.14	14.41	-4.82
Zharma district	-731	-921	25,99	11,03	10,93	-0,9	21.58	21.29	-1.34
Kokpekty district	-950	-637	-32,95	4,26	3,37	-20,89	16.76	15.52	-7.40
Urjar district	-1196	-1682	40,64	9,44	9,18	-2,75	19.44	18.49	-4.87
Note: Compiled by authors based on the data from the Bureau of National Statistics (2022)									

The data presented in Table 5 illustrates population dynamics in the Abay region from 2010 to 2020, broken down by balance of migration, natural increase (decrease) rate, and birth rate.

A table review reveals that Semey city and Kurchatov had positive migration balances, with Kurchatov also exhibiting a high birth rate. Conversely, Abay district experienced negative migration balances, decreasing natural increase rates, and decreasing birth rates. Ayagoz district also had a negative balance of migration. However, its natural increase rate remained relatively stable with a slight decrease, and it had consistently high birth rates over the decade.

Beskaragai, Borodulikha, and Kokpekty districts all had negative migration balances, decreasing natural increase rates, and decreasing birth rates. Similarly, the Zharma district had a negative balance of migration, but it had a relatively stable natural increase rate and a high birth rate. Finally, the Urjar district exhibited a negative balance of migration but had a high natural increase rate and a consistently high birth rate.

Taken together, the data suggest that some regions in Abay are experiencing population decline due to negative migration balances and decreasing natural increase and birth rates. However, other regions, such as Kurchatov, Ayagoz, Zharma, and Urjar, are experiencing positive population growth due to high birth rates and positive balances of migration. In Table 5, there is a negative trend in the dynamics of the natural increase coefficient for 2010-2020 in 80% of districts and cities of the Abay region. This may have serious consequences for the development of cities and districts.

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5. DISCUSSIONS

Dynamics of population

Regarding the results, the emigration rate from the cities and districts is higher than immigration. The positive trends are shown in Beskaragai, Borodulikha, Kokpekty districts and Kurchatov city in comparison between 2010 and 2020 with slight differences. In contrast, the negative trends for migration balance are shown in the cities and districts of Semey, Abay, Ayagoz, Zharma and Urjar. The high number of emigrants might cause problems with a shortage of the working population in the research districts and cities. It might become the reason for the lower economic development of the Abay region. Also, this tendency might be explained by the search for available and satisfactory working opportunities in the big cities, the migration of school graduates for educational purposes and might be related to returning of the ageing people to the districts related to the cultural belief among elders of living in the neighborhood with during their adulthood (70+). However, the migration balance might not show the stagnation of the population migration due to the ageing of the population in districts of the region and dissatisfaction with emigration, and it does not show population growth or decline.

Evolution of the number of schools and trends in school enrollment

Due to the reduction of secondary educational institutions (schools) and the increase in the number of pupils, this may lead to several serious consequences. Firstly, it may lead to a reduction in the availability of education for children and young people in these districts and cities. Fewer schools can lead to longer commutes to the nearest school, which can be a problem for young people, especially those who do not have their own transport or limited travel finances. Secondly, it may lead to a reduction in the quality of education in these areas and cities. Reducing the number of students can lead to less funding for schools and fewer teachers. This may mean that teachers will have to teach more classes, which may have a negative impact on the quality of education. Third, it can have negative economic consequences for these districts and cities. Reducing the number of schools may discourage new residents, especially those planning to have children, which may lead to a reduction in the population and a worsening of the economic situation in these districts and cities.

To address this situation, policies should be implemented to ensure that access to education is not only available but also equitable and of high quality. One approach may involve increasing the number of schools in each district or implementing measures to reduce the student-teacher ratio. Additionally, providing financial support to families who may not have the resources to afford school supplies or transportation could help reduce access barriers. Such efforts would promote equal access to education and help ensure that all students have the opportunity to reach their full potential.

Evolution of the number of hospital beds and hospital organizations

The decrease in the number of hospital beds and organizations in different districts and cities of the Abay region can have several serious consequences.

Firstly, it may lead to a reduction in the availability of health care for the residents of these areas and cities. A reduction in the number of hospital beds and organizations can mean fewer patients are able to receive qualified medical care. This may mean longer appointment waiting times, longer travel times to receive care, and fewer available specialists. Secondly, it may increase the burden on the remaining hospital organizations. Reducing the number of hospital beds and organizations may mean that the remaining healthcare institutions have to accept more patients, which may overload the staff, worsening the quality of medical care and increasing the

waiting lists for appointments. Thirdly, it may lead to an outflow of qualified specialists from these areas and cities. A reduction in the number of hospital beds and organizations may mean that there are fewer opportunities to work in the medical field in this area. This may lead to skilled professionals having to seek employment in other districts and cities, which may further reduce the availability of health care for the residents of these districts and cities.

Dynamics of regional distribution of population broken down by the balance of migration

First, a negative coefficient of natural increase can lead to a decrease in population, which can further cause a decrease in demand for goods and services. This may result in less interest in investing in the urban economy. Secondly, a declining population could lead to lower production and employment rates, which could negatively impact the area's economic development. Therefore, measures should be taken to stimulate the birth rate and attract new inhabitants to the cities and districts of the Abay region, as well as to create favourable conditions for investment and economic development.

The population dynamics for the analyzed period indicate a steady downward trend from a negative 4% to a negative 18%, which can be attributed to the following reasons. The number of schools, hospital beds and organizations is decreasing in these towns and districts, as is the birth rate. This leads to poor infrastructure for developing young families, which may have the potential for developing villages and towns. The outflow of population from districts and villages to cities is increasing, leading to a shrinking labor force and reduced economic growth in these areas.

6. CONCLUSIONS

In conclusion, this study analyzed socio-demographic data in the Abay region and provided insights into population changes in different regions. The findings could inform policy decisions related to population management and development in each region.

(a) The study also revealed a higher emigration rate than immigration, which may cause a shortage of the working population and lower economic development in the region. However, the migration balance alone may not fully capture the population dynamics in the region. The study highlights the importance of considering socio-demographic indicators in regional development planning and contributes to a better understanding population trends.

(b) Furthermore, the analysis of changes in the education sector in Kazakhstan from 2010 to 2020 indicated a positive trend in the number of school students despite a decrease in the total number of schools. This information can assist policymakers and researchers in identifying areas for improvement and making informed decisions to enhance the education sector in Kazakhstan. Similarly, the negative trend in the number of hospital beds and hospital organizations in the Abay region during 2010-2020 could lead to reduced access to healthcare, an increased burden on remaining hospitals, and an outflow of qualified specialists from the region.

(c) In general, reducing the number of hospital beds and organizations in districts and towns of the Abay region can have serious consequences for medical care, the availability of qualified specialists and the quality of life of the residents of these places. Therefore, it is necessary to take measures to preserve and develop medical institutions in these districts and cities, as well as to attract qualified specialists to work in the medical sphere.

(d) The data on population dynamics, including migration, natural increase/decrease rates, and birth rates, could be useful for policymakers and researchers interested in understanding healthcare and demographic trends in the Abay region. Overall, this study highlights the importance of analyzing and understanding socio-demographic indicators in regional development planning to promote sustainable economic and social growth.

A limitation of this analysis pertains to the unavailability of data for the Aksuat district, which was separated from the Tarbagatai district. Consequently, separate calculations could not be performed for the statistically significant areas within the Aksuat district.

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RESEARCH ARTICLE

Analysis of Environmental Factors in the Development of the Regions of Kazakhstan

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EJEBS

Abstract

This paper examines theoretical, methodological and analytical studies to improve the environmental monitoring of air pollution and water resources, as well as to facilitate the collection of data for the determination of assessment indicators for future research work and reports on the environment. A literature review has shown the importance of understanding the impact of environmental issues such as air and water pollution on various aspects of human life and regional development. In the paper, it was decided to use methodological generalization and system analysis. The theoretical significance of this study is to generalize and expand classical and modern theories of sustainable development of regions, theoretical developments of domestic and foreign scientists in the field of environmental monitoring, and increasing the competitiveness and sustainability of regions in the context of globalization and Industry 4.0. Additionally, statistical data on strategic planning and reforms of the Republic of Kazakhstan 2005-2020 were used. Based on these results, it can be recommended that the neediness implement the priority of improving the welfare of society in regions with minimal environmental impact. To maintain the overall balance, prevent the depletion of natural resources, and reduce the generation of hazardous waste, it is essential to rationalize the production and consumption of energy. The study results can be used by international intergovernmental organizations, local, regional and republican government bodies, universities and colleges.

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1. INTRODUCTION

Kazakhstan has developed a predominant model for the use of natural resources, based on a raw material approach, which is accompanied by excessively high man-made environmental pressures. The problem of interconnection and economy in Kazakhstan is relevant since environmental factors are of great importance for the population's quality of life and the development of interregional relations on the electoral campaign of the development of a society based on the preferences of a broad public policy.

The issue of environmental impact on regional economic development is a question of various studies. Some studies emphasize the relation of environmental degradation to the decrease in the socio-economic indicators which affect the health state of the population (Russel et al., 2018; Makarova et al., 2023). Other studies underline the significance of the public sector interference in the question of environmental issues solution. Furthermore, countries with developed and rapidly developing industrial sectors such as coal, gas and oil mining; countries with high migration rates and increase in the number of populations show an increase in greenhouse gases emission (Wei et al., 2018; Leung et al., 2020; Almetwally et al., 2020; Dong et al., 2021)

The primary sources of negative environmental impact are emissions of pollution as a result of exposure to stationary sources, emissions of pollution of water bodies with wastewater, disposal of production and consumption waste, pollution of subsoil and soil, ionizing and other physical phenomena (Madon et al., 2019). In recent years, a tense situation has continued in Kazakhstan regarding the loss of metals, transportation, and consumption. This is a dangerous pollution of the environment and a real danger to public health. Environmental factors significantly impact people's lives, ranging from environmental pollution to access to clean water and safe food sources. It is essential to understand these factors and how they affect the population, as they have implications for public health, economic development and overall quality of life (Lioubimtseva & Henebry, 2009; Gomez et al., 2018; Balakrishnan et al., 2019; Dell'Angelo et al., 2018; Liu et al., 2019; de Mello et al., 2020; Seitz, 2021).

Air pollution is a serious environmental problem in many countries, including Kazakhstan. Industrial activities, transport and heating systems contribute to the high content of particulate matter and other pollutants in the air, which can have serious health consequences. For example, a study conducted in Almaty showed that air pollution is associated with an increased risk of respiratory diseases, cardiovascular diseases and premature death. Air pollution from harmful emissions and climate change severely affects health, the environment and regional development. This leads to increased mortality, morbidity and economic costs and worsens regions' stability and economic development. In Kazakhstan, industrial and transport emissions exacerbate air pollution, leading to significant economic losses and threats to air quality and the environment (Zhang et al., 2010; Perera, 2018; Glaeser & Kahn, 2010; Pan et al., 2018; Fratocchi et al., 2019; Assanov et al., 2020; Juginović et al., 2021).

The regulatory system for environmental protection in Kazakhstan appears ineffective, with small fines for pollution and economic constraints hindering compliance. As a result, many industrial enterprises operate with outdated equipment and inadequate purification systems. The enforcement mechanism could be more robust, characterized by interdepartmental rivalry, frequent government reorganizations, and corruption. Historical legacies, a lack of environmental expertise, and a low ecological education further contribute to the challenges. Additionally, public engagement is passive due to social instability, inflation, wealth decline, and unemployment, which have diminished the priority placed on environmental issues (Dahl & Kuralbayeva, 2001).

Summarizing, it can be noted that on the basis of the studied domestic and foreign scientific literature, there are different theoretical views on the importance of the effects of environmental

factors. At the same time, the consequences of economic development in the form of various kinds of pollution remained out of consideration, especially in Kazakhstan from the point of view of the regional approach. The purpose of this study is to assess the current state of the environment, consider the permissible changes and pressures on the environment in the regions and analyze the environmental problems of the regions of Kazakhstan.

2. LITERATURE REVIEW

Regional development is a complex process involving various social, economic and environmental factors. Among these factors, the environment plays a crucial role in shaping the trajectory of the region's development. Environmental factors, including access to water, air pollution and emissions of pollutants into the atmosphere, can be essential for regional development, sustainability and the general well-being of the population.

In some countries, environmental pollution has reached crisis levels. Some studies highlight increasing number of the population as the main indicator for air pollution, especially in Asian regions. They state that increase in the number of the population increases greenhouse gases emission. However, there must be done some remarks as to the industry type development in the country (Leung et al., 2020). Moreover, countries with increasing population and industrial development are characterized as at high risk of severe air pollution. For instance, China has faced severe air pollution due to its dependence on coal for energy production and a rapidly growing industrial sector (Wei et al., 2018). This has led to widespread public health concerns and calls for government action to address the problem. Similarly, in India, air pollution has become a serious public health crisis. Even more, Balakrishnan et al. (2019) stated that air pollution is in the second place as the indicator for highest death rates after suicide. In addition, it was estimated that about two million people in India died because of air pollution.

Kazakhstan's population and GDP have been growing steadily, but health indicators are lagging due to environmental degradation. The key issues include air and water pollution, radioactive contamination, the shrinking Aral Sea, climate change, and soil contamination. These issues must be urgently addressed to sustain development without harming public health. It is crucial to understand the impacts of each problem to allocate resources efficiently and effectively (Russel et al., 2018). This is necessary to achieve society's economic and social goals and requires large-scale measures to protect and sustainably use natural resources (Makarova et al., 2023).

Industrial emissions, vehicle emissions and other anthropogenic activities contribute to air pollution, which can have detrimental effects on human health, the environment and the economy. Exposure to air pollution is associated with respiratory and cardiovascular diseases, decreased labor productivity, increased healthcare costs and environmental degradation (Almetwally et al., 2020). Air pollution can also negatively affect the region's attractiveness for investment and tourism, affecting economic growth and regional development (Dong et al., 2021).

The quality of atmospheric air is another important environmental factor that can be affected by access to water in the regions (Zhang et al., 2010). Air pollution caused by emissions of pollutants into the atmosphere can have harmful consequences for human health, the environment and regional development. Studies have shown that air pollution is associated with increased mortality and morbidity, as well as higher healthcare costs (Juginović et al., 2021). The economic costs of air pollution in Europe are significant, including healthcare costs, reduced labor productivity, and damage to buildings and crops. Air pollution costs can burden regions, affecting their economic development and sustainability (Perera, 2018).

Emissions of pollutants into the atmospheric air can also affect regional development. Greenhouse gas emissions from various human activities contribute to climate change, which can affect, among other things, natural resources, agriculture and infrastructure (Glaeser & Kahn, 2010; Madon et al., 2019). The effects of climate change can exacerbate existing vulnerabilities

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and inequalities in the regions, leading to social, economic and environmental consequences. In addition, sources of air pollution, such as industrial and transport activities, may be spatially concentrated in certain regions, leading to environmental injustice and inequality (Pan et al., 2018; Fratocchi et al., 2019).

Access to water environmental factor affects regional development as well. Water resources are essential for agriculture, industry and human consumption, and water availability and quality can affect economic activity and social well-being in the region. Insufficient access to clean water can hinder agricultural production, industrial growth and human health, leading to a reduction in economic opportunities and social security (Dell'Angelo et al., 2018).

Gomez et al. (2018) underlined that access to safe drinking water is crucial for human health and development. Particularly in rural areas of developing countries people still lack access to drinking water. Moreover, socioeconomic factors play a role in improving water access, they include factors for water access in rural areas such as gross national income, women's education, agriculture's contribution to GDP, and rural population growth as determinants for water access in rural areas. Women's education is particularly important for increasing water access, especially in lower-middle and low-income countries. Investment alone is insufficient to improve water access, as shown by the lack of association between development assistance and water access. Understanding these factors can guide policymakers in making evidence-based decisions for improving water access (Gomez et al., 2018).

In addition, access to water in the regions and its quality can also influence regional development policies and strategies. Water availability and quality can be important factors when making decisions related, in particular, to land use, farming methods and infrastructure development. In addition, declining water quality and increasing water demand pose significant challenges globally. Land use and land cover patterns, particularly in urban and agricultural areas, significantly impact water quality. For example, regions with abundant water resources may prioritize agricultural or industrial development, while regions with water scarcity may focus on water conservation and management strategies. For instance, despite having abundant freshwater resources, Brazil faces water scarcity due to pollution from agricultural runoff, industrial effluents, and domestic sewage. The conversion of forested areas for agriculture and urbanization exacerbates water quality degradation (de Mello et al., 2020). Regional water policy may affect economic growth, social well-being and environmental sustainability especially in regions where there is given preference to agricultural industry development, rather that water conservation solutions development (Liu et al., 2019; Seitz, 2021).

Access to water in Kazakhstan, especially in rural areas, is a constant problem that many localities have not completely solved. The lack of reliable and safe drinking water sources in these regions can seriously affect public health, including an increased risk of water-borne diseases and other health risks, especially for vulnerable populations. Industrial and agricultural activities, as well as inadequate waste management methods, also contribute to water pollution in Kazakhstan, further affecting water quality and safety (Dahl & Kuralbayeva, 2001). In addition, the water supply in Kazakhstan is affected by regional differences with differences in access and quality of water supply in different regions. The northern regions generally have a better water supply infrastructure compared to other regions due to their proximity to water sources and a higher level of economic development. However, Kazakhstan's southern and eastern regions face more serious water supply problems due to the arid climate and limited access to water sources (Lioubimtseva & Henebry, 2009).

Air pollution is also a concern in Kazakhstan, as industrial and transport emissions exacerbate this problem. The economic costs associated with air pollution, including those related to health, premature mortality and loss of productivity, are estimated to be significant, reaching billions of dollars annually. Emissions of pollutants into the atmospheric air due to anthropogenic activities

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also threaten air quality, human health and the environment in Kazakhstan (Assanov et al., 2021).

Thus, access to water in the regions plays a significant role in the quality of life, the costs of pollutants in the atmospheric air, emissions of pollutants into the atmospheric air and regional development. Insufficient access to water resources can lead to health risks, increased economic costs and social upheavals. Poor air quality caused by emissions of pollutants into the atmosphere can also adversely affect human health, economic development and environmental sustainability. The effects of climate change and environmental injustices associated with air pollution may further exacerbate regional disparities. In addition, access to water resources and their quality can influence regional development policies and strategies.

This literature review highlights the importance of understanding the relationship between access to water in regions and its impact on various aspects of human life and regional development. It emphasizes the need for effective water management strategies, including policies promoting equal access to clean and safe water resources, air pollution mitigation and sustainable development practices. This literature review highlights the importance of understanding the relationship between access to water in regions and its impact on various aspects of human life and regional development. It emphasizes the need for effective water management strategies, including policies promoting equal access to clean and safe water resources, air pollution mitigation and sustainable development practices.

3. METHODOLOGY

The sustainable development of the regions of Kazakhstan is one of the priorities today, since dynamically developing and competitive regions represent a source of growth for the whole country, a support for the implementation of a national policy to reduce regional imbalances, promote a more balanced and sustainable development of the country. In order to enhance sustainable environmental management and support sustainable development, the UN has contributed to enhancing the capacity of scientists and government officials to reduce water-related risks; expand interaction and cooperation in weather and climate monitoring; increase the scale of climate-optimized agricultural technologies and approaches to sustainable land management; and data collection, related to sustainable management and monitoring of energy and water resources.

The UN supported the development of the project «Zhasyl Kazakhstan» (Green Kazakhstan), a section on adaptation to updated nationally determined contributions and legislative proposals to compensate for the loss of biodiversity and supported Kazakhstan in creating national systems of strategic environmental assessment (SEA) and environmental impact assessment (EIA) in accordance with the requirements for the introduction of a new Environmental the codex.708 civil servants were trained on the topic «Sustainable Recovery: Opportunities for a green, low-carbon and closed (multi-turn) economy after COVID-19» within the framework of the Partnership for Green Economy Action program (PAGE). The UN also supported the revision of the Green Economy Concept and the adoption of a Low-carbon Development Strategy until 2060.In addition, the UN has undertaken studies to identify policy options to support energy system productivity improvement and industrial decarbonization; analysis of the development of sustainable and clean energy; and analysis of national legislation and stakeholders in disaster risk reduction systems in Kazakhstan. In April 2021, the UN launched a five-year regional project «Reducing the vulnerability of the population in the Central Asian region from the breakthrough of glacial lakes (PLO) in the face of climate change», which aims to strengthen adaptation to climate change.

This research is considered from the standpoint of methodological generalization and system analysis. The methodological basis of the study was a generalization of classical and modern

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theories of sustainable development of regions, theoretical developments of domestic and foreign scientists in the field of environmental monitoring, and increasing the competitiveness and sustainability of regions in the context of Industry 4.0.

The dynamics of current costs for environmental protection in 2020 were analyzed by regions, and regions with low, medium and high current costs for environmental protection were identified. In accordance with the methodology of the Committee of the Bureau of National Statistics of the Republic of Kazakhstan MNE, environmental protection costs include investments in fixed assets aimed at environmental protection and rational use of natural resources, as well as current environmental protection costs. Unlike general costs, current costs are the costs of enterprises and organizations for carrying out activities, ensuring the current operation of technological processes and industries, as well as for the maintenance and operation of machinery and equipment that are designed and operate in order to prevent, reduce, clean (recycle) and /or elimination of contaminants (products).

The issue of water resources analysis in the national economy is currently reflected in a number of scientific studies (Dahl & Kuralbayeva, 2001; Lioubimtseva & Henebry, 2009; Assanov et al., 2022). It should be noted that today, in the national economy, certain methods and approaches to the analysis and assessment of water resources have been established. But none of these can be universally accepted for studying this process.

This study used statistical data on strategic planning and reforms of the Republic of Kazakhstan 2005-2020. This study presents statistical data from environmental statistics such as «The volume of current costs for environmental protection in the Republic of Kazakhstan for 2005-2020», «Emissions of pollutants into the atmosphere by regions from stationary sources in 2020», «Water supply of the Republic of Kazakhstan by regions for 2015-2020», «Provision of infrastructure for water resources of the Republic of Kazakhstan by regions for 2020».

4. FINDINGS AND DISCUSSION

The costs of economic entities aimed at protecting the environment in 2020 amounted to 384 billion tenge, respectively, 420.4 billion tenge in 2019. The total costs are formed from investments in fixed assets (173.6 billion tenge) and operating costs (210.4 billion tenge). A significant share of environmental costs (91.1%) is carried out by industrial enterprises.

Akmola (16.7%), Atyrau (11.4%), Pavlodar (10.5%) and East Kazakhstan (10.3%) regions are leading in the regional structure in terms of costs. The largest volume in the structure of total costs by types of environmental activities falls on activities in the field of renewable energy sources - 30.1%, protection of atmospheric air - 23%, and waste management - 19.1%.

Analyzing the dynamics of current cost indicators in 2020 by regions, certain regions with low, medium and high levels of current costs were identified (see Table 1).

TABLE 1. Indicators of current costs in 2020 by region

Low volume - 1-5 billion tenge	Average volume - 7-14 billion tenge	High volume - 25-40 billion tenge
1. Akmola	1. West Kazakhstan	1. Aktobe
2. Almaty	2. Kostanay	2. Atyrau
3. Zhambyl	3. Mangistau	3. Karaganda
4. Kyzylorda	4. Shymkent city	4. Pavlodar
5. North Kazakhstan		5. East Kazakhstan
6. Turkestan		
7. Astana city		
8. Almaty city		

In 2020, the largest amounts of money for environmental protection activities were spent in such regions as Aktobe, Atyrau, Karaganda, Pavlodar and East Kazakhstan. The average volume of expenses of enterprises on the environment was directed to the following regions: West Kazakhstan, Kostanay, Mangistau and Shymkent. The smallest volume in the structure of current costs was allocated in Akmola, Almaty, Zhambyl, Kyzylorda, North Kazakhstan, Turkestan, Astana and Almaty. In 2020, stationary sources of pollution emitted 2,441 thousand tons of pollutants into the air, which is 1.7% less than in 2019.

In the volume of current costs, material costs amounted to 77.5 billion tenge (36.9%), paid to other enterprises (organizations) for the provision of environmental services - 85.5 billion tenge (40.6%). The most priority areas in the total current costs are traditionally the following areas: air protection (34.7%), waste management (29.5%), wastewater treatment (26.2%). 73.3% of the total environmental protection costs are financed from the own funds of economic entities [12].

For the period 2005-2020 in general, in Kazakhstan, there is a positive trend in investment in environmental protection. Thus, the volume of current costs for environmental protection in Kazakhstan in 2015 amounted to 43,558,237.5 thousand tenge, compared to 2020 increased by 4.8 times to 210,397,122 thousand tenge (see Figure 1).
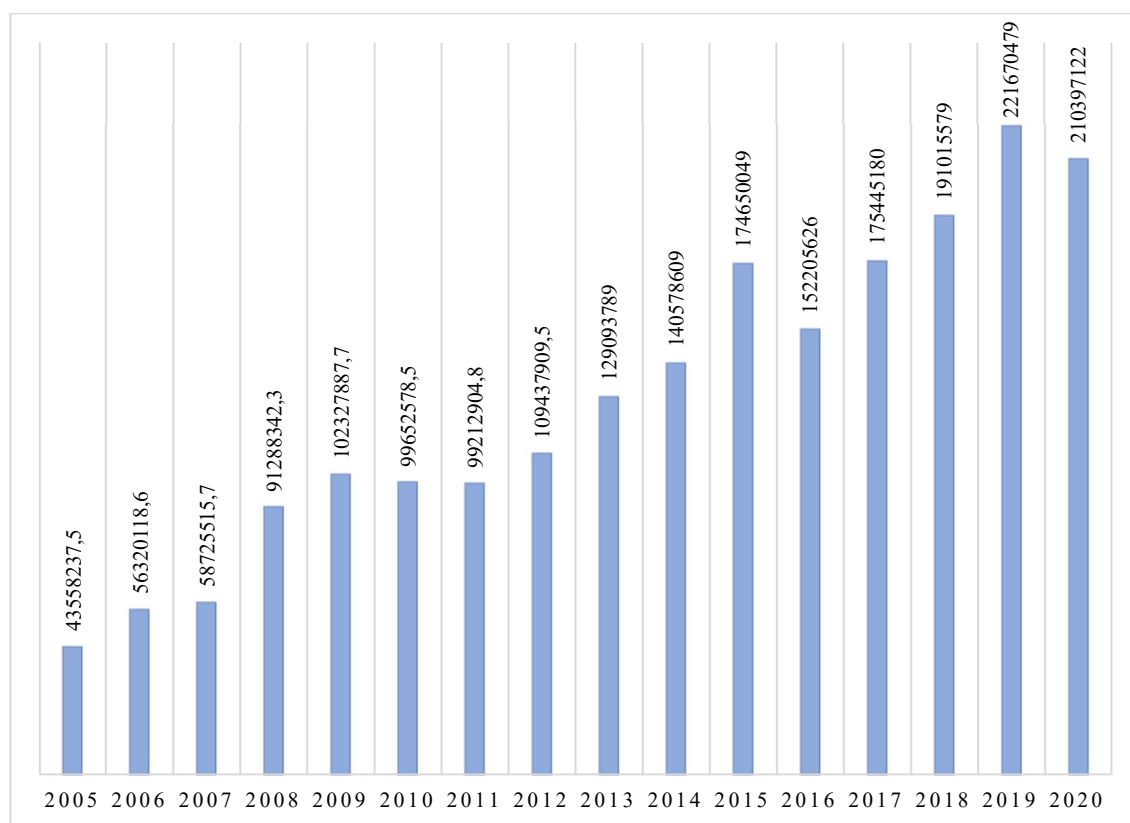

FIGURE 1. The volume of current costs for environmental protection in Kazakhstan for 2005-2020, thousand KZT

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The treatment facilities of stationary sources captured and neutralized 93.1% of the total volume of pollutants received (93.2% in 2019). The largest volumes of pollutant emissions fall on sulfur dioxide 868.1 thousand tons, carbon monoxide - 486.5 thousand tons and nitrogen oxides (in terms of NO_2) - 311.4 thousand tons. Of the total volume of pollutants emitted into the atmospheric air, 79.5% were gaseous and liquid substances, 20.5% - solid.

The main emissions of pollutants into the atmospheric air were carried out by industrial enterprises, which accounted for 86.6% of all emissions (85.8% in 2019). For example, Karaganda, Pavlodar - 627.7 and 723.0 thousand tons; West Kazakhstan, Almaty, Kyzylorda, Turkestan, Almaty, Shymkent - up to 50 thousand tons; Akmola, Aktobe, Atyrau, Kostanay, North Kazakhstan, East Kazakhstan - 50 thousand tons to 153.9 thousand tons.

Figure 2 presents emissions of pollutants into the atmosphere by region in 2020.
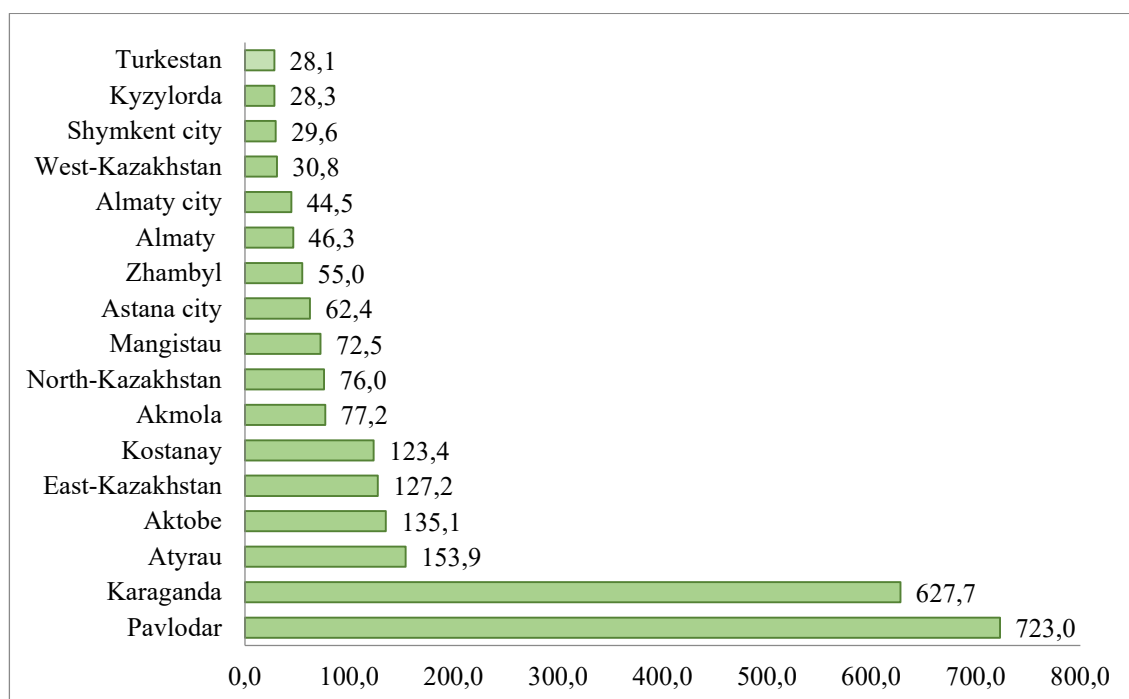
FIGURE 2. Emissions of pollutants into the atmosphere by regions from stationary sources in 2020, thousand tons

Note: compiled by authors

One of the most important aspects of this general challenge is the problem of providing the country's population with drinking water, which has not yet been fully resolved in many settlements. The problem is not new and to a certain extent has a historical character. But still, the issue was never set as a priority, which, of course, affected the health and life expectancy of the population.

According to the average indicator per capita of Kazakhstan, the republic cannot be classified as a country with an acute shortage of water resources. But, the uneven distribution of water sources throughout the country, as well as their irrational use, depreciation of the infrastructure of water resources significantly complicate the solution of problems of providing the population and the economic complex with water.

Due to the geographical location of Kazakhstan, the flows of 7 out of 8 river basins are formed in neighboring states (PRC, Central Asian countries, Russia) and are of a transboundary nature.

Given that 44% of the water fund is replenished from external sources, the issue of transboundary cooperation in the context of water security in Kazakhstan is very important and requires a strategic and integrated approach.

In accordance with international approaches, one of the most important criteria for the physical availability of food is the availability of drinking water. As of January 1, 2019, the problem of access to drinking water in rural areas has not been fully resolved. According to the information of local executive bodies (hereinafter - LEBs), 3461 rural settlements with a total population of 6.2 million people or 51.5% of the entire rural population of Kazakhstan are provided with access to centralized water supply. 61 settlements use imported water, 3,099 settlements have a decentralized water supply system. Access to centralized water supply in cities is 87%.

More detailed information on water supply is provided in Table 2.

TABLE 2. Water supply of Kazakhstan by regions for 2015-2020, thousand cubic meters

Region	2015	2016	2017	2018	2019	2020
Kazakhstan	22 852	24 623	25 279	25 096	25 104	27 752
Akmola	57	54	71	58	55	56
Aktobe	327	442	731	270	222	232
Almaty	3 473	3 181	3 259	3 656	3 342	3 350
Atyrau	272	279	279	272	288	290
West Kazakhstan	420	595	715	633	287	295
Zhambyl	1 805	1 338	2 287	1 587	1 603	1 650
Karaganda	1 812	1 672	1 449	1 477	1 625	1 700
Kostanay	135	134	123	119	120	122
Kyzylorda	5 030	4 786	5 197	5 062	5 305	5 350
Mangistau	1 216	1 295	1 225	1 357	1 475	1 400
Pavlodar	3 136	3 116	3 253	3 273	3045	3 005
North Kazakhstan	61	61	198	181	258	255
Turkestan	5 886	5 885	5 880	5 645	5 986	6 070
East Kazakhstan	644	643	694	678	665	660
Astana city	100	98	103	104	108	102
Almaty city	239	245	238	248	258	255
Shymkent city	-	-	-	238	231	230
Note: compiled by authors						

In normal climatic years, water bodies do not cause any particular problems for the life of the population and the economy of the country. In extreme years or years close to them, according to the conditions of formation of water flow, even watercourses that completely dry up in summer carry a threat of emergency situations.

In Kazakhstan, there are 1,732 hydraulic structures with different departmental affiliation and form of ownership, which can potentially be sources of emergency situations. The city of Almaty is not 100% provided with water, although the city of republican significance, the situation is the same as the city of Astana. The main problem in the water supply is the shortage of specialists.

The range of connections to the sewerage infrastructure in cities is very wide - from 12% in the city of Ayagoz to 98% in the city of Satpayev. In the regional centers and cities of Astana and Almaty, 60-94% of the population is connected to sewerage systems. Many industrial cities, such as Ridder, Zyryanovsk, Karatau, Satpayev, Zhezkazgan, Zhanatas, have a high level of connections to the sewerage system - more than 90%.

More detailed information of provision of infrastructure for water resources is provided in Table 3.

TABLE 3. Provision of infrastructure for water resources of Kazakhstan by region in 2020

Region	Number of enterprises (units)	Waterpipelines, total (km)	Sewerage, total (km)	Number of pumping stations (units)	Volume of supplied and treated water (thousand cubic meters)	PWater consumption and average daily water supply (thousand cubic meters)	Design capacity of pumping stations, (thousand cubic meters) per day
Kazakhstan	865	83 909,7	16 593,0	32 669,0	1 546 104,7	937 990,8	8 365,7
Akmola	89	5 904,2	1 058,1	810,9	37 901,9	2 127,5	422,1
Aktobe	42	5 017,2	936,1	1 129,4	48 788,0	12 736,9	889,6
Almaty	96	6 924,6	1 463,3	1 177,0	43 231,7	2 340,3	318,4
Atyrau	25	4 212,2	415,7	2 326,8	59 270,9	3 267,9	43,6
West Kazakhstan	42	4 074,4	423,0	238,5	33 792,2	11 126,2	585,7
Zhambyl	17	2 631,0	489,5	1 031,8	37 772,2	1 023,7	138,7
Karaganda	117	7 505,5	2 548,2	8 839,4	428 389,6	238 562,9	1 749,8
Kostanay	34	4 144,1	1 185,2	1 388,0	55 754,0	2 395,6	697,5
Kyzylorda	15	6 318,2	499,3	752,4	26 100,9	2 469,6	92,4
Mangistau	23	2 605,9	546,6	152,8	56 260,0	760,3	196,8
Pavlodar	160	3 200,5	1 047,4	3 291,8	135 563,8	14 627,8	886,3
North Kazakhstan	52	5 015,9	469,3	891,0	32 999,9	5 529,2	366,2
Turkestan	39	12 056,2	424,5	653,2	47 723,7	258,0	55,3
East Kazakhstan	82	5 191,8	1 572,7	2 707,4	189 137,2	633 705,8	1 264,9
Astana city	1	1 377,4	862,6	1 042,8	102 140,0	5 114,0	387,4
Almaty city	25	3 676,3	1 769,1	5 779,3	154 587,6	1 941,5	70,9
Shymkent city	6	4 054,4	882,5	456,5	56 691,3	1 654,9	200,2
Note: compiled by the authors							

In 39 cities and towns, there are no treatment facilities at all, respectively, wastewater is discharged without treatment, it is discharged directly to filtration fields, as in the city of Taraz, to storage tanks in the cities of Kokshetau, Uralsk, Petropavlovsk, Kostanay.

Many existing treatment facilities have already exhausted their operational resources and require repair, others are operating with overload, which leads to a mismatch between wastewater treatment technology and design data.

So, in the cities of such regions as Kyzylorda, Mangystau, North Kazakhstan, East Kazakhstan, the percentage of insufficiently purified water is from 39 to 72%. Also, a consequence of the depreciation of fixed assets of sewerage networks is a high level of accidents, so in 2019 the accident rate of sewerage networks on average in the republic ranged from 0.2 to 29.5 accidents per 1 kilometer.

Basically, water supply networks were put into operation 25 - 40 years ago and have an unprotected inner surface (mainly steel and cast-iron pipes). Therefore, due to the ongoing corrosion, water conduits and water networks are subject to rapid wear and overgrowth, which leads to a decrease in the throughput of water pipes, an increase in the number of accidents, water losses and a deterioration in the quality of drinking water. In general, the depreciation of fixed assets of sewerage systems in most settlements of the republic is 40-70%, and in some, it reaches 100%.

In the medium term, the population of Kazakhstan is projected to grow to 20.8 million people, which will lead to an increase in water consumption by 35%, while the share of the urban population will increase from the current 53% to 73% due to the formation of agglomeration centers based on the largest cities Kazakhstan - Astana, Almaty and Shymkent with a population of at least two million people, as well as Aktobe and Aktau, which have a high proportion of the working population and where small and medium-sized businesses are most actively developing. As the country develops, other large cities of Kazakhstan may become agglomeration centers, which will require the construction of a new water management infrastructure to meet the needs of the growing population of agglomerations in water supply and sanitation systems.

5. CONCLUSIONS

This study examined assessing the current state of the environment, considering the permissible changes and pressures on the environment in the regions, and analyzing the environmental problems of the regions of Kazakhstan. As a result of this study, several important conclusions were made. Certain regions with low, medium and high levels of current costs for environmental protection were identified. As a result of the analysis of statistical indicators, regions were identified that need to be reduced emissions of pollutants into the atmosphere from stationary sources.

In general, the results of the study demonstrate the deterioration of the environmental situation in the regions of Kazakhstan. As a result of the activities of industrial enterprises, and factories, the intensification of agriculture, and the overpopulation of large cities, a large amount of garbage is generated, and emissions of harmful substances enter the atmosphere and water bodies. It has been determined that cities of republican significance, such as Almaty and Astana, are not 100% provided with water infrastructures. The main problem is the lack of professional water supply specialists. It was revealed that in 39 cities and towns, there are no treatment facilities at all, and associated wastewater is discharged without treatment. However, a rational approach to environmental management at the national level has not yet been fully presented, which would help to significantly reduce environmental pollution from industrial and economic human activities. Therefore, it seems very important to carry out strategic reforms and expand international cooperation in order to reduce environmental risks and deficits and to create reserves in economic and ecological systems.

At the present stage, the existing distribution and processes of population movement in the regions do not always contribute to solving the problems of economic development, improving the level and quality of life of the population, and maintaining a favorable environmental situation. Therefore, it is proposed to increase the potential for a balanced and rational use of the territories of the regions of Kazakhstan. There are also gaps in state regulation, in the field of ecology, soviet regulatory documents are still used, which do not provide an objective assessment of the quality of the environment in the design of activities. Also, in the regulatory legal acts and in the procedures for allocating a land plot for the placement of a production facility, the presence of a positive conclusion of the state environmental review is not considered. Local executive bodies allocate land plots regardless of the presence or absence of a positive conclusion of the state environmental expertise, and local akimats do not implement state environmental policy.

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The main condition for the proposed measures to be effective is to improve environmental legislation as a whole and to introduce environmental standards into all other legislation, i.e.it is not possible to green the economy and society without greening legislation.

The subject of further research is a comprehensive study of economic and social processes and their impact on the ecological situation in the regions, the development on this basis of practical grounds and mechanisms for the sustainable development of the regions of Kazakhstan.

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Industrial Policy in the EAEU Countries: Challenges and Solutions for Kazakhstan in the Competition and Intellectual Property Law

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Abstract
The paper describes and examines the industrial policies of the Eurasian Economic Union member states. It shows the need to adjust the traditional type of industrial policy of the Eurasian Economic Union countries, which relies on leading industries. The purpose of this article is to identify the main challenges for the industrial policy in Kazakhstan, taking into account its participation in the EAEU and the risks associated with distortion of competition as a result of hostile mergers and acquisitions, and to propose solutions intended to ensure a balance between competition protection and industrial policy. The paper's objectives are to review the problems arising at the intersection of trade, innovation, and intellectual property in the EAEU countries and to develop recommendations for industrial and innovation policy. The article considers two main issues in accordance with the purpose: the industrial policy problems in the EAEU countries; the use of intellectual property and competition law for the development and protection of innovations. It is shown that the industrial policy of Kazakhstan and other EAEU countries remains insufficiently effective and has a contradictory nature. Since 2000, the economic complexity index decreased in most EAEU countries, the intensity of industrialization remained low, and the share of medium and high-tech manufacturing diminished. There is a need to adjust the traditional type of industrial policy, to exclude selective advantages to specific firms, to focus on industry-wide industrial policy, the insufficient experience of EAEU member states in counteracting hostile and murderous takeovers, the complexity of innovation development system, protection of competition within the integration.

Keywords: Industrial Policy, Competition, Intellectual Property, Innovation, Killer Acquisitions, Kazakhstan, Eurasian Economic Union

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EJEBS

1. INTRODUCTION

Economic development priorities in Kazakhstan have been industrialization, innovation, and diversification over the past twenty years, i.e. since 2003. Four industrial programs were developed during this period. They contained the main elements, mechanisms, and tools of industrial and innovation policy, and a special law was adopted at the end of 2021. Since 2010 Kazakhstan, as a participant in the Eurasian integration project and other international agreements, has been adapting its economic, including industrial, policy subject to the implementation of the economic interests of Kazakhstan.

Competition conditions change significantly with removing barriers to moving goods, capital and labor. In countries with a relatively immature market economy, low technological level, high corruption level, high concentration of economic power in the hands of industrial and financial groups, and a strong influence of foreign capital, attention should be paid to conditions that ensure fair competition and technological progress.

However, the development of innovations often has the potential to negate or displace previous innovations and innovators, creating preconditions opposing innovations in one way or another. "The best is the enemy of the good" formula describes the complex innovation development process. As more and more options for future technological change emerge, the risks for incumbent technology leaders increase who may both act as drivers of alternative technologies or disruptive innovations and drag on their emergence through acquisitions and mergers. This problem has not yet received sufficient attention in Kazakhstan and the EAEU countries.

The purpose of this article is to identify the main challenges for the industrial policy in Kazakhstan, based on the participation in the EAEU and the risks associated with distortion of competition as a result of hostile mergers and acquisitions, and to propose solutions intended to ensure a balance between competition protection and industrial policy. The paper's objectives are to review the problems arising at the intersection of trade, innovation, and intellectual property in the EAEU countries and to develop recommendations for industrial and innovation policy. The article considers two main issues following the purpose: the industrial policy problems in the EAEU countries, the use of intellectual property and competition law for the development and protection of innovations.

2. LITERATURE REVIEW

To date, the role of pro-industrial policy and competition has been debated. Cheng (2020) notes two points of view. According to the opponents, industrial policy is the antithesis of competition policy, just as the emergence of state-created cartels in Japan and Korea is contrary to competition. According to defenders, industrial policy has lifted several Asian countries from poverty and turned them into technological leaders.

One of the priorities in the European Union is technological sovereignty based on the use of industrial and competition policy. Aghion and Williamson (1998), Aghion et al. (2015) and Petropoulos (2019) believe that industrial and competition policies should be complementary. The industrial policy acts as a means to compensate for competitive imperfections, remove restrictions, and motivate investments. It is required to avoid selective advantages to specific firms and national champions but to focus on industry-wide industrial policy and corporate transparency.

The main goal of competition policy is to prevent competition distortion and protect consumer welfare. Distortion of competition occurs primarily through hostile takeovers. Liekefett (2020) notes that this activity increased after market downturns, such as the financial crisis of 2008 and the downturn during the COVID-19 pandemic.

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Letina et al. (2021) noted that competition authorities only consider mergers if they significantly increase market share. However, this approach needs to be revised, as it can eliminate potential competitors and competing innovations (Madl, 2020). In 2017, digital giants - Microsoft, Google, Apple, Amazon, and Facebook acquired startups for US$31.6 billion. Google alone acquired one firm per month between 2001 and 2020. Anti-competitive motives, contrary to the legislation on intellectual property and monopolies, may be among the reasons for these acquisitions. The practice of hostile takeovers was widespread in the post-Soviet area. The main stages, forms and consequences of these practices for the population, enterprises and territories are considered in detail (Yegorov & Shkola, 2018).

3. METHODOLOGY

A generally accepted set of methods intended for economic and legal study is used in this article taking into account the specifics of the study object and subject.

The primary study sources are the internal legislation of the EAEU countries and the legal framework of the EAEU, data from the Bureau of National Statistics, Statistics of the EAEU, and the World Bank.

In general, the study process implemented in the article is a secondary study. Secondary study, also known as desk study, is the process intended to review and assess the existing literature and studies under the chosen topic.

The descriptive statistics method is main in social and economic study and enables to get an idea of the state of countries, industries, processes in different time periods based on a comparison of certain statistical indicators. The dynamics of indicators describing the quality of industrialization in the EAEU countries in comparison with the countries of the European Union is considered in this study based on this method.

The comparative analysis method is widely used both in the field of economic and legal study, especially when it comes to the study of international economic relations, the harmonization of legal norms in integration associations, the assessment of the quality of process changes in temporal dynamics, and the adaptation of best practices. The essence of the comparative analysis method is to compare different theoretical and institutional approaches, results processes (Wilson, 2007). This method is used in this article to compare approaches and tools in the field of industrial policy of Kazakhstan and competition policy with the principles of best practices which made it possible to identify contradictions between the implemented industrial policy and competition policy.

The doctrinal or "black letter" method is a method intended to assess legal norms and to make recommendations for their further development (Wilson, 2007). This method is applied to the analysis of the domestic legislation in the EAEU countries and the EAEU legal framework. Problem areas are identified based on it, the solutions are proposed to overcome the risks for innovative and industrial development caused by violations in the field of competition and the prevention of the practice of murderous takeovers and acquisitions.

4. RESULTS AND DISCUSSION

Industrial policies of the Kazakhstan and EAEU countries

The industry is essential in the Eurasian Economic Union (EAEU) economies. The foundations of industrial policy in the EAEU countries are contained in several documents (long-term, medium-term, sectoral and intersectoral). Unlike national ones, the industrial policy within the Union is formed by the main areas of industrial cooperation. The EAEU industrial policy aims to collaborate and remove obstacles to creating a common market of industrial goods and services (Presnyakova, 2020). However, scientific, technological, and industrial cooperation and mutual

trade remain low (Kasatkin et al., 2021; Kostyunina, 2021). The main stages and tools of its implementation are shown in Table 1.

TABLE 1. Main stages of industrial cooperation in the EAEU

Year	Solutions
2013	19 priority sectors for cooperation (Decision of the SEEC No. 40 dated May 31, 2013)
2014	Legal and regulatory framework for industrial policy in the EAEU (Article 92 of the Treaty on the EAEU dated May 29, 2014)
2015	The main directions of industrial cooperation (Decision of the Intergovernmental Council No. 9 of September 8, 2015)
2016	Industrial cooperation tools: - Eurasian technology platforms (ETP). - Eurasian network of industrial cooperation and subcontracting. - Financing of cooperation projects with integration potential. - Eurasian engineering center for machine tool building.
2017	Implementation tools for joint projects: - Interstate programs and projects in industry; - Eurasian Technology Transfer Network.
2018 – 2020	Implementation of joint projects of the EAEU countries. Digital transformation of industry. Formation of a single digital industrial space of the EAEU
Note: Compiled by authors	

Some aspects of the Eurasian integration development influence the technological development of the EAEU countries. One is the spatial aspect, usually considered through characteristics such as quality, differentiation, heterogeneity, asymmetries, and inequality. Peculiarities of non-equilibrium both between the subjects (Russia's dominance) and within the issues of Eurasian integration (regional inequality, confinement of benefits of mutual trade and migration to large cities) are pointed out by (Khusainov et al., 2015; Pakholkin, 2018; Vardomskiy, 2021).

Member states independently develop, form, and implement national industrial policies according to the EAEU Treaty. Almost all EAEU member states focus primarily on traditional industries in their industrial policies.

The manufacturing share in global GDP in 2021 was 16.6%, and manufacturing remains an essential source of employment, growth in living standards, and a driver of innovation. The share of manufacturing in EAEU countries remains lower than, for example, in the European Union (EU), except for Belarus. The EAEU countries are significantly behind the EU countries in such parameters as value added per person employed in agriculture, industry, and manufacturing exports. Since 2000, all countries, except for Belarus, have seen a decline in the Economic Complexity Index (ECI), indicating the industrial policy's poor performance. Moreover, Kazakhstan's index values are negative throughout the period and have continued to decline. All these data suggest the contradictory nature of the industrial policy in the EAEU countries and Kazakhstan, among others.

The medium and high-tech manufacturing share decreased, except for Kazakhstan (see Table 2).

Kazakhstan. Since 2003, industrial policy in Kazakhstan has been implemented through industrial and innovative development strategies and programs. It should be noted that diversification, competitiveness, and departure from the raw material model remain the keywords in the industrial policy objectives at all stages. At the end of 2021, Kazakhstan adopted the Law on an industrial policy that defines the goals, objectives, principles, and main conditions for

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industrial development, including state regulation and incentives, industrial infrastructure, promotion to sales markets, and systematic methods of industrial action.

It is possible to note the creation of such objects of innovative infrastructure, such as technoparks, business incubators, special economic zones, etc., as a positive result of industrial programs. At the same time, the main results of the programs are still connected with traditional industries.

The implementation of state industrial programs shows that no clear parameters to assess the quality and dynamics of industrial modernization have been developed until the present.

TABLE 2. Industry in the EAEU end EU in 2000-2021 years

| Country | EAEU | | | | | | | | | | European Union | |
| | Armenia | | Belarus | | Kazakhstan | | Kyrgyzstan | | Russia | | | |
Years/ Indicator	2000	2021	2000	2021	2000	2021	2000	2021	2000	2021	2000	2021
Agriculture, forestry, and fishing, value added (% of GDP)	..	11,1	12,1	6,8	8,1	5,1	34,2	14,7	5,8	3,7	2,2	1,8
Agriculture, forestry, and fishing, value added per worker (constant 2015 US$)	1555	6135	3156	7250	2034	7643	674	2246	4040	14201	12458	25476
Industry (including construction), value added (% of GDP)	..	26,6	33,5	32,2	37,8	35,3	29,2	26,7	33,9	33,2	25,4	22,8
Industry (including construction), value added per worker (constant 2015 US$)	7121	13291	4897	13444	19890	37855	5178	3727	13244	23639	51584	66449
Manufacturing, value added (% of GDP)	..	11,4	27,0	22,9	16,5	13,6	18,1	13,5	..	14,4	17,5	14,7
Manufactures exports (% of merchandise exports),	41,2	22,7	65,1	38,4	0,15	16,1	18,2	38,9	24,1	22,1	79,0	77,1
Medium and high-tech manufacturing value added (% manufacturing value added) (2020 y)	9,5	8,2	42,0	41,2	5,1	16,9	5,9	2,2	32,7	25,8	..	..
Medium and high-tech exports (% manufactured exports) (2020 y)	27,5	15,2	45,2	41,5	1,9	37,8	45,3	17,6	36,2	27,5	..	..
Research and development	0,19	0,21	0,72	0,55	0,18	0,13	0,16	0,09	1,05	1,10	1,76	2,32

expenditure (% of GDP)												
Economic Complexity Index (ECI)	0,60	-0,24	0,73	0,83	-0,17	-0,33	0,22	0,16	0,77	0,2	..	..
Note: compiled by authors												

Industrialization in Kazakhstan is performed within the traditional models and traditional specialization and does not contribute to the formation of new growth industries. Most projects have little to do with creating a new type of industry in Kazakhstan. Projects in traditional capital-intensive industries - oil refining, chemical industry, mining, and metallurgical complex prevail in the regional business support maps. These industries account for 21% of all projects. Over half of the projects (52%) were implemented in the construction industry and agriculture. Creating selective competitive advantages for specific projects and firms (corporate leaders, major exporters) is important in industrial policy. The tasks intended to protect competition, consumer welfare, and corporate transparency are practically not discussed.

Temirkhanov (2020) expresses the opinion that the fundamental approaches to an industrial policy implemented in Kazakhstan differ from the best world practice and have changed from program to program in the direction of deterioration. Thus, one of the vulnerable issues in industrial policy remains the possibility of competition distortion. The policy's emphasis has shifted from measures intended to create favourable conditions and support entrepreneurship to implementing major investment projects (see Table 3).

TABLE 3. The content of the industrial policy of Kazakhstan

Titlte	Goal	Directions and methods of implementation
Strategy for industrial and innovative development 2003-2015	Sustainable development, economic diversification, shift away from raw materials	Stimulating the competitiveness of enterprises. Creation of globally sustainable Kazakh corporations. Corporate leaders. Favorable business climate and development of SMEs. State holdings. Development institutions. Infrastructure. Government orders.
State Program of Accelerated Industrial and Innovative Development 2010-2014	Diversification, increasing the competitiveness of the manufacturing industry	Corporate leaders. Large investment projects. Selective measures to support specific sectors of the economy and projects. National Fund. National Welfare Fund "Samruk-Kazyna". Development institutions.
State program of industrial and innovative development 2015-2019	Balanced and sustainable growth, diversification of the economy, increasing its competitiveness	Major industry-forming and infrastructure projects. Systemic measures to support the manufacturing sector. Targeted support for investment projects in the manufacturing sector. Shifting emphasis to support competitive enterprises. Reorientation of budget expenditures towards system-wide measures.
State program of industrial and innovative development 2020-2025.	Competitive manufacturing industry in the domestic and foreign markets	Focus on stimulating efficient enterprises. Acceleration of Kazakh companies. Financing of trade transactions. Direct measures to stimulate target groups of enterprises - "New industrial players", "Strong rear" and "Growth drivers".

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On industrial policy. Law of the Republic of Kazakhstan dated December 27, 2021 No. 86-VII LRK	Sustainable development of the manufacturing industry, competitiveness, high-tech exports, moving away from the raw material model	Financing and co-financing of projects. Leasing. Guarantees and guarantees for loans. Lending. Subsidizing the interest rate on loans. Investments in authorized capital. Engineering and communication infrastructure.
Note: compiled by authors		

One example is the Entrepreneurship Support Card breakthrough project launch – a bread production enterprise named "Ulytay Nan" LLP in 2018. 100% of the enterprise shares were acquired by "Kazakhmys" group to implement the state program on social responsibility of business in 2019. In 2022, the growth of bread prices in Kazakhstan averaged 19%, while the highest price increase was noted in the Ulytau region, where it was 48%. The availability of a new competitor in the market should have improved the consumers' position by offering a more comprehensive range of products and better quality, following the logic of the best practices of industrial policy. In this case, we do not have complete information about the fate of other manufacturers operating in this market before the new player. Did it result in their displacement from the market, bankruptcy, or redistribution of market share? Nevertheless, this significant increase in prices could indicate the shortcomings of industrial projects. These issues should have been the subject of the competition authorities' attention. These industrial and competition policy effects do little to serve the consumers' interests and competitiveness. Distortion of competition can also have far-reaching adverse consequences on innovative development, which will be discussed in the next section.

Armenia. The industrial policy of Armenia is contained in several normative legal acts, the main of which is the Law "On industrial policy". Like other EAEU countries, Armenia is trying to pay more attention to developing innovative industries. In Armenia, the IT sector has become one of the main drivers of economic development. Many IT companies operate in the country, some of which work on the principles of outsourcing (Glinkina, 2017). Since Armenia acceded to the EAEU in 2015, its industrial production has grown (EEC, 2018).

Belarus. The industrial policy of Belarus is regulated by several normative legal acts and National Strategy for Sustainable Development for the Period to 2035. Most of the industrial products of Belarus are exported to Russia and other EAEU member states. Belarus focuses on such innovative industries as information technology, energy, biotechnology, ecology, mechanical engineering, agro-industrial technologies, etc. The country plans to develop critical competencies in science and technology that are important for ensuring the competitiveness of the national economy. Innovative industrial clusters and technological platforms will be formed with the participation of scientific and educational institutions.

Kyrgyzstan. The main document regulating the industrial policy of Kyrgyzstan is the Decree On approval of the strategy for sustainable industrial development for 2019-2023. The new industrial approach of Kyrgyzstan also focuses on the development of the manufacturing industry. The predominant sectors of the manufacturing industry in Kyrgyzstan are metallurgy, food production, building materials industry, and textile and clothing production. After Kyrgyzstan joined the EAEU in 2015, the country's industrial production volume has grown. (EEC, 2018) The leading exporters of Kyrgyz products are the EAEU member states.

Russia. Russia has the most extensive industry among the EAEU member states. The industrial policy of Russia is contained in several legal acts, the main of which is the Federal Law "On Industrial Policy". The new industrial policy of Russia is aimed at overcoming the dependence on exporting raw materials and improving the quality of economic growth. At the same time, Russia, like other EAEU countries, strives for innovative economic development. Russia focuses on creative industries such as space, information technology, ecology, and energy.

The state programs of EAEU countries governing industrial policy are similar in terms of goals, objectives, mechanisms of state industrial policy implementation, etc. However, there are fewer similarities than differences. It creates specific problems. For example, Belarus leads among the most EAEU countries in innovation development, while the industrial policy in Kyrgyzstan contains few provisions for innovation development. The UN Economic Commission for Europe report identifies problems in the innovation sphere of Kyrgyzstan. They include a need for more incentives and political support for innovation, low demand for innovation, and high levels of labor migration (UNECE, 2019). At the same time, similar sectoral priorities hinder the formation of a common internal market, given the specialization of the member states of the Union.

Modernization of Competition and Intellectual Property Law in the Republic of Kazakhstan.

The competition for leadership based on innovation and technology has become increasingly intense and complex. Like other EAEU countries, Kazakhstan has been striving for many years to create an effective innovation development system. However, a significant part of innovations, as we know, "does not overcome the valley of death" and does not reach the market, including as a result of insufficiently effective competition and intellectual property protection systems.

Since 2015, the main direction of competition policy in the Republic of Kazakhstan has been bringing legislation in the field of competition protection in line with the standards of the Organization for Economic Cooperation and Development (further - OECD). As a result, 77 economic, administrative and other barriers were identified in 52 laws of the Republic of Kazakhstan (MNE RK, 2019). These barriers limited the entry of new players into commodity markets. In 2017, the first cartel investigation in the pharmaceutical industry was carried out in Kazakhstan (MNE RK, 2019, APDC, 2019). The antimonopoly body of the Republic of Kazakhstan revealed that when SK-Pharmacy LLP procured services for the storage and transportation of medicines within the guaranteed volume of free medical care, several market entities entered into a preliminary agreement on the participation of one of the cartel representatives in procurement and subsequent equal distribution of the income received among the rest of the parties to the contract. As a result, about 500 million tenge was recovered (administrative fine and monopoly payment). The pharmaceutical market in Kazakhstan is small. Therefore, the antimonopoly body of the Republic of Kazakhstan has not investigated many cases in this area. However, if Kazakhstan focuses on developing the pharmaceutical industry, the country will face specific problems.

The anti-competitive nature of such transactions is explicit. They hinder the innovative development of industries, strengthen the positions of dominant companies, increase economic concentration in the market and make it difficult for new independent players to enter the market. Today, the provisions on the "killer acquisitions" are not contained in the legislation of any of the EAEU countries, including Russia.

New companies play an essential role in competitive markets. They are the source of new ideas. However, such firms can be vulnerable. In some cases, purchasing a new company leads to losing the product and participating in a competitive market. According to (Cunningham et al., 2021), 5.3-7.4% of new acquisitions in the US pharmaceutical industry are "killer acquisitions". According to statistics in the pharmaceutical sector, 6% of all new business acquisitions are murderous. About 50 "killer acquisitions" are made annually (Pike, 2020).

"Killer acquisitions" is when incumbent players acquire new companies and stop developing their products. "Killer acquisition" is a deal that eliminates a competitor. Such practices are most often observed in such sectors of the economy as information technology, pharmaceuticals, bioengineering and agricultural technology.

"Killer acquisitions" can become dangerous for the innovative development of the Republic of Kazakhstan. There is a risk that in this case, the country will be unable to implement either

R&D outsourcing or other forms of integration into the global technological space because the "killer acquisition" of one of the companies can occur at any moment. Therefore, Kazakhstan must start improving legislation related to "killer acquisitions" soon.

Yegorov and Shkola (2018) noted that the practice of hostile takeovers increases the danger and negative consequences of this phenomenon in developing integration processes. The authors draw attention to the insufficient experience of EAEU member states in counteracting hostile and murderous takeovers even within one state, noting that the export of raiding abroad accompanied the development of economic integration processes in the post-Soviet space. Thus, within the Union State, there were takeovers in Belarus with the ultimate goal of disrupting the activities of enterprises that had markets in Russia and competed with Russian enterprises.

Abdikanova (2016) notes the importance of legal regulation and intellectual property protection in the conditions of integration and accession to the world (WTO, etc.) at the national and international levels.

For Kazakhstan and the EAEU, the European Union's experience in introducing uniform legal norms, principles and control mechanisms for aggressive mergers and acquisitions seems useful, leaving the issues of regulation and responsibility for each country.

There are several possible solutions to this problem. One solution to this problem is to investigate new firm acquisitions thoroughly. Enhanced acquisition verification minimizes the risk of violation by law enforcement. Merging parties will be subject to more detailed requests for information and may need to provide more evidence to refute fears of potential anti-competitive consequences. However, to begin to investigate, the Agency for Protection and Development competition needs to find out about acquiring new firms.

The Republic of Kazakhstan can follow the example of Germany. In 2017, Germany amended the Act Against Restraints of Competition, which obliges companies to notify the Agency about the merger (OECD, 2020). This Act sets the size of the transaction threshold. In addition to Germany, such a law exists in several countries worldwide. Kazakhstan can also introduce such a norm into its legislation. It will help the Agency for Protection and Development competition out about acquiring new firms and initiating an investigation.

Another way to solve this problem is to allow the Agency for Protection and Development to conduct investigations after the acquisition. The legislation of the Republic of Kazakhstan must establish a period after the purchase during which the Agency will be able to investigate. In this investigation, the Agency for Protection and Development will determine whether the acquisition was a "killer acquisition" or not.

For almost 30 years of the independence of the Republic of Kazakhstan, a lot of work has been done in the country to improve legislation in the field of intellectual property. However, although Kazakhstan's ruling in the field of legal protection and intellectual property protection meets basic international requirements, several issues need to be resolved.

One of the gaps in the intellectual property rights of the Kazakhstan is the absence of a law on technology transfer. Among the EAEU countries, such laws exist in the Russian Federation and the Republic of Belarus. The presence of these laws contributes to a more active innovative development of these countries, in contrast to countries with no such laws. In the State Program of Industrial and Innovative Development of the Republic of Kazakhstan for 2020 - 2025, technology transfer is defined as one of the elements contributing to the transition to an innovative economy.

However, the legal aspects of technology transfer still need to be sufficiently reflected in the legal system of the Republic of Kazakhstan. The Entrepreneurial Code of the Republic of Kazakhstan contains many provisions to develop technology transfer in the country. Still, more is needed to regulate relations arising in its implementation.

For example, the Eurasian Economic Commission has developed Guidelines for the Transfer of Technologies and (or) Analytical Methods in the Production of Medical Products (EEC, 2021). This document is detailed. It regulates the entire process of technology transfer. Moreover, it contains provisions on risk assessment, criteria for the success of a transfer, etc. The Guidelines of the Eurasian Economic Commission facilitate the technology transfer process in the production of medical products within the Union. However, in the Republic of Kazakhstan, technology transfer in other industries and issues of technology transfer with countries not members of the EAEU remain open.

One of the main barriers in the technology transfer process is finding sales markets for developments or partners for creating the production. Within the framework of the EAEU, it is planned to develop a standard network system for searching for developers of innovative technologies, strategic investors, and technology partners. Kazakhstan can create such a system independently and provide this information to the EAEU. This will also contribute to a more active development of technology transfer.

5. CONCLUSIONS

The industrial policy of the EAEU countries needs to be more effective and consistent. Almost all EEU member states focus primarily on traditional industries in their industrial policies. Since 2000, the economic complexity index (ECI) has declined in all countries except Belarus. The manufacturing industry share in the EAEU countries remains lower than, for example, in the European Union. The medium and high-tech manufacturing share has declined, except for Kazakhstan.

Modern global technological transformations dictate new requirements for industrial growth. The industrial policy should take not only the interests of the industry as such but also the problems of the development of knowledge-intensive industries and the expanding sector of knowledge-intensive services in the world into account. It is required to avoid selective advantages to specific firms and national champions but to focus on industry-wide industrial policy and corporate transparency.

Competition for leadership based on innovations and technologies becomes increasingly intense and complex. Like other EAEU countries, Kazakhstan has been striving to create an effective system of innovation development, competition, and intellectual property protection systems for many years. In modern conditions of economic integration development, the practice of hostile takeovers becomes a rather dangerous phenomenon. The European Union's experience in introducing unified legal norms, principles, and mechanisms to control aggressive mergers and acquisitions seems useful for Kazakhstan and the EAEU leaving each country with the regulation and responsibility matter. New acquisitions of firms should be scrutinized to minimize the risk of violations, and the Competition Protection and Development Agency should be allowed to investigate after a purchase has been made.

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Incomes of the Population of Kazakhstan: Differentiation and Forecast

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Abstract

The purpose of the study is to forecast and determine the main factors affecting the growth of per capita income of the population of Kazakhstan. The paper is devoted to an urgent problem – differentiation and forecast of the income level of the population of Kazakhstan. In the study, based on the results of a survey conducted as part of the study in 2021, 4 conditionally defined social groups were formed according to the subjective integral assessment of respondents' own income. Based on the formed decile groups of respondents, the Gini coefficient was calculated and compared with official statistics. The method of statistical forecasting was used in the preparation of the article. With the help of factor forecasting, the system of the interrelation of per capita monetary incomes of the population with other factors is modelled.

In the article, when finding factors affecting the incomes of the population of Kazakhstan, a model was obtained in which six factors turned out to be statistically significant: Three indicators of them, these are the Minimum wage, the Minimum pension and Subsistence minimum, are state minimum social standards. It is obvious that it is necessary to revise the indicators on the value of which the level and quality of life of the population and the economic growth of the country depend. In further studies, based on the results obtained, it is planned to develop recommendations for reducing income inequality in Kazakhstan.

Keywords: Economic, Economic Growth, Income of Population, Income Inequality, Differentiation, Forecast, Kazakhstan

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1. INTRODUCTION

The quality of life and social status of the population is directly related to their income and solvency, which in turn are not only of social importance, but are also factors that determine life expectancy itself. The problem of equitable distribution of income has been relevant for mankind at all times. At different stages of the development of civilization, conflicts arose on the basis of the division of profits, and this emphasizes the importance of income differentiation for the population. In different periods of the development of the state, the incomes of the population are different and the market economy creates many opportunities for the population to earn in accordance with their abilities and knowledge.

The population's income is a complex category reflecting the economic relations that develop in the production, distribution, exchange and consumption of the product between individual parties of society. The level and differentiation of income of the population reflect the differences in earnings and income distribution between the population.

The average salary, pension, social benefits, income from entrepreneurial activity and other sources of income determine the level of income of the population. It is one of the indicators of the country's economic development. The higher the income level of the population, the higher the quality of life of citizens and the level of well-being of society. Differentiation of income of the population means differences between earnings and incomes of different categories of citizens. Differences in the level of education, vocational training, availability or absence of work, employment status and other factors may cause this. It can lead to social tension, as well as inequality in access to goods and services.

The study of the population's data makes it possible better to understand the current socio-economic situation in the country and identify problematic issues that may arise in the future. Also, the study of the population's income level is an essential factor in the development of social programs to support vulnerable groups of the population. According to the population's income level, it is possible to assess the general standard of living of the population in the country and establish appropriate socio-economic measures and standards.

In order to develop a balanced economic policy that takes into account the interests of all population groups, data on the income levels of the country's population is also needed. The analysis of the population's income makes it possible to assess social and economic mobility and determine which of the population groups is moving up or down the social ladder.

Currently, the incomes of the population are changing quantitatively and structurally, and these changes need to be investigated in order to develop theoretical foundations for the formation of incomes of the population according to the level of economic growth of the country.

The purpose of the research is to study the problems of social inequality and income differentiation, as well as to identify factors that affect the population's income when predicting Kazakhstan's socio-economic development.

Research question: What are the main factors affecting the population's income level?

Research hypothesis: To assess the standard of living of the population, it is necessary not only to determine the differentiation of incomes of the population but also factors that significantly affect the standard of living of the population in order to form the main directions of state policy and take specific measures to increase the level of income.

As per capita income increases, people tend to have more opportunities to meet basic living needs, which can help them escape poverty and reduce the proportion of the population living below the subsistence minimum. In addition, a higher income level can allow people to invest in education and vocational training, which can help improve their employment prospects and earning potential in the long run. Therefore, it is crucial to address the root causes of poverty and implement policies and programmes that can contribute to reducing poverty and inequality.

2. LITERATURE REVIEW

The level of income of the population is one of the main characteristics of the economic situation in the country. Studies of the population's income level make it possible to assess the social orientation of the state's economic policy and assess the effectiveness of measures to combat income inequality (Dmitrichenko et al., 2021). Studies of the population's income level can be carried out at various levels: global, national, regional, etc. At the global level, one of the best-known studies is the annual "World Inequality Report." It is based on data collected by economists from various countries of the world and allows you to assess the scale of income inequality at the world level. One of the critical conclusions of reporting is that income inequality is growing in most countries, including in developed (UN, 2020).

The study of income inequality with the participation of experts in various fields is also necessary to determine the state policy in the field of the income distribution, trade, education, labor market, regional management, etc. (Joyce & Xu, 2019).Also key in modern research are objective and subjective definitions of inequality. Scientists believe that developing policies to reduce inequality is necessary, taking into account subjective assessments by people of their living conditions to obtain a complete picture of the phenomenon (Faggian et al., 2023).

Income inequality can have both positive and negative effects on economic growth. On the one hand, inequality can drive economic growth, as more affluent people can invest more money in various projects, including new businesses and technologies that can drive economic growth. Moreover, income inequality can serve as a motivating factor for lower social segments of the population to improve their living conditions and increase their income (Breunig & Majeed, 2020). On the other hand, inequality can limit economic growth because it can lead to limited access to education, health care and other resources that can contribute to human capital growth. This can reduce the number of people who can participate in economic activities and reduce labor productivity. Moreover, income inequality can contribute to the emergence of social protests and instability, which can adversely affect investment and economic growth.

Countries with unequal income distribution are more vulnerable to pandemic threats (Su et al., 2022). Studies from Germany, the UK, and the US show that infection and death rates from COVID-19 are relatively higher in high-poverty or low-income regions or regions with poor socioeconomic status (Hoebel et al., 2021; Plümper & Neumayer, 2020). Thus, the impact of income inequality on economic growth depends on the specific situation and context in each country and can be both positive and negative (Kirton et al., 2012; Barro, 2000; Aiyar & Ebeke, 2020).

At the regional level, the assessment of the causes and factors of inequality is important, as it affects the development and implementation of the country's modernization strategy and directions. Researchers based on using methods of analyzing statistical data by regions of Kazakhstan determined the impact of interregional country income inequality on economic growth (Turkebayeva et al., 2022).

Today, there is a need to revise methodological approaches in assessing the population's standard of living and income of the population, and it is essential to determine the patterns of change in the population's well-being and search for ways to increase it. Experts began to be more inclined to believe that official statistics use a methodology based on indicators of inequality only in consumption. In contrast, inequality in the monetary incomes of the population would reflect the situation with the stratification of society in Kazakhstan more accurately.

Many causes of economic inequality are interconnected. An analysis of foreign and domestic scientific literature showed that the main factors affecting inequality in the income of the population are the labor market and wage policy, sources of cash income, education, gender,

health and access to health care, migration (both foreign and domestic), social policy of the state, taxation system, as well as economic growth, globalization, etc. (Mukhamediev, 2016; Chancel & Piketty, 2021).

To eradicate poverty and form a stable middle class, Kazakhstan needs to develop the potential of institutions, making them open and effective for implementing complementary strategic directions. Strategic priorities should include diversification-based economic management, private sector development, foreign trade expansion, and human capital development (World Bank Group, 2018)

Suppose the economy's current growth does not increase the well-being of the bulk of the population and is distributed highly unevenly. In that case, this may have a negative impact on economic growth in the long term.

Firstly, suppose a significant part of the population is unable to receive high incomes and cannot consume a large number of goods and services. In that case, this can lead to a decrease in market demand and a decrease in production. This could lead to slower economic growth in the long run.

Secondly, the uneven income distribution can lead to social and political tension in society, which can adversely affect the investment climate and loss-making of businesses. It could also lead to worse conditions for entrepreneurship and business development, which could slow economic growth (Abaidullaeva, 2022).

Thus, for sustainable economic growth, it is necessary to strive for a more even income distribution and increase the well-being of the bulk of the population. Recently, many studies have been conducted in Kazakhstan on the population's income level. Most of them were based on official statistics, but there were also studies based on sociological surveys and social data analysis (Jumambayev et al., 2022). One of these studies was conducted by the National Statistical Committee of the Republic of Kazakhstan in 2019. It showed that the average per capita yearly income was about 1.3 million tenge. At the same time, the poverty rate in the country was about 9.1%.

In another study conducted by the World Bank in 2018, it was noted that Kazakhstan is one of the leaders in terms of income in Central Asia. However, the average value of per capita income hides significant differences between regions and social groups. Some studies have shown that many Kazakhstanis face low incomes and cannot afford basic needs such as food and housing. Thus, studies on the income level of the population of Kazakhstan indicate that although the average income in the country is relatively high, many citizens face problems related to poverty and lack of basic needs.

3. METHODOLOGY

Over the past few years, the economies of different countries have been developing in extremely difficult conditions. The geopolitical and geo-economic situation in the region is the reason for the socio-economic restructuring of Kazakhstan. Multiple observations, analysis of a large amount of data and various information are necessary to understand the state of affairs correctly.

During the study of the level of income of the population, various methods and approaches are used. One of the most common methods is the analysis of statistics obtained from various sources. These can be data from national statistical services, surveys of the population or data obtained from employers.

Various general scientific and special methods were used when studying the income level and its differentiation. With the help of analysis and synthesis, the methods of forecasting the population's income level were singled out. The scientific method has provided based on

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theoretical knowledge to carry out the systematization of materials, to make accessible the new and to expand available knowledge at the expense of empirical data about the investigated problem. The main tools of the scientific method are observations and experiments, based on which hypotheses are put forward, which are confirmed or rejected, which requires collecting additional data for making an effective management decision.

The article, using a systematic approach, studied and analyzed indicators of assessing the standard of living of the population, their integrity and ensuring their structural elements.

Empirical analysis of the income level of the population in Kazakhstan was carried out using the method of economic statistics, graphical and comparative analysis. The analysis of the dynamics of inequality and income differentiation of the country's population has been carried out over the past 10-20 years.

The study used the results of a questionnaire survey within the framework of a grant financing project conducted in 2021, in which about 7.5 thousand respondents took part. The questionnaire survey was conducted to obtain reliable information about the current socio-economic situation and assess the pandemic's negative impact on the population's income level. Further, based on the information received about the income level of the population, decile groups were formed, and the Gini coefficient was calculated to analyze the dynamics of average income in the country and compare it with official statistics. Autoregressive forecasting is based on a statistical study of the dynamics of per capita monetary incomes of the population.

The methodology of the study differs from the novelty we have studied in terms of determining the income gap using statistical forecasting methods to identify factors that affect the income level of the population. Factor forecasting was used to statistically study and model the relationship of average per capita cash income with determining factors (Vaskina, 2016; Vaskina & Naats, 2017). Data from the Bureau of National Statistics, the results of the survey and other materials were provided as sources of information necessary for the systematic analysis of the study.

4. FINDINGS AND DISCUSSION

The country's economic development in 2021 was under the influence of recovery trends after the pandemic shock of the previous year. The population's average per capita cash income amounted to 136.3 thousand tenge and increased in nominal terms by 7.7%, in real terms - decreased by 0.6%. The average monthly salary increased in real terms by 8.3%, amounting to 248.8 thousand tenge.

According to official data, in 2022 in Kazakhstan, almost 1 million people had incomes below the subsistence level. Ensuring sustainable income growth of the country's population is the main task of the state. In this regard, the development by the Government of Kazakhstan of programs to increase the incomes of the population to improve the well-being of citizens is closely related to the development and use of forecasting methods to obtain planned values of the main indicators of the analyzed processes (Ministry of National Economy of the Republic of Kazakhstan, 2022).

The main goal of developing forecasts of socio-economic development is to increase the people's standard of living by achieving sustainable economic growth, a high degree of employment, and price stabilization. Forecasts of the socio-economic development of the state are used by state bodies in making decisions on socio-economic activities (Rudakov, 2022)

Issues of income growth, poverty and the fight against it should be at the center of any socio-economic development forecast and discussed by the authorized body in the first place.

The problem of profitable differentiation of society during the period of ongoing reforms is a determining factor in the country's social climate. A significant gap in the population's income is associated with ongoing institutional changes and the emergence of new sectors of the economy.

In general, the state policy of recent years has been aimed at improving the well-being of residents of Kazakhstan and reducing income inequality. However, despite all efforts, much work remains to achieve a more even distribution of incomes in society (Centras Securities, 2021).

The Government of the Republic of Kazakhstan approved the Comprehensive Plan "Program for Increasing Incomes of the Population until 2029" dated March 28, 2023, No. 246, which emphasizes that as of the third quarter of 2022, the share of the population having incomes below the subsistence level, amounted to 5.3%, however, in thirteen regions, including in the cities of Astana, Almaty, Shymkent, since 2019 there has been an increase in the population with incomes below the subsistence level. The analysis of the current situation showed a low share of wages of workers in the structure of GDP (30.1%) compared to other countries, a negative trend in incomes of the population (nominal incomes of the population are growing, and real incomes are decreasing), there is regional inequality in terms of GRP per capita, the problem of poverty is increasing (Comprehensive Plan of the Government of the Republic of Kazakhstan, 2023).

A subjective integral assessment by an individual of their own life is an assessment that a person gives their life based on their personal sensations and perceptions. This assessment may include various aspects of life, such as income level, health, social relations, work, personal time, etc. A person can score their life on a scale of 1 to 10, where 1 means very low life satisfaction, and 10 means very high life satisfaction.

Subjective integral assessment of an individual's own life is essential for measuring and understanding the quality of life of the general population. This assessment can be used in social and economic research to determine what factors influence people's well-being and what changes in social policy can improve their quality of life.

It is important to note that an individual's subjective integral assessment of their own life is subjective and can vary depending on personal preferences, values, life experience, and other factors that an individual considers essential to their life. The determination by the individual himself of the degree of satisfaction of his needs, and his position in life gives the most reliable picture.

Figure 1 shows the survey results on the subjective assessment of an individual's income level.
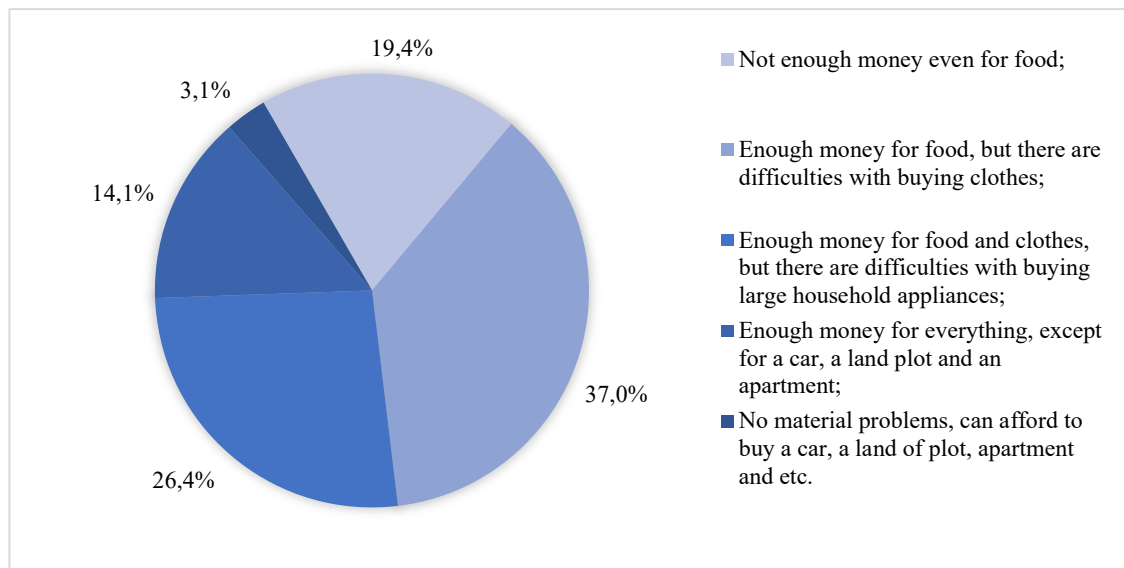
FIGURE 1. Data on the subjective assessment of own income

Note: compiled by the authors

According to the survey results, data on the income level and sources of livelihoods were obtained, and individuals relate to a particular group based on their subjective assessment of material support. As a result of the study, the proposed four conditional social groups were distributed as follows:

- low-income - there are not enough funds for food, clothes and shoes;
- not the poor, but also not the middle class - there are enough funds to buy food and clothes, but there is not enough for durable goods (household appliances, furniture, etc.);
- the middle class - there are enough funds to buy food, clothing and pay for utilities and durable goods. However, difficulties arise in buying new housing or transport;
- the upper class - there are enough funds for a comfortable life and providing yourself with high-quality products, having a job or his own business or property that brings constant income.

According to the survey, 19.4% or 1,452 people noted that there are not enough funds even to purchase food, and 37% or 2,765 respondents noted that they have income to buy food but experience difficulties in buying clothes and shoes. 26.4% or 1971 of respondents experience difficulties only when buying large equipment or durable goods, 14.1% or 1055 respondents noted that the funds are not enough only to purchase new housing and transport, and mainly do not experience problems. Furthermore, only 3.1% or 232 out of 7475 respondents noted that there are enough funds for a comfortable life and do not have material problems. The analysis showed income and expenditure inequality among the respondents.
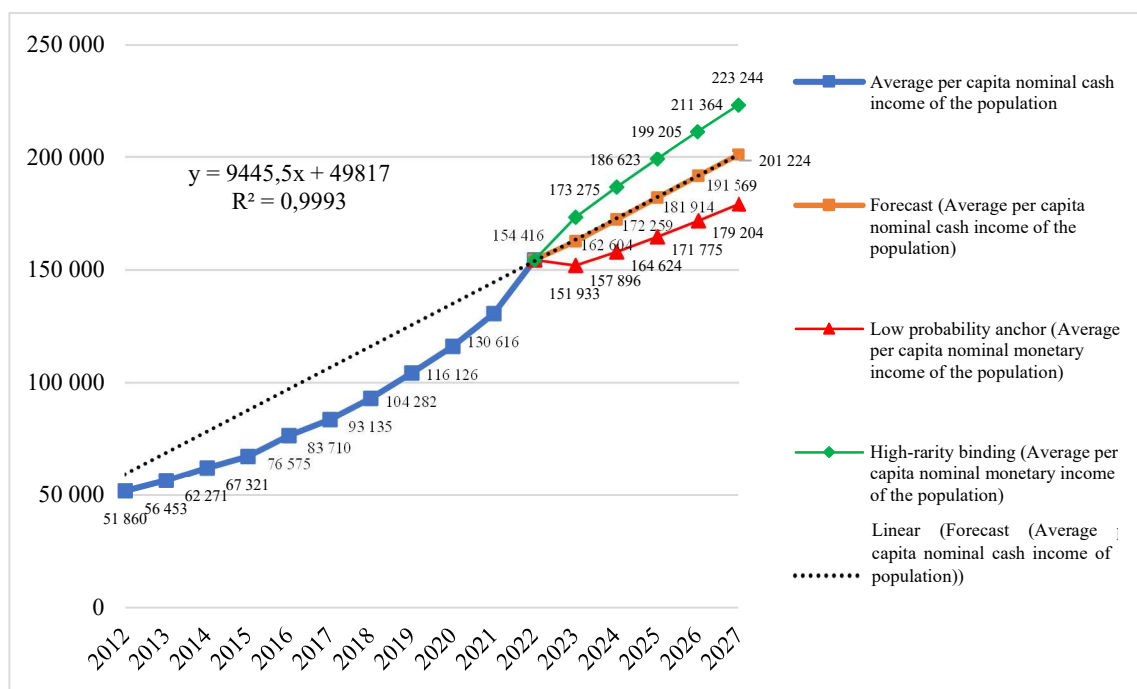
FIGURE 2. Trend model of average per capita nominal cash income of the population

Note: compiled by authors

The most significant shares of the population with income despite the regular efforts of the government to combat income inequality, the differentiation of incomes of the population in Kazakhstan remains one of the main problems of the country's economy.

The source of information on income inequality of the country's population is official statistics. Below the subsistence minimum in the IV quarter of 2022 are observed in Turkestan (8.5%), Mangistau (8.1%) regions, and the smallest - in the city of Astana (2.1%) and in the region of Ulytau (2.2%). There is still a significant differentiation between the share of the population with incomes below the subsistence level in urban and rural areas.

Considering the distribution of households and their population by the amount of income used for consumption, one can note the largest concentration of the population in the range from 40001 to 80000 tenge (54.33% of the population).

According to statistics in Kazakhstan for the 4th quarter of 2022, the average per capita nominal cash income of the population amounted to 172,172 tenge. However, the level of income varies depending on the place of residence, education and employment. For example, in cities, incomes are on average higher than in the countryside. In some regions of Kazakhstan, such as Almaty and Astana, the income level is significantly higher than in other regions of the country (Bureau of National Statistics, 2022).

In addition, there are also other factors affecting income differentiation, such as education and employment. People with high education and highly qualified specialists in the fields of IT, medicine, finance and education, in general, have higher incomes than those who are engaged in unskilled labor.

Substituting the value into the regression equation, we obtain the forecast values in Kazakhstan, shown in Table 1.

TABLE 1. Scenario forecast of the average per capita nominal cash income of the population of the Republic of Kazakhstan for 2023-2026

| Year	Options for forecasts of the average per capita cash income of the population, tenge/month		
	Basic	Pessimistic	Optimistic
2023	162 604	151 933	173 275
2024	172 259	157 896	186 623
2025	181 914	164 624	199 205
2026	191 569	171 775	211 364
2027	201 224	179 204	223 244
Note: compiled by authors based on Bureau of National Statistics (2022)			

Using the trend models obtained in Excel, the forecast of the average per capita nominal cash income of the population for 2023-2026 was made. The average per capita cash income trend equation is as follows: $y = 9445.5x - 49817$. The approximation factor is 0.9993. From 2012 to 2022, the cash incomes of the population of Kazakhstan tended to increase by 9445.5 tenge per year.

However, it should be borne in mind that this increase (real income growth) will be less by the inflation rate. At the current inflation rate, the number of people living on incomes below the subsistence level is growing, which requires the state to make significant changes to the mechanism for regulating the population's income. For this purpose, it is necessary to identify the factors that dominate the influence on the average per capita income of the population.

The Gini coefficient is the main one according to the differentiation of incomes of the population, this is an indicator of the degree of income inequality in society, which ranges from 0 to 1. The closer this coefficient to one, the more income is concentrated in a separate group of the population, while part of the population is living in poverty.

According to the National Statistical Agency of Kazakhstan for 2022, the Gini coefficient was 0.281.

Figure 3 shows the dynamics of the Gini coefficient from 2000 to 2021 based on the data of official statistics of Kazakhstan. During the analyzed 10-year period, the Gini coefficient increased slightly.
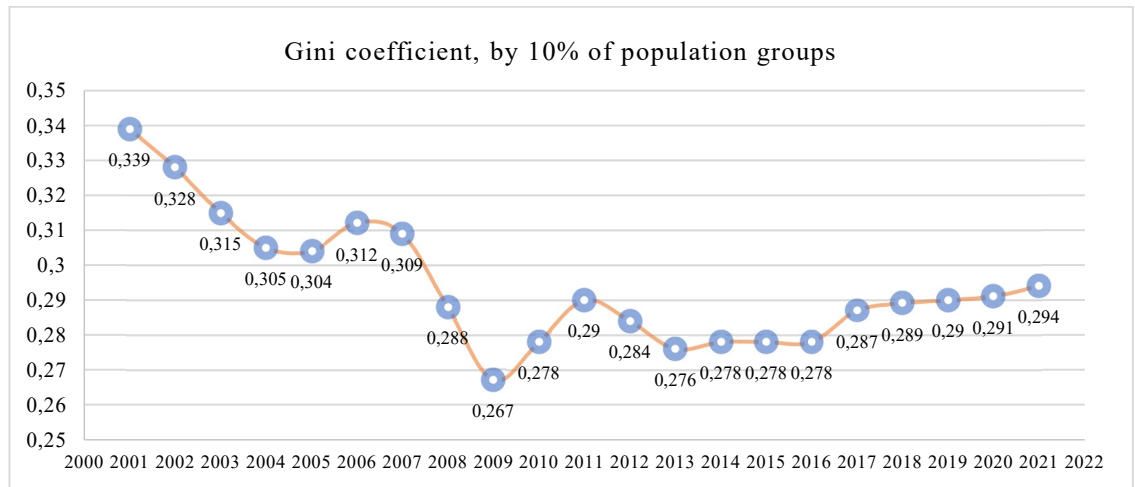
FIGURE 3. Dynamics of the Gini coefficient in Kazakhstan

Note: compiled by authors based on Bureau of National Statistics (2022)

Further, based on surveys on the level of income we surveyed, decile groups were formed to analyze the dynamics of average income and compare with official statistics. The calculation, according to the survey conducted in 2021, made it possible to draw the following conclusions (see Table 2).

**TABLE 2.** Decile Groups to Determine Gini Ratio by Income of Respondents (Survey Results, 2021)

Decile	Income,tg	Number of respondents	Income share	Cumulative income share	The proportion of the population	Cumulative proportion of the population
1	0	1191	0,00%	0,00%	16,33%	16,33%
2	60000	517	1,93%	1,93%	7,09%	23,42%
3	100000	1284	3,22%	5,14%	17,61%	41,03%
4	150000	1500	4,82%	9,97%	20,57%	61,59%
5	250000	1226	8,04%	18,01%	16,81%	78,40%
6	300000	600	9,65%	27,65%	8,23%	86,63%
7	400000	515	12,86%	40,51%	7,06%	93,69%
8	500000	150	16,08%	56,59%	2,06%	95,75%
9	600000	138	19,29%	75,88%	1,89%	97,64%
10	750000	172	24,12%	100,00%	2,36%	100,00%
Total		7293	100,00%		100,00%	
Note: compiled by authors						

7293 respondents were divided into ten decile groups with different incomes. Notably, 16.3% or 1,191 respondents, responded that they had no income. The Gini coefficient for the formed decile groups was 0.735, while according to official statistics for 2021, the coefficient was 0.294.

The Lorentz curve, reflecting inequality in the income distribution in society, is presented in Figure 4.
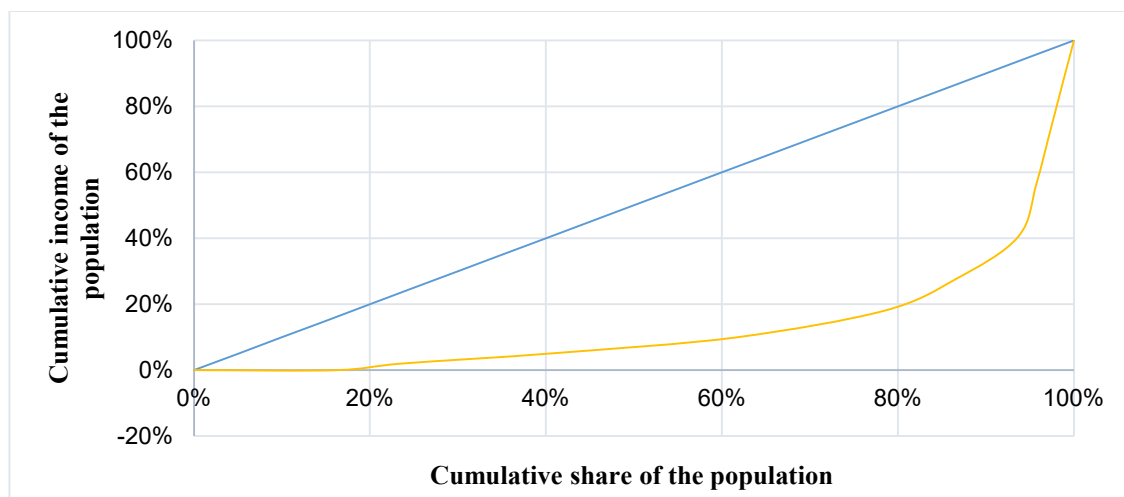
Figure 4: Lorentz Curve

Note: compiled by authors

By bending the line, you can understand the inequality level in respondents' income in 2021. According to the survey results, the largest group of respondents, 1,500 out of 7293 respondents (20.57%), have an income of 150 000 tenge per month.

It is possible to stop this trend in the growth of the number of people with incomes below the subsistence level by amending the mechanism for regulating the population's income. To do this, it is necessary to identify the factors that have the most significant impact on the population's income.

Multiple regression analyses were performed to determine the relationship between the dependent variable and several independent variables using the statistics for 2011-2021 in Table 3.

TABLE 3.Factors for the model of formation of average per capita incomes of the population

No.	Key Figure, Unit of Measure	Designation
1	Average per capita nominal cash incomes of the population, tenge/month	Y
2	Average monthly nominal salary of one employee, tenge/month	x1
3	Value of the subsistence minimum, tenge/month	x2
4	The total population with incomes below the subsistence minimum, people	x3
5	Gini ratio, by 10% of the population groups	x4
6	Minimum wage (Minimum wage), tenge/month	x5
7	Minimum pension, tenge/month	x6
8	Consumer spending of the population, average per capita, tenge/month	x7
9	The life expectancy of the population at birth, years	x8
Note: compiled by authors		

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In this case, the average per capita nominal cash income of the population ("y") can be considered as a dependent variable, and the average monthly nominal salary of one employee ("x1"), the subsistence minimum ("x2"), the total population with incomes below the subsistence minimum ("x3"), Gini coefficient, by 10% of population groups ("x4"), minimum wage ("x5"), minimum pension ("x6"), consumer spending of the population, average per capita ("x7") and population life expectancy at birth ("x8") - as independent variables.

A multiple regression model can be used to determine which independent variables impact the population's average per capita nominal cash incomes. However, before constructing a model, correlation analysis must be performed to select relevant factors for inclusion in the model. You can use Excel to compute a matrix of pairwise correlation coefficients. Based on this matrix, you can predefine the number of factors that should be included in the model, for example, in this case, these are seven factors for predicting the dynamics of the average per capita cash income of the population.

The matrix of pairwise correlation coefficients shows how strongly each of the independent variables and the dependent variable are related. For example, the correlation coefficient between the average monthly nominal wage of one worker and the average per capita nominal cash income of the population is 0, 992888912, indicating a very strong positive correlation between these variables. Also, the correlation coefficient between the subsistence minimum and the average per capita nominal monetary income of the population is 0, 996432415, which also indicates a very strong positive correlation. Similarly with the Gini coefficient, 10% of the population groups ("x4" = 0, 864248619), minimum wage (MIP) ("x5" = 0, 951228347), minimum pension size ("x6" = 0, 994999859), average per capita consumer expenditure ("x7" = 0, 998253727), indicating a very strong positive correlation with the average per capita nominal cash income of the population.

The average degree of dependence is expressed between the average per capita nominal monetary income of the population and the total population with incomes below the subsistence minimum ("x3" = 0, 699544574).

However, it should be noted that the correlation coefficient between the expected life expectancy of the population at birth and the average per capita nominal monetary income of the population is only ("x8" = 0, 159239624), which suggests that the two variables are weakly related.

The multiple regression model can be represented in Table 4.

TABLE 4. Results of calculation of regression model parameters

Par.	Coefficient	Standard error	t-statistic	P-Value	Lower 95%	Upper 95%
Y	-139210,0666	16390,1106	-8,493540404	0,013580165	-209731,0207	-68689,11248
X 1	0,750488866	0,073114933	10,26450874	0,009358232	0,435900701	1,06507703
X 2	-5,712208554	0,777724718	-7,344769198	0,018037165	-9,058487936	-2,365929173
X 3	0,018865386	0,010318374	1,828329301	0,209010994	-0,025530995	0,063261766
X 4	522480,1601	63791,48194	8,190437723	0,014581596	248007,5662	796952,7539
X 5	0,242270745	0,034764054	6,969001448	0,019975256	0,092693092	0,391848398
X 6	1,876974821	0,124760043	15,04467922	0,00438902	1,340175683	2,413773959
X 7	0,074016213	0,011556729	6,404598947	0,023522252	0,024291622	0,123740804
Note: compiled by authors						

Based on the results of the calculation, it can be seen that all variables except X3 are significant (P-value < 0.05), therefore, the model is suitable for practical use. From the results of the calculations, we get the multiple regression equation without the participation of this variable:

$$Y = -139210,0666 + 0,750488866X1 - 5,712208554X2 + 522480,1601X4 + 0,242270745X5 + 1,876974821X6 + 0,074016213X7$$

Thus, six factors were statistically significant in this model. These are: Average monthly nominal salary of one employee, Subsistence minimum, Gini coefficient for 10% of the population groups, Minimum wage, Minimum pension, Consumer spending of the population on average per capita.

According to the results of the study, 3 out of 6 significant factors are the minimum social standards of the state - the subsistence minimum, the minimum wage, and the minimum pension. Hence the conclusion is that it is necessary to improve the strategic directions of state policy regarding improving the standard of living and income of the population by increasing the size of social standards.

5. CONCLUSIONS

To sum up, the following study has focused on world experience in addressing gender inequality in the labor market and its effective adaptation to the conditions of Kazakhstan.

Based on the study, the following results were obtained.

In recent years, Kazakhstan has seen a deepening of the problem of poverty and income inequality in the country's regions. Of the 7293 respondents who answered the survey questions, 57% of the surveyed citizens do not have the opportunity to spend their income in addition to buying food and clothes.

Tracking the total population with incomes below the subsistence level can help identify trends and inform policy decisions aimed at reducing poverty and promoting fairer income distribution. It is important to note that the living wage is often set at a very low level, and even if the average per capita nominal cash income is above this level, there can still be significant income inequality and poverty in the population.

With rising incomes, consumer spending per capita tends to increase. This is because as people make more money, they tend to have more disposable income to spend on goods and services, which can lead to more overall consumer spending in the economy. In addition, higher incomes can lead to increased confidence and optimism among consumers, which can further increase spending.

The relationship between the average per capita nominal monetary income of the population and the minimum wage can be complex and multifaceted. However, in general, it could be expected that an increase in the minimum wage could have positive consequences for the average per capita nominal cash income of the population. This is because raising the minimum wage is likely to result in higher wages for workers earning at or near the minimum wage, which in turn could lead to overall wage increases across the economy. The same trends apply to pensioners who receive the minimum pension. With the growth of the minimum pension, it will be influenced by various economic factors, such as inflation, changes in the labor market, demographic shifts, which, ultimately, can lead to a decrease in their standard of living. Thus, the three social standards of the state - the size of the subsistence minimum, the minimum wage, and the minimum pension - must be revised as indicators of the size of which the level and quality of life of the population and the economic growth of the country depend.

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RESEARCH ARTICLE

Formation of Industrial and Logistics Hub in the Border Areas of Kazakhstan and Uzbekistan

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Abstract

Central Asia is a strategic region of the China-Europe continental bridge. The conflict between Russia and Ukraine has seriously affected international supply chains, which has led to the intensification of the development of alternative corridors and the construction of new regional logistics hubs along them. The purpose of the research is to determine, on the basis of these sources, the factors of the formation of industrial and logistics hubs, as well as the directions of their development on the example of the border regions of Kazakhstan and Uzbekistan. In preparing this article, a mixed research strategy was used, which implies quantitative and qualitative methods. It consists not only of the systematic study of the literature on the research topic and statistical information but also involves the implementation of theoretical studies, comparison, generalization and analysis of the results, argumentation and formulation of conclusions. The study identified the main constraining factors for the development of such centres delays in customs inspection, inconsistency in the legal framework of the transportation process, underdevelopment of infrastructure, low level of digitalization and the use of information systems, the use of non-tariff barriers, low level of digitalization and the use of information systems. The creation and development of integrated transport services based on a digital platform will speed up this process. In addition, taking into account these factors, the components of an industrial and logistics hub are proposed: an industrial zone, a logistics zone, a trading zone, a certification zone with appropriate services, as well as a digital platform as a link between all components.

1. INTRODUCTION

As part of the One Belt, One Road initiative, further growth in demand for the development of logistics infrastructure along the China-Europe continental bridge, of which Central Asia is a strategic part, is predicted. Regionalization in Central Asia will inevitably occur under the influence of the main "power centers" operating here - Russia, China and the United States. The conflict between Russia and Ukraine has seriously affected global supply chains, which has led to the intensification of alternative corridors and the construction of new regional logistics hubs along them. Thus, global changes give new impetus to soften foreign economic interaction in new directions. For Kazakhstan, Uzbekistan has recently become such a direction. Having common borders, Kazakhstan and Uzbekistan have all the prerequisites for deepening cross-border cooperation. Cross-border infrastructure projects play an important role in allocating resources, promoting sustainable development, increasing the profitability of transport corridors, and obtaining new markets for goods and services.

In this context, Kazakhstan's proposal to Uzbekistan to participate in the development of the Trans-Caspian International Transport Route (TITR) is of interest. Another initiative in the region is the formation of the Shymkent-Tashkent-Khujand Economic Corridor (STKEC), under which ADB funded a feasibility study to establish an International Industrial Cooperation Center (IICC) between Kazakhstan and Uzbekistan. There are many reasons why this geographical area can become a dynamic economic corridor. Among them: a) advantageous location and spatial features of the region; b) high population density; c) high economic activity in the region; d) close historical, cultural and ethnic ties. Due to its geographical location, only Kazakhstan can provide Uzbekistan with transit to the north, and important transport arteries from Kazakhstan to the south pass-through Uzbekistan. Currently, more than 50% of the trade turnover of Uzbekistan passes through the territory of Kazakhstan.

The development of transport and logistics hubs in the border areas of Kazakhstan and Uzbekistan will contribute to developing trade in the region, creating joint ventures, and improving the quality of transport and logistics services. Through the center, it is planned to carry out cooperation projects in the field of agricultural products, automotive, electronics, pharmaceuticals, and building materials and export them to foreign markets through the border industrial and logistics hub. The center is offered to be in the area of the international checkpoints "Atameken" - "Gulistan". In 2021, Uzbekistan ratified the ESCAP Agreement on dry ports, designed to simplify the transportation of international cargo, allowing it to be registered as a land port of international importance in the future. Central Asia is considered one of the world's regions with higher logistics costs, averaging 20% of GDP compared to 9% in OECD countries (ITF, 2019). Thus, trade and logistics services and production clusters can provide cooperative ties with the international market. The purpose of the study is to determine, based on these sources, the factors for the formation of industrial and logistics centers, as well as the directions of their development on the example of the border regions of Kazakhstan and Uzbekistan.

The relevance of this research is substantiated by the fact that today the level of development of logistics in Kazakhstan needs to be improved. For example, according to the logistics performance index (LPI), Kazakhstan 2023 took 79th place in the world, 8 points lower than in 2018. At the same time, Uzbekistan took the 88th position. If we compare the sub-indices, we can see that the worst indicators for Kazakhstan were "timeliness" and "international transportation", while for Uzbekistan, these were "timeliness" and "cargo tracking". In connection with the preceding, it is necessary to study the features associated with the development of transport corridors in which both states participate, their advantages, disadvantages, and reasons for the low level of logistics development indicators in order to determine the factors, components and directions for the development of an industrial and logistics hub in the border region between Kazakhstan and Uzbekistan.

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2. LITERATURE REVIEW

Dry ports, logistics parks, cargo villages, inland terminals, and intermodal terminals are several terms at different operational levels that are used in other countries and regions to describe logistics centers (Wagener, 2017). According to the European Association of Logistics Platforms (Europlatforms EIGG1), logistics centers are areas that include all types of logistics activities and have intermodal transport capabilities managed by legal entities to ensure European standards and quality for sustainability. Moreover, because multimodal transport has some disadvantages and the need to overcome these problems, new concepts of synchronous modality are emerging (Dong et al., 2018; Qu. et al., 2019), where it was possible to find a new solution for more flexible and integrated freight transport. The level of integration, i.e. the ability to integrate different modes of transport to ensure the efficient and economical use of the transport system, is an essential attribute of freight villages. More companies allow for more efficient use of terminals in terms of economies of scale (Uygun & Niyayesh, 2022). A significant reduction in logistics costs to the best - optimal - level is possible through effective management and coordination of internal processes of individual supply chains controlled by logistics centers. This, in turn, leads to the creation of additional values (profits) for all the entities that make up this center (Świerszcz & Ćwik, 2018). The directions for the future development of logistics centers are mainly related to the implementation of IT systems and data transmission systems (Kostrzewski et al., 2021).

Although logistics centers were created to facilitate and enhance domestic cargo flow, they are connected to the business generators due to globalization, changing processes, the need for an efficient supply chain, and economic and environmental consequences (Yang et al., 2017). Accordingly, they must keep up with the times and consider the new problem-solving paradigm. Thus, the new concepts of industrial and logistics centers must be explained in detail.

The new industrial paradigm has enabled LCs to meet new logistics needs and achieve competitive advantages. LCs must evolve automated systems if they desire to remain part of operations (Taliaferro et al., 2016). Kazakhstan has an opportunity to increase the attractiveness of its logistics services through its digital transformation. Digital innovation materialized in most cases by a digital platform.

A study conducted by McKinsey Quarterly with the participation of 1600C-suite executives in companies from different sectors and key regions shows that 43% of digital players on the platform and 52% work on third-party platforms, leaving only 5% of digital players without an explicit platform (Bughin et al., 2019). In the platform business model, digital actors play the role of intermediaries, offering a digital platform on which users can connect and make transactions with suppliers (Katz, 2015). There are now logistics platforms worldwide, such as the European Logistics Platform, under which DHL, P&G, Volvo, Michelin, the European Rail Freight Association and others operate.

Other papers also address the challenges facing the global value chain, such as the effects of I4.0 re-localization or changes in the interaction and power relations between participants in the value chain (Dachs et al., 2019; Strange & Zucchella, 2017). A key research topic of logistics platforms is that they see as an organizational structure that promotes coordination and communication throughout the supply chain to ensure smooth transport links and coordination with various modes of transport (Varella & Buss Goncalves, 2013). Consequently, in some studies, they called intermodal logistics platforms, the purpose of which is to ensure the integration of different supply chain agents in the same physical location (Cambra-Fierro & Ruiz-Benitez, 2009). They usually become regional logistics platforms capable of stimulating and facilitating logistics activities, business exchanges and urban development in a specific geographical region (Boudoin et al., 2014; Silva & Leyte, 2019).

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The concept of the platform, including the principles of construction, its architecture, ecosystem, and methods of organization of interaction of all participants of the transport and logistics chain, should be created first. Only after that should we proceed to its implementation, otherwise, we will get the current chaos and duplication in the relationship "all with all" in the digital format. In addition, the platform will address the problem of interaction between the state authorities at the borders and private logistics structures. Despite the widespread adoption of platform strategy in the logistics sector attracting wide attention from academia and practitioners, developing knowledge about logistics platforms is still at an early stage. Strategy concepts often differ and depend on the context in which the strategy is implemented (Grzybowska & Gajsek, 2016).

Thus, it can be concluded that logistics hubs play an important role in ensuring the efficiency of the transport system and creating additional value for the participants. They must consider changing processes and new logistics needs brought about by globalization, supply chains and environmental factors. Digital platforms are becoming effective in improving logistics services and achieving competitive advantages.

3. METHODOLOGY

In preparing this article, a mixed research strategy was used, which implies quantitative and qualitative methods, the results of which will complement each other.

The main research questions were:

- What factors are essential in forming an industrial and logistics hub in the border areas of Kazakhstan and Uzbekistan? Based on this, what components are included in the model of the industrial and logistics hub?

- What are the development directions of the industrial and logistics center in the border areas of Kazakhstan and Uzbekistan?

This project uses a descriptive type of research. It consists not only of the systematic literature review on the research topic and statistical information but also involves the implementation of theoretical research, comparison, generalization and analysis of the results, argumentation and formulation of conclusions, practical recommendations, and suggestions.

The main stages of the study are:

(1) In the first stage, the factors of transport connectivity between Kazakhstan and Uzbekistan. Then, it was decided to investigate the transportation volumes and transit tariffs along the main international corridors to compare the potential of Kazakhstan and Uzbekistan and their opportunities in terms of price competition with the UTLC-ERA corridor. It was also decided to consider each country's interests when building its own policy for developing existing transport corridors.

(2) Analysis of statistical data. During the secondary research process, various secondary sources were used, such as reports from the World Bank, CAREC, Eurasian Economic Commission, and Committee on Statistics of the Republic of Kazakhstan, to identify and collect information for this research. Based on the study of sources, factors for developing international transportation between Kazakhstan and Uzbekistan were identified. In particular, the following criteria were used: time spent passing through the border crossing points (BCP), cost of passing through the BCP, cost of transportation along the corridor section, and speed of transportation along the CAREC corridors. Analyzing the dynamics of these indicators from 2015 to 2020, we can see progress or regression and the current status of trade facilitation indicators. Therefore, when considering these indicators, it was decided to focus more closely on the problems that caused the low indicators level. This made it possible to determine the factors for the development of international transportation between Kazakhstan and Uzbekistan in order to deepen the

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economic integration of border regions.

(3) At the final stage, recommendations were developed for forming an industrial and logistics hub between Kazakhstan and Uzbekistan in terms of institutional, infrastructural, and process approaches. Also, at this stage, a study of the current state of the production and logistics infrastructure, existing transport corridors, and trade flows is being carried out. This allows you to identify potential areas for the development of the production and logistics center and highlight priority sectors for development and investment.

Thus, this research methodology provides a comprehensive analysis and answers the main research questions. This provides convincing results supported by arguments, conclusions and practical recommendations for the formation of an industrial and logistics hub in the border regions of Kazakhstan and Uzbekistan. Through these three steps, it will be clear what should be oriented towards achieving high rates of cargo movement along international transport corridors and technological integration of the hub into the international multimodal network.

4. FINDINGS AND DISCUSSION

In 2021, Kazakhstan's export to Uzbekistan decreased, while Uzbekistan's exports to Kazakhstan increased. The decrease in exports was due to a reduction in tonnage when transporting grain, scrap metal, oil products, and coal. The increase in Uzbekistan's exports to Kazakhstan was due to a rise in the transportation of building materials, chemicals, soda, and ferrous and non-ferrous metals. Transit is like the sum of imports and exports by rail, demonstrating the importance of transit trade. Currently, more than 50% of the trade turnover of Uzbekistan passes through the territory of Kazakhstan (Ionova, 2018).

Road transportation recovered significantly in 2021 after falling in 2020. Kazakhstan's exports to Uzbekistan and Uzbekistan's transit traffic through Kazakhstan showed strong double-digit growth. Goods moving in the direction from Kazakhstan to Uzbekistan included wood, and its products, rubber and its products, chemicals, apparatus, and equipment. In the opposite direction, goods such as consumer goods, fabrics, and textiles are sent by trucks. Volumes of transportation between Kazakhstan and Uzbekistan presents in Table 1.

TABLE 1. Volumes of transportation between Kazakhstan and Uzbekistan, million tons

Variable	Rail transportation			Road transport		
	2020	**2021**	**Change, %**	**2020**	**2021**	**Change, %**
From Kazakhstan to Uzbekistan	9.637	7.665	-20.5%	0.286	0.501	75%
From Uzbekistan to Kazakhstan	1.071	1.742	63%	0.759	0.815	7%
Transit	9.817	9.823	0.06%	1.143	1.623	42%
Total	20.525	19.230	-6.3%	2.188	2.939	34%
Note: compiled by authors						

Wagener (2017) has demonstrated the importance of logistics centers for international freight corridors. Moreover, because of the restriction of transportation within the territory of the Russian Federation Kazakhstan may face a decline in transit revenues. The country was the main beneficiary of the regular United Transport and Logistics Company (UTLC) freight container train from China to Europe, crossing Kazakhstan, Russia, Belarus and Poland. Traffic from China to Europe direction has grown rapidly, from 1,900 to 14,000 in 2021.

Currently, the Middle Corridor (TITR) is attracting considerable attention since there are no other competitive alternatives. Kazakhstan is a member of the TITR Association, within which,

since 2017 multimodal container transportation according to approved complex rates for transportation of goods through the ports of Kuryk/Aktau - Baku (Alyat) - Batumi/Poti, incl. to/from Kazakhstan and Central Asia, to/from China and Southeast Asia to/from Azerbaijan, Georgia, Uzbekistan, EU, Turkey. According to TITR, the number of TEUs from China to the Caucasus and Turkey increased from almost zero in 2017 to 15,000 in 2018 and 33,600 in 2022.

As shown in the following table, TITR rates per km are comparable to UTLC rates, although travel times are longer despite shorter distances. Perhaps this is related to additional operations required for maneuvering, loading, and ferries and transportation through the Caspian Sea, as well as waiting time.

Next, consider the data Comparison of TITR and UTLC tariffs in Table 2.

TABLE 2. Comparison of TITR and UTLC tariffs, 2022

Variable	Route	km	Tariff for transportation of a 40-foot container, $	$ /km	Time
TMTM	Altynkol-Poti	4500	3100	0.69	16-20 days
	Poti Altynkol		1550	0.34	16-20 days
UTLC	Altynkol-Brest	5200	2700-3000	0.52-0.58	8-10 days
	Brest-Altynkol		2400-2800	0.48-0.56	8-10 days
Note: compiled by authors					

Even though the fact that the efforts of both countries have recently been directed towards the development of transit corridors, it should be taken into account that the interests of Kazakhstan and Uzbekistan do not coincide in some areas. For example, Uzbekistan is actively lobbying for the China-Kyrgyzstan-Uzbekistan railway project, bypassing the territory of Kazakhstan. Kazakhstan has also supported the Uzbek project to build the Mazar-i-Sharif-Kabul-Peshawar railway as an opportunity to enter the future trans-Afghan corridor. But it will not be possible to realize it without serious investments and without the support of the Taliban and Pakistan, who must guarantee the safety of the railway. No less important for the countries of Central Asia is cooperation within the framework of the international North-South corridor with access to Iranian seaports, which is also of interest to India.

Theoretically, in case of its successful implementation, part of the flow can be redirected from the territory of Kazakhstan to this corridor. Nevertheless, it is important to consider all these and other projects in the context of regional interconnectedness and integration, and not in isolation from each other in a purely national framework.

According to OECD estimates, global connectivity in Central Asia averages less than 60 %. The components of this index include distance, transport costs including border crossing and handling, cost, travel time, and border crossing time. The cost of importing and exporting goods in Central Asia remains high, which undermines their competitiveness.

One of the main problems of low transport connectivity is differences in customs and trade regulations. Kazakhstan is a member of the WTO and the EAEU, while Uzbekistan has not yet joined the WTO and has observer status in the EAEU, which hinders border trade through visa requirements, informal fees, lengthy and expensive customs and border procedures, and restrictions on the movement of goods and entry of foreign vehicles.

Customs authorities inspect cargo when suspected of prohibited goods, such cases are defined as the "red corridor", and it is estimated that in Kazakhstan from 2% to 3% of all deliveries pass through it. Uzbekistan customs reported that the share of shipments passing through the red corridor is 24%.

Corridor Performance Measurement and Monitoring (CPMM) conducted by ADB in the Central Asia Regional Economic Cooperation (CAREC) region shows that BCPs in Central Asia

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are generally congested and carriers take longer to cross borders. Inadequate infrastructure, suboptimal layout, cumbersome control procedures, and inconsistent operations cause delays.

Next, Kazakhstan-trade facilitation indicators presents in Table 3.

TABLE 3. Kazakhstan-Trade Facilitation Indicators, 2015-2020

Kazakhstan	Road transport						Rail transportation					
	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020
Time taken to pass through the BCP (hour)	3.8	4.4	8.6	7.1	9.2	8.7	40.6	42.5	44.0	40.5	39.9	48.6
BCP Pass Costs ($)	104	113	124	96	115	123	333	369	381	332	327	341
Transportation costs along the corridor section ($ per 500 km, per 20 tons of cargo)	909	825	654	791	715	1850	1107	929	808	768	687	724
Travel speed along CAREC corridors (km/h)	30.6	31.5	28.8	30.5	30.7	29.2	17.6	17.2	17.5	19.9	18.1	15.3
Speed without delay (km/h)	47.8	52.0	53.9	56.3	53.2	52.9	51.8	5 3.6	56.4	53.2	67.8	65.2
Note: compiled by authors												

It is noted that border crossing times at rail checkpoints took longer than at road checkpoints and that leaving the BCP took longer than entering it. The border crossing time for rail transport was already high in 2015 (40.6 hours), and 2020 it increased to 48.6 hours. The inbound cargo was the primary source of longer delays. Border crossing costs for rail travel were higher than those for road transport, rising from $333 in 2015 to $341 in 2020. Slow border crossing times have offset some of the effects of the increase in average train speeds across Kazakhstan (from 51.8 km/h in 2015 to 65.2 km/h in 2020) and reduced the overall transit speed to 15.3 km/h in 2020 from 17.6 in 2015.

Further, Uzbekistan - trade facilitation indicators presents in Table 4.

TABLE 4. Uzbekistan - Trade Facilitation Indicators, 2015-2020

Uzbekistan	Road transport						Rail transportation					
	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020
Time taken to pass through the BCP (hour)	5.9	5.9	5.8	8.5	7.7	10.1	10.5	9.4	7.5	5.6	6.2	6.4
BCP Pass Costs ($)	89	99	88	73	87	102	97	103	98	99	99	100
Transportation costs along the corridor section ($ per 500 km, per 20 tons of cargo)	445	426	423	477	600	648	1710	1409	1138	971	778	671
Travel speed along CAREC corridors (km/h)	29.4	28.5	28.0	28.5	28.6	26.6	10.4	10.8	10.0	14.0	10.5	9.7

Speed without delay (km/h)	49.3	47.6	46.8	50.8	49.6	46.9	41.6	36.5	25.3	27.9	38.2	21.9

Note: compiled by authors

From the tables it can be seen that the speed without delays is two, sometimes three times higher than the actual speed of transportation, that is, all the time that was saved on the way to reach the borders is lost as soon as the vehicle reaches the border.

There are a few problems and factors to the development of cross-border logistics centers:

1. *Delays during customs inspection.* As members of the CIS countries do not apply import tariffs, there are various non-tariff barriers between countries, such as sanitary and phytosanitary measures and technical standards. There is no coordination between control services at the border, which is why paper copies of documents are required in various departments. There is also no coordination between departments on the border and those inland, and the slightest error or typographical error causes a significant delay in obtaining an export permit. Cooperation between the customs services of Kazakhstan and Uzbekistan is insufficient. In 2018, the customs authorities of Kazakhstan and Uzbekistan signed an agreement on mutual recognition of customs control of certain types of goods and adopted a risk management system. However, the agreement only applies to a limited number of goods, and most shipments are subject to physical inspection. To do this, the container/wagon is delivered to a private railway marshalling yard, where the cargo is unloaded, checked, and reloaded. All vehicles undergo physical inspection on both sides of the border. This process increases the transit time and the cost of crossing the border. This can also be seen in the table. In Kazakhstan, the time and the cost of passing through the border point by rail is 48.6 hours and $341, respectively.

Solution:
- move from physical checks to a risk management system.
- establish joint customs, transport, and other types of control, and establish cross-border electronic data exchange between countries' "Single Windows".
- harmonization of data requirements for customs clearance of goods.
- to implement electronic license forms for trucks.
- to adopt standards for passing the state borders by a cargo vehicle.

2. *Non-compliance with the legal framework of the transportation process.* Document harmonization has not been completed. Translations and language barriers can be a problem at some borders.

Solution:
- to the maintenance of the electronic consignment note of the CMR.
- introduction of a multimodal waybill with international recognition and responsibility of the principal, which will allow you to follow in the transit mode when changing the mode of transport without the need for multiple transport documents.
- introduction of the electronic TIR system (eTIR), the ATA (Admission Temporaire/Temporary Admission) carnet system, and the CAREC Advanced Transit System (CATS-CATS)/Common Information Exchange (ICEIOI).

3. *Infrastructure underdevelopment.* The railway network in the region was built mainly during the Soviet period and many sections are in poor condition. The capacity of railway stations in the border area is insufficient for such a large volume of traffic. There is a lack of necessary equipment on the access roads for receiving/sending containers. Non-intrusive inspection equipment, such as X-ray machines, is either not available or is outdated and often breaks down, causing customs officials to conduct manual checks on vehicles and cargo. All of the above is the reason for their high costs and time to cross borders in the region. The shortage of freight wagons in Uzbekistan is causing delays in the return of wagons owned by other countries from

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Uzbekistan. This increases the cost of delivering goods to Uzbekistan, as wagon owners in Kazakhstan are reluctant to rent out their wagons for shipment to Uzbekistan.

Solution: Adopt a financing program with a rate of up to 4% aimed at stimulating the purchase of saddle tractors and universal platforms for the transportation of containers.

4. *High rates*. Tariffs charged by the Kazakh railways for the transit transportation of goods are significantly higher than the tariffs for transportation to/from/within Kazakhstan. In this regard, goods transported to Uzbekistan are often reloaded from railway to road transport in the Turkestan region. Lack of economies of scale due to small volumes, because of which transit transportation through Kazakhstan is carried out using the technology of wagon shipments. It should also be mentioned that China subsidizes transportation to Europe but is less interested in transportation to/from Central Asia.

Solution:
   – Transition to an open and transparent model for the formation of tariff and transit policies of transit countries. UTLC-ERA provides direct forwarding services. According to the same principle, organising an integrated company, including TITR participants - Kazakhstan, Azerbaijan, Georgia, and Uzbekistan is possible.
   – Launch of a regular container train.
   – Creation of large multimodal terminals (for example, by combining small ones), which will serve as the central transhipment hubs of the country. The scale of operation of such terminals (typically 200,000 TEUs per year) will make it possible to develop a schedule for the regular departure of block trains to Europe and Asia.

5. *Regional terrorism* is due to proximity to the borders of the Central Asian region.

Solution: Systems must be considered to ensure the security of transport and logistics activities and cooperate with specialized services partner countries.

6. *Low level of digitalization and application of information systems*. Due to the lack of information support, foreign carriers and service consumers cannot track their cargo and vehicles. Therefore they are suspicious of the transportation of goods through the territory of Kazakhstan and Uzbekistan.

Solution: Creation and development of integrated transport services based on a digital platform.

Thus, having considered the factors influencing the development of corridors between Kazakhstan and Uzbekistan, it is possible to determine the components that should be included in the model of an industrial and logistics hub in the border area (see Figure 1).

The planned industrial and logistics hub aims to strengthen cross-border cooperation with a focus on industrialization, where production and processing can be carried out in an integrated manner in one zone.

In world practice, to develop logistics hubs, it has regulatory support from the state - the organization of special economic zones with a preferential taxation regime, the presence of customs points with simplified and accelerated customs operations, and assistance in the acquisition of land. In this regard, the hub would be more attractive to investors and operators if it were given a status equivalent to the free economic zone. At the same time, this industrial and logistics hub should be different from other free economic zones, offering unique features for a cross-border hub, such as improving border crossing procedures and achieving economies of scale through Kazakhstan-Uzbekistan joint development, investment, and production.

Regional cooperation should be based on complex industries (for example, the EU); it is very difficult or impossible to ensure collaboration based on the predominance of primary industries. It is necessary to identify basic projects with great potential to create new points of growth, construction, and development of the entire industrial zone. The hub could occupy an important niche of innovative technologies and support start-ups in developing and testing alternative
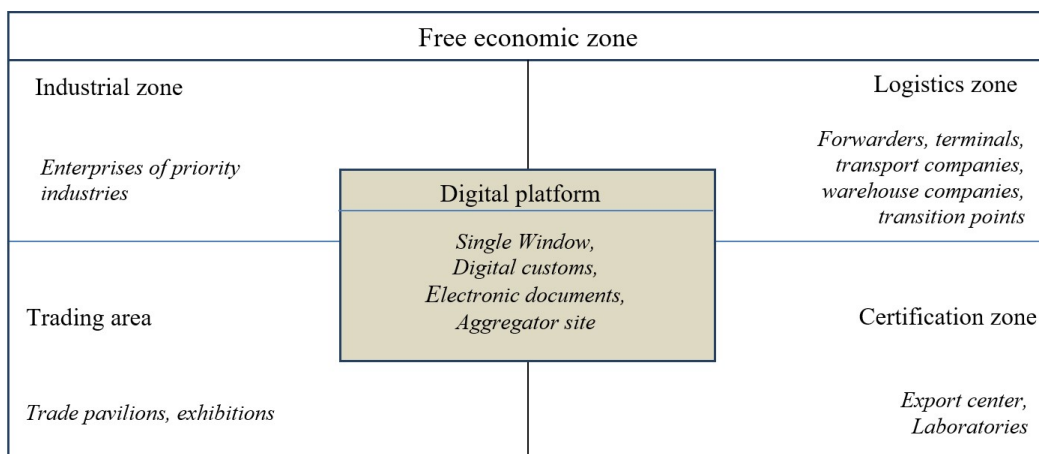
FIGURE 1. Components of the industrial and logistics hub model

Note: compiled by authors

energy sources and energy-saving technologies, thus becoming an analogue of Silicon Valley. As one of the critical areas, the development of the agro-industrial complex industry with an emphasis on producing ecological products can also be.

It is obligatory to have support measures, financial, and consulting to develop exports - for which it is necessary to include an export center. These measures also include interaction with government agencies, industry, and business organizations, on customs procedures, veterinary and quarantine services, and sanitary and epidemiological control.

A multidisciplinary laboratory for product certification will be able to carry out the entire range of product analyses following international standards, which will increase the export potential of countries. In this regard, it would be convenient to connect the e-certification service in the field of conformity assessment "E-certification", which provides for full traceability of the processes for issuing documents on conformity assessment in electronic form.

Digitalization of the logistics hub and creation of "Intelligent Dry Port " is an open and neutral platform connecting several systems, thus ensuring a secure and intelligent exchange of information between the various organizations that comprise the port community (CAREC, 2021).

Trade facilitation is essential for the development of cross-border trade. Currently, many digital services have been introduced into transport activities. Based on the best practices of foreign countries, it is possible to extract such areas of digitalization as:

– European Common Transit System (NCTS) allows you to check the goods before they arrive at the border, which reduces the time customs procedures and the cost of transporting goods;

– the Free and Secure Trade Lane freight program between Mexico and the US, and the US and Canada. The program ensures the free movement of trucks and pre-approved transportation and cargo;

– the Border Wizard provides essential information about cross-border traffic and offers alternative ways to manage traffic. System planning at border crossings has made border control more efficient;

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– the Super Green Lane Plus (SGL+) program in the Philippines aims to provide priority customs clearance lanes. Companies with good to her reputation have an exemption from documentation, physical inspection, and exemption from post-clearance audit for three years.

There are already positive examples in the direction of digitalization of logistics processes. Kazakhstan has organized electronic data exchange in the IFTMIN format of the EDIFACT standard, since 2018 together with Russian Railways on certain transportation routes are carried out in electronic form using an enhanced digital signature. There was a time saving for employees of consignors, and consignees due to the use of templates, the coverage of several documents at once by one operation, the prompt correction of detected errors, the absence of the need to visit the station, reducing the downtime of loaded wagons and containers. The "Electronic Train" project ensures the acceleration of customs procedures at the border with the help of prior information.

Thus, further directions for the development of digitalization can be:
– transition to electronic transportation documents and paperless workflow;
– development of interoperability formats with international electronic documents;
– systems for tracking the movement of goods using electronic navigation seals, infrastructure for reading and monitoring the passage of goods through transport hubs and logistics terminals;
– intelligent traffic analytics for modeling and optimizing transport corridors;
– creation and development of intelligent infrastructure in the format "Mobility as a Service" (Mobility as a Service/MaaS), allowing to digitize of the interaction processes between participants and electronic platforms for ordering logistics services;
– the possibility of implementing integrated "tickets" for multimodal transportation, selecting optimal routes for multimodal transportation, and will also create a tool for monitoring cargo flows in order to redistribute vehicles on routes and ensure connectivity between territories. Thus, an example of sites aggregating passenger tickets, the same service can be provided for container transportation;
– in issuing transport permits in digital form in the "single window" mode;
– digitalization and automation of customs control procedures;
– additional simplification and acceleration of customs procedures for carriers and cargo owners with a risk profile corresponding to a high level of reliability.

Another area for improvement in the countries under consideration is that it is difficult for carriers to find legal and practical information. For example, carriers and shippers often need to be made aware that their or a neighboring country has introduced or lifted import bans on certain goods. A digital portal with information about border crossing, insurance, and shipping rules can increase the efficiency of logistics activities. Online portals showing real-time border checkpoints can help carriers with route planning and governments with customs control.

In the future, there is great potential for the industrial and logistics hub to enter the markets of other countries by connecting to WLP hubs and increasing the connectivity of trade and transport systems. World Logistics Passport is an initiative to stimulate international trade through the first global loyalty program to simplify customs and trade operations and develop efficient multimodal corridors. This will speed up the movement of goods along international transport corridors and allow the hub to be technologically integrated into the international multimodal network.

5. CONCLUSIONS

Kazakhstan and Uzbekistan, being neighboring countries, have no access to the sea, but at the same time both countries are increasing their trade, export and transport potential. The study showed that this circumstance, despite the implementation of the countries of their own transport

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policy, involves finding common ground on participation in international transport corridors. In the context of global challenges, the processes of cross-border interaction are deepening. Cross-border communications of countries on participation in existing international transport corridors will give impetus to the development of not only border areas but also national economies as a whole. The transport and trade infrastructure will be developed with the formation of transport and logistics centers that ensure the uninterrupted passage of goods across the border. Such centers can be created in the border areas of neighboring countries, improving their infrastructure and providing employment for the population. However, the study revealed the main constraining factors for the development of such centers, which were described in detail above. The most unsolvable at the moment are delays during a customs inspection, and discrepancies in the legal framework of the transportation process. Infrastructure underdevelopment. This issue requires a comprehensive solution at the government level. Low level of digitalization and application of information systems. The creation and development of integrated transport services based on a digital platform will speed up this process. In addition, the use of non-tariff barriers also causes concern. In this regard, it is necessary to switch to an open and transparent model for the formation of tariff and transit policies on the part of transit countries.

UTLC-ERA provides direct forwarding services, according to the same principle it is possible to organize an integrated company, including TMTM participants - Kazakhstan, Azerbaijan, Georgia, and Uzbekistan. Creation of large multimodal terminals (for example, by combining small ones), which will serve as the central transshipment hubs of the country. The scale of operation of such terminals (typically 200,000 TEUs per year) will make it possible to develop a schedule for the regular departure of block trains to Europe and Asia.

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RESEARCH ARTICLE

Analysis of Features of Investment Attractiveness of Agriculture in Kazakhstan

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Abstract

The article reveals the peculiarities of increasing investment attractiveness in agriculture in Kazakhstan, that is, starting from the first years of independence, the country creates favorable conditions for attracting domestic and foreign investments to the country's economy. The possibilities of reviving natural production depend on the level of their accumulation and efficiency of use, especially during a change in the geopolitical situation, against the background of which Kazakhstan may occupy one of the best positions in the world in this industry. However, at the same time, agro-industrial investment processes, particularly agricultural production, have their characteristics due to their specifics. Attracting investment in the agro-industrial complex is a multifaceted task that covers the entire range of possible financial, economic, legal and organizational resources. Which, in turn, are aimed at developing and using optimal and effective mechanisms for investing in the agricultural sector. The study of the chosen topic was carried out using the following methods of cognition: dialectical method, method of theoretical analysis and synthesis of various sources of domestic and foreign literature, structural and functional method, the system method, comparative method, description method, statistical methods of information processing, method of summarizing the information and materials obtained in this work. Based on the study of this situation in the European and CIS countries, the main problems were identified, and solutions were proposed to increase investment attractiveness in the agro-industrial complex, as well as methods for assessing them were systematized.

1. INTRODUCTION

The agro-industrial complex of Kazakhstan is the largest inter-industrial complex, uniting several sectors of the country's economy. AIC and agriculture, in particular, is a strategic sectors of the country's economy, forming food and, accordingly, national security and independence of the country, especially in the period of geopolitical changes. The agrarian sector of Kazakhstan has a vast potential to increase production volumes, provided that appropriate investments are attracted, and advanced technologies and scientific achievements are introduced.

Since the first years of independence, Kazakhstan has created favorable conditions for attracting domestic and foreign investment into its economy. Possibilities of a revival of natural production and overcoming of crisis phenomena depend on the level of their accumulation and efficiency of use. Investment processes in agro-industrial, particularly agricultural production, have their features conditioned by their specificity and therefore require scientific research. Taking into account the current events in Ukraine, which is one of the main competitors in livestock and crop production, the agro-industrial complex of Kazakhstan today is attractive to both foreign and domestic investors.

Despite several studies on investment support for the agricultural sector and its investment attractiveness, some problems still need to be fully resolved, especially in investment support for agricultural enterprises.

The purpose of the study is to analyze the investment attractiveness of the agricultural economy of the Republic of Kazakhstan, and the main methods of assessing the investment provision of the agricultural sector are proposed.

Having analyzed the state of investment security of agriculture in Kazakhstan, as well as the situation in the member states of the Eurasian Economic Union, it is worth noting that it is possible to achieve high efficiency of agricultural production thanks to investments. The primary sources of agricultural investment in the Republic of Kazakhstan, despite the measures of state support for agriculture, in the form of State programs in the field of agricultural support are own funds, budgetary resources and funds attracted from commercial sources.

In the economic life of each country, investments are the dominant factor of development and occupy a leading place in the reproduction of production resources and, consequently, in the acceleration of economic growth.

Successful implementation of market reforms in the agricultural sector of the Republic of Kazakhstan is only possible with the effective structural restructuring of the economy and the creation of a favorable investment climate.

An essential condition for attracting investments, including foreign ones, is the formation and implementation of the investment attractiveness of the economic system, which should be understood as its ability to accept significant investments. Ensure their full and efficient use, payback and transformation of investment resources into production growth, a saturation of the market with liquid products, expansion of the investor's influence on the market and guaranteeing the return of invested capital.

In this context, the production of agribusiness products should ensure the country's food security and realize its export potential, primarily in the markets of EAEC countries, Central Asia, the Caucasus and the Middle East; and improve the well-being of rural workers and residents.

2. LITERATURE REVIEW

The category of "investment attractiveness" is an occasion for discussion because in the economic literature until today, there is no accurate idea of the content of this concept. In scientific works, the term "investment attractiveness" is equated with a number of similar

concepts: "market attractiveness", "investment climate", "investment image", and "investment potential" (Dontsova & Nikifirova, 2004; Zakirova et al., 2016; Roznina et al., 2018; Tsvetkov et al., 2018). They are not synonymous at the same time.

The most common definition is as follows: it is a system of various objective factors which together determine the investment potential of a region, taking into account possible investment risks and potential returns on invested funds (Jorgenson & Kuykendall, 2008). Investment attractiveness, according to the authors, should be understood as a complex economic characteristic, which is characterized by the financial condition and business activity, capital structure, corporate governance, the level of demand for products and their competitiveness and is influenced by the investment attractiveness of the country, region and industry (Kokhanovskaya & Barykina, 2019).

The investment attractiveness of an enterprise for investors is determined by the level of income that an investor can obtain from the invested funds. The main requirement for creditor investors is confirmation of the enterprise's ability to meet its obligations to repay capital and pay interest, and for investors involved in the business, confirmation of the ability to absorb the investment and increase the value of the investor's shareholding (Lavrenko, 2014).

The reliability of financial condition guarantees investment attractiveness and has much in common with it. In support of this, le Polain de Waroux argued that the financial position characterizes the allocation and use of funds of an enterprise. It is conditioned by the degree of fulfilment of the financial plan and the measure of replenishment of own funds at the expense of profit and other sources, as well as the speed of turnover of production funds and especially current assets (le Polain de Waroux et al., 2016).

There are many methods for assessing the investment attractiveness of an enterprise. The authors of the methods for assessing investment attractiveness are the following scientists. All methods can be divided into two groups: in the first group there are those methods which result in an integral estimation of the financial condition of an enterprise, and in the second group there are methods which take into account not only internal but also external factors (Testa et al., 2015). The term "investment attractiveness" means a set of indicators, including qualitative and quantitative characteristics. The definition of this concept serves as the basis for the study of principles and conditions of economic system development, functioning of sectoral, inter-sectoral complexes and individual economic entities (Zakirova, 2016). Mashkin emphasizes that investment attractiveness means the presence of such conditions of investment that influence investor's preferences in choosing one or another object of investment (Dozorova et al., 2021).

According to the definition of Krylov, Vlasova and Egorova: "investment attractiveness" is an economical category characterized by the efficiency of the enterprise property use, its solvency, stability of financial condition, its ability to self-development based on the increase of capital profitability, technical and economic production level, product quality and competitiveness (Krylov et al., 2020). According to the opinion of Russian scientists Zhukova and Nagovitsyn, one of the directions of increasing the efficiency of production in agricultural enterprises of various forms of ownership and organizational and legal forms is the activation of investment activity in all branches of the agro-industrial complex (Zhukova et al., 2016).

The effectiveness of investments, both of individual objects and their totality, is assessed, as a rule, using such indicators as the payback period, characterizing the initial point of covering investments with the total results of the project, profitability (efficiency), capital return and capital intensity, increase in profits and production volumes, reduction of labour costs and production costs per one tenge of attracted investments and others (Vorobyov et al., 2019).

Based on the study of scientific works of foreign and domestic scientists on finding investment attractiveness and its defining criteria, the concept of "investment attractiveness"can be characterized as:

(1)   it is advisable to consider investment attractiveness at all levels of the economic system - state, regional, sectoral, and the level of economic entities;

(2)   investment attractiveness can be represented as an independent economic category – a combination of external and internal factors, as well as qualitative and quantitative indicators of the investment potential of any of the levels of the economic system;

(3)   assessment of investment attractiveness at all levels of the economic system is carried out in the current period (analysis of the current situation) and the forecast period (forecast of the investment market).

Participants in assessing investment attractiveness are the main components of the economic system: the state, region, industry, and economic entity.

3. METHODS OF RESEARCH

When studying the situation and preparing the article, we used well-known research methods: a content analysis of modern sources, systematization of data, comparative and logical analysis, generalization, and statistical analysis of the dynamics of indicators.

The analytical part of the study is based on statistical and financial information: Kazakhstan Stock Exchange Survey "Agricultural Industry of the Republic of Kazakhstan, September 2021", "Agroindustrial Complex. Statistics of the Eurasian Economic Union". The methodological basis of the research was formed by the State programmers in the sphere of support of the agro-industrial complex, such as the Resolution of the Government of the Republic of Kazakhstan dated December 30, 2021, No. 960. On approval of the Concept of development of the agro-industrial complex of the Republic of Kazakhstan for 2021 - 2030, as well as statistical compilations of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan.

The analysis of the investment attractiveness features was based on the data obtained фccording to the statistical data of the collection "Agro-industrial complex. Statistics of the Eurasian Economic Union", an analysis was made of the situation in the agro-industrial complex of five countries. The leading socio-economic indicators of agriculture in the Eurasian Economic Union member states for the five years from 2018 to 2022 are considered.

Based on the national statistics data, the situation in attracting investments in agriculture of the Republic of Kazakhstan was analyzed. Three assessment methods are proposed to assess the investment attractiveness of Kazakhstan's agro-industrial complex. Using these methods in the development of state programs will ensure the rational distribution of investment funds in agriculture, which will increase the industry's efficiency.

4. RESULTS AND DISCUSSIONS

Russia and Ukraine are significant competitors in the agricultural sector. However, in light of recent changes in the geopolitical situation, i.e. the military action in Ukraine, great opportunities are opening up for our country and expanding markets for agricultural products worldwide. Active investment activity in Kazakhstan's agro-industrial complex is a prerequisite for its development, and attracting investment in the central agricultural regions is a crucial task for modern society and the state. Investment attractiveness is the most critical factor influencing the efficiency of an enterprise's activity. The simultaneous impact of investment potential and risk determines an enterprise's investment attractiveness. The higher the investment attractiveness of the enterprise, the higher the volume of attracted investments, which, in turn, contributes to its expanded reproduction and increased competitiveness. A low level of investment attractiveness exacerbates the problems associated with poor performance of the enterprise.

The need for investment activities in the agro-industrial complex stems from its essence. With investments, it is possible to create the agro-industrial complex, its current activity, and its further development. This predetermines the urgent need for investment activity in the agro-industrial complex during its functioning.

On the other hand, the investment activity of individual enterprises of the agroindustrial complex assumes economic growth. The country provides a higher level of welfare for the population. This is the essence of the importance and role of investment activities of enterprises in this sector of the economy for the country's whole economy.

The assessment of investment attractiveness plays a vital role in analyzing investment activities for several reasons. First, the investor is interested in returning the invested funds with a specific benefit based on supply and demand in the market of investment resources. Secondly, the investment process in the agroindustrial complex has a pronounced regional character. The functioning of the agroindustrial complex is delineated by space and time, as mentioned above. Thirdly, the comparability and comparability of economic indicators in absolute and relative values is easily ensured in the agro-industrial complex.

Based on the comparability of agricultural performance across different regions of the country and even internationally, it also makes it possible to assess the investment attractiveness of a particular region. However, this does not necessarily mean that where there is security. For example, a high grain yield is more likely to be invested there, but it can also happen that quite a lot of money was invested at one time. Now the possibility to invest has been exhausted and vice versa. Wherever yields are low, there is a real possibility to increase them by investing. Therefore, it cannot be stated unequivocally that the investment attractiveness is ensured only by the reported economic performance.

The Republic of Kazakhstan, the Republic of Armenia, the Republic of Belarus, the Kyrgyz Republic and the Russian Federation became members of the Eurasian Economic Union in 2015. This symbiosis is an international, regional economic integration organization with an international legal personality established by the Treaty on the Eurasian Economic Union. According to the statistical data of the collection "Agro-industrial complex. Statistics of the Eurasian Economic Union", it is possible to analyze the situation in the agricultural sector of the five countries (see Table 1).

TABLE 1. Main socio-economic indicators of agriculture in Eurasian Economic Union member states

Country	Years				
	2018	2019	2020	2021	2022
Gross domestic product (billion US dollars)					
Armenia	12,4	13,6	12,6	13,9	12,9
Belarus	60,0	64,5	60,8	68,2	51,8
Kazakhstan	179,3	181,7	171,1	193,0	143,0
Kyrgyzstan	8,3	8,9	7,8	8,5	7,1
Russia	1 660,7	1 693,3	1492,8	1778,9	1 532,2
EEU	1 920,7	1 962,0	1745,1	2 062,5	1 747,0
Share of agriculture, forestry and fisheries in the gross value added of the economy as a whole (percentage)					
Armenia	1,9	1,9	1,8	1,9	2,5
Belarus	9,2	9,9	9,3	9,9	12,0
Kazakhstan	13,1	13,5	15,4	17,3	20,1
Kyrgyzstan	3,0	3,2	3,2	3,8	4,2
Russia	85,5	89,6	89,9	102,8	131,2
EEU	112,7	118,1	119,6	135,7	170,0

Fixed capital investment in agriculture, forestry and fisheries Billions of units of national currency					
Armenia	4,9	4,2	3,2	4,2	4,1
Belarus	11,2	11,8	13,1	13,8	13,7
Kazakhstan	3,3	3,9	4,6	5,9	6,1
Kyrgyzstan	2,0	2,0	1,9	1,8	1,9
Russia	4,4	4,4	4,2	4,2	4,1
Note: compiled by authors based on data Statistics of the Eurasian Economic Union (2022)					

As seen from this Table 1, the share of agriculture, forestry and fisheries in the gross value added of the EAEU economies as a whole is insignificant. This is because the agribusiness sectors are characterized by low labor productivity and are also located in a high-risk farming zone, requiring a considerable amount of investment in the fixed capital of the agribusiness sector. In particular, in the Republic of Kazakhstan, the output of agricultural products in 2022 in crop production by 39.4% formed by peasant and private farms. In livestock production, this indicator reached 67.1%. Thus, private and subsidiary farms produce almost half of the country's agricultural products.

Cereals account for about 69.1% of the total crop area, and Kazakhstan is one of the world leaders in grain and flour exports. The main export markets are Central Asia, Azerbaijan, Afghanistan and Iran.

In 2020, due to the Covid - 2019 pandemic, there was a decline in economic activity that affected all member states and almost all sectors of the economy. The decline in the EAEU was 2.9% and lower than in the Euro zone (6.6%) and the USA (3.5%). The decline was observed in most sectors of the economy: investment in fixed capital decreased by 4.2%, retail trade turnover by 4.1%, freight turnover by 4.8%, and passenger traffic almost halved (by 49.1%). Only construction (0.7%) and agriculture (2.3%) maintained a positive trend (Agribusiness. Statistics of the Eurasian Economic Union: Statistical collection, 2020).

Investment attractiveness is that more comparative production efficiency per unit of investment is achieved by investing. In order to inject it, potential calculations are needed. In order to increase the investment attractiveness of the agricultural sector, it is necessary to introduce a number of financial instruments aimed at reducing the cost of loans attracted to finance AIC projects and instruments to reduce the risks of lenders and investors. According to the national statistics of the ASE&RK for 2018 - 2020, the total gross output of agriculture increased from 4.5 trillion tenge to 6.3 trillion tenge. The share of the service sector in total gross agricultural output fell from 13.1 billion tenge to 10.9 billion tenge, which is less than 0.2 per cent. Because of the underdeveloped service infrastructure, today, agricultural enterprises are forced to buy the inputs required for production at high prices and sell their products at low prices. In addition, the vast majority of small and medium-sized producers are unable to retain specialists, even though they need their services the most.

Most farmers and peasant households do not have the possibility to obtain credit for the development of their farms. The main two reasons are, on the one hand, the underdevelopment of various types of financial instruments and the lack of structural subdivisions of second-tier banks in the field and, on the other hand, the lack of collateral that might be acceptable as collateral.

In addition to the low renewal rate of agricultural machinery and equipment in the sector, the situation could be better for small and household farms regarding energy supply and technical equipment.

In recent years, the following state support measures have been introduced to stimulate the development of cooperation: investment subsidies; reduction in the cost of harvested agricultural

raw materials; a special tax regime has been established for agricultural cooperatives, providing a 70% reduction in all taxes (Siksimbayeva et al., 2023).

In addition, there are simplified registration procedures, information and financial support, a state register and statistical monitoring.

According to the latest data, 2919 agricultural cooperatives and 49374 members were registered in Kazakhstan at the beginning of 2021.

However, these cooperatives' performance remains abysmal, which is a discouraging factor for most agricultural cooperatives. The 2018 audit revealed that 18% of cooperatives were inactive and 42% were "fictitious", organized to receive state subsidies.

According to a Finprom.kz study, in January-August 2021, investment in fixed capital in agriculture, forestry and fisheries amounted to 427 billion tenge, 46.2% more than a year earlier. Real growth in physical volume was 43.2%.

Most investments are directed to crop and livestock production: 99.4% of the RoK, or 424.4 billion tenge. Thus, 278.1 billion KZT was invested in one- or two-year crops, 98.2 billion KZT in livestock farming, 38.9 billion KZT in mixed farming, 7.8 billion KZT in perennial crops and 1.4 billion KZT in crop cultivation and animal breeding and crop processing activities.

The remaining investments are in fisheries (KZT2.5 billion) and forestry and logging (KZT77.3 million). In the same period of 2020, 292 billion tenge was invested in the agricultural sector, plus 10.7% for the year (Statistics of the Eurasian Economic Union, 2022). In Figure 1 presents fixed capital investments from 2015 to 2021.
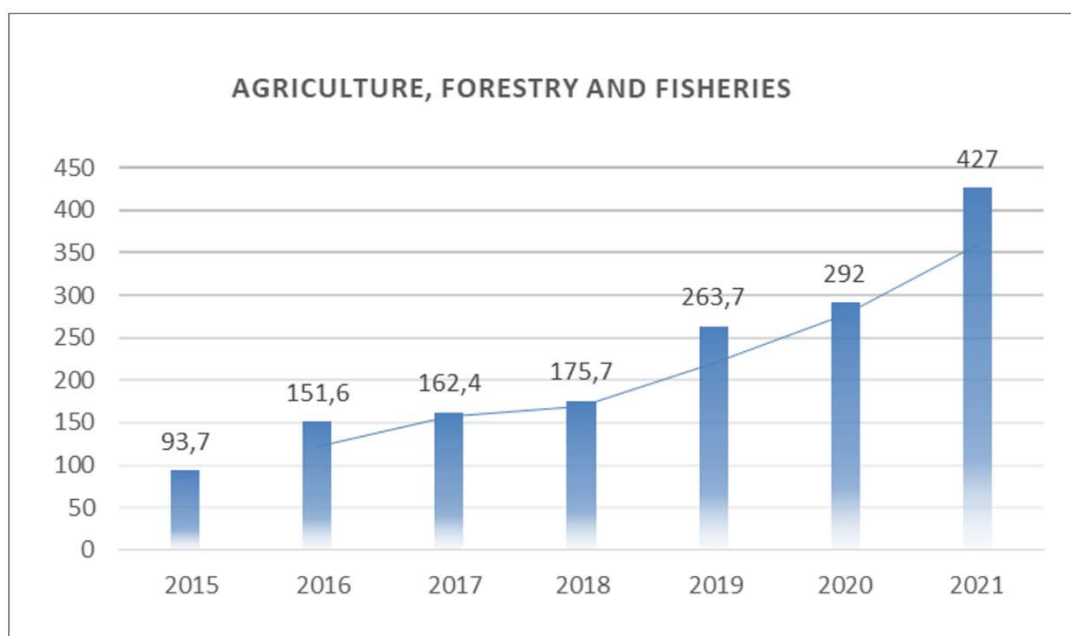
FIGURE 1. Fixed capital investment for 2005-2021

Note: compiled by the authors based on the data from the Bureau of National Statistics (2022)

Most of the investment in the sector came from enterprises' funds: 291.9 billion tenge, 43.8% more than last year. Non-bank loans accounted for 116.6 billion tenge, 76.3% more than last year. Bank loans financed 18.5 billion tenge, 19.1% less than a year earlier. There were no

direct capital investments from budgetary funds in the sector (Statistics of the Eurasian Economic Union, 2022). The level of the ratio of investment in fixed assets is presented in Table 2.

TABLE 2. Investment in fixed capital. Agriculture, forestry and fisheries

Investment	2020	2021	growth
Total	292,0	427,0	46,2%
Equity funds	203,1	291,9	43,8%
Borrowed funds	66,1	116,6	76,3%
Loans from banks	22,8	18,5	-19,1%
Note: compiled by authors based on the data from the Bureau of National Statistics (2022)			

According to data from Government Decision No. 960 of 30 December 2021 on approval of the Concept of Development of the Agro-industrial Complex of the Republic of Kazakhstan for 2021-2030, the trend of stable development in crop production has not changed.
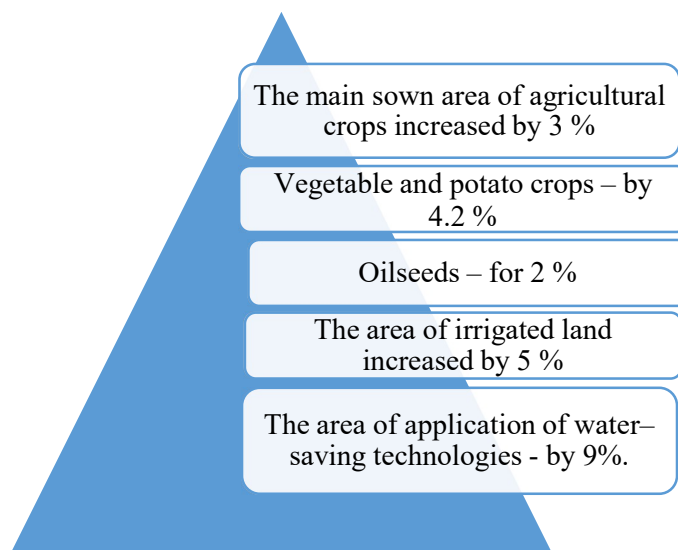
FIGURE 2. Main area under crops in Kazakhstan

Note: compiled by authors based on the data from the Bureau of National Statistics (2022)

The average yield of potatoes rose by 4%, vegetables by 3%, sugar beet by 6% and fruit and berry crops by 7.8%. However, diversification in the crop sector needs to be at an adequate level. Monoculture is predominant in the country's major grain-growing regions. More attention should be paid to the development of forage production. The extension of irrigated land and the introduction of modern water-saving technologies are prolonged. There are areas for improvement in the work on the preservation of soil fertility. The volume of applied mineral fertilizers is only 23% of the scientifically grounded norms and only 1.2% for organic fertilizers. During this period, domestic fertilizers accounted, on average, for 65% of the total fertilizer application, while imported fertilizers accounted for 35%. Fertilizers not produced in the republic (urea, ammonium sulphate, complex (nitrogen-phosphorus-potassium) fertilizers, liquid and micro fertilizers) are in demand among agricultural producers. There is a problematic situation in the seed production system as well. Because of insufficient development of the domestic seed

production system, the provision of seeds of the main crop varieties is decreasing. Thus, the import of wheat seeds for the last five years increased by seven times, barley seeds - by four times, and provision with seeds of hybrids of oil-bearing, vegetable crops and sugar beet is about 10 %. The renewal rate of the technical fleet in agriculture also needs to catch up to the requirements of the time. Thus, in 2020 this figure was 4.1 %, while the norm is 6-8 %. About 76% of the technical fleet has a more than ten-year service life. In most regions, there is no real diversification in the crop sector, and land use regulations are violated without effective control methods.

Recently, work on developing organic farming has continued in the country. Since 2009 the certified areas of organic land have more than doubled - from 134 thousand ha to 300 thousand ha. Currently, 70 farms have received certificates from foreign bodies for confirmation of compliance for the production of organic products. In 2020, Kazakhstan exported 12.5 million USD worth of organic products.

According to IFOAM's international ranking of 123 countries, Kazakhstan ranks 9th among countries exporting organic products to EU member states, including such strategic products as organic wheat in fourth place and organic oilseeds in sixth place.

The potential for developing organic farming is not being utilized to the extent it is available. Of the total area of 22 million hectares of crops on organic crop technology is cultivated only about 1.5%. At the same time, according to calculations of foreign experts in Kazakhstan, 46% of used arable land (11.5 million hectares) and 70% of pastures in ecological condition are suitable for organic crop and livestock production. There is no domestic market for certification services in organic production. There are no forms of collective certification of organic producers.

To assess the investment attractiveness of Kazakhstan's agro-industrial complex, we propose using three methods of approach to assessing the investment attractiveness. These methods are recommended in domestic and foreign literature (see Table 3).

TABLE 3. Methods for assessing investment attractiveness

Name of methods	Formula	Reference
Integral assessment method	$$I_y = \sum_{I=1}^{n} X_i * p_j$$ Where Iy-is the integral indicator of investment attractiveness; n-number of indicators included in the assessment; Xi-weight of an individual indicator; pj-point depending on the change in the particular indicator.	is calculated on the entire set of indicators that characterise investment attractiveness
Point system	Grade I, absolute financial strength, -value of the integral indicator 100-97 points. Grade II, normal financial stability, -value of integral index 96-67 points. III class, relative financial instability, -Integral indicator score 66-37. - Grade IV, absolute financial instability, -Integral indicator value 36-11 points. -Grade V (10-0 points) -crisis financial condition	The analysis of investment attractiveness is carried out according to groups of indicators, which are assigned a score (Zhukovaet al., 2016)

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Rating the financial situation of a company	1) Evaluating the profitability of economic activities; 2) evaluation of management efficiency; 3) evaluation of business activity; 4) evaluation of liquidity and financial stability.	a tool for comparative analysis and assessment of investment attractiveness. A. D. Sheremet's methodology was used (Sheremet, 2011), according to which the initial indicators for rating assessment are formed into four groups
Note: compiled by authors		

Investment projects in agriculture, as well as in other sectors of the economy, are subject to numerous risks. Based on a review of the practice of analyzing the risks of implementing investment projects in the agro-industrial complex, including ways to assess them, it can be concluded that in most cases, it is not possible to determine the exact quantitative value of each risk of an investment project at the stage of its preparation. At the same time, a qualitative assessment of the risks of an investment project carried out with the involvement of consultants and experts and with sufficient data on the cost of the project and ways of its implementation, including from a financial point of view, allows us to make a realistic enough representation of the possible risks of the project and their size in order to further implement their rational distribution among project participants and qualified management of them in the process of implementation.

5. CONCLUSION

In conclusion, there is a need to say once again about the importance of the Kazakhstan agro-industrial complex as a whole and the investment attractiveness of agriculture. In light of recent geopolitical changes, the main competitors in this area, Russia and Ukraine, are embroiled in a military conflict. Favorable opportunities have been created for our country to be a leader in the world market of exporters of agricultural products. However, it is necessary to emphasize the negative aspects that affect the final results. For example, it should be noted that due to the low investment potential and shortcomings in working capital, all agricultural producers' profits go to current assets, leaving virtually no funds for capital investments. Therefore, the intensification of investment activity, including the search for additional sources of investment, is not only the primary condition for preventing a crisis in agriculture but also becomes the determining direction of its long-term development.

After conducting a study of a number of methods used to assess the investment attractiveness of the agro-industrial complex of Kazakhstan, it can be concluded that all the developed methods have both advantages and disadvantages. Currently, there is no single, well-established comprehensive methodology for assessing the attractiveness of the agricultural sector, which would not have drawbacks and would help investors make the right decision.

Three assessment methods have been proposed: the method of integral assessment, the scoring system and the rating assessment of the financial condition. Nevertheless, these methods for assessing investment attractiveness can be considered purely subjective for a given sector of the national economy.

The investment attractiveness of agriculture largely determines its competitiveness through the timely technological renewal of production. Objective and inverse relationship. The more technologically advanced the production, the more efficient and investment-attractive it is.

In addition, this paper describes the multiplier effect of investment attractiveness. Once attracted, investments enhance subsequent investment flows, creating conditions for transitioning to a new technological order. It seems possible to break the vicious circle of technological backwardness due to insufficient investment if agricultural enterprises widely use financial instruments to attract additional capital, combined with publicity and openness to the investment community of their strategic goals and recent decisions to achieve them.

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1. INTRODUCTION

In the context of Kazakhstan, the real estate market holds significant importance, with Almaty city being a prominent hub of economic activity. Understanding the dynamics of the real estate market in Almaty is crucial for various stakeholders, including investors, developers, and policymakers. This research aims to analyse the real estate market in Almaty city using a system dynamics approach, shedding light on its unique characteristics and uncovering the drivers of price volatility.

The real estate market is a complex system influenced by a multitude of factors, such as supply and demand dynamics, economic conditions, government policies, and market expectations. Analysing such a complex system requires a comprehensive approach that can capture the interrelationships and feedback loops between these factors. System dynamics, a powerful tool developed by the Massachusetts Institute of Technology (MIT), offers a suitable methodology for understanding and analysing complex systems.

By employing the system dynamics modelling approach, this research seeks to provide a comprehensive analysis of the real estate market in Almaty. It aims to capture the dynamic nature of the market, taking into account the various factors that influence its behaviour. Through this analysis, the study aims to uncover the specific drivers of price volatility and provide valuable insights for stakeholders.

Understanding the drivers of price volatility in the real estate market is essential for making informed decisions. Price volatility can have significant implications for investors, developers, and policymakers, affecting investment strategies, development plans, and policy formulations. By identifying and analysing the factors contributing to price volatility, this research aims to enhance the understanding of the real estate market in Almaty and provide a foundation for evidence-based decision-making.

The findings of this research can contribute to the existing body of knowledge on real estate market analysis, particularly in the context of Almaty city. By utilising the system dynamics modelling approach, this study offers a progressive method for analysing the real estate market, providing a deeper understanding of its dynamics and behaviour.

1. INTRODUCTION

Today, the real estate market is an integral part of the economic growth of any country. Real estate and the level of its development are important both economically and socially since it satisfies one of the basic human needs - the need for housing. For a significant part of the population, housing is the main source of wealth, a condition for preserving the family and supporting psychological balance and confidence. Features of the current state of development of the economy, which has entered a phase of recession and is just beginning to recover, real estate market research is becoming particularly relevant.

Analysing real estate markets and understanding the factors driving price volatility is of utmost importance in today's dynamic economic landscape. Real estate markets worldwide exhibit various levels of volatility, making it crucial to conduct thorough analyses to comprehend the underlying reasons behind price fluctuations. Numerous studies have been dedicated to explaining market volatility and identifying the factors that contribute to rising prices. However, it is essential to recognize that there is no universal answer applicable to every country or region. Each locality requires its analysis to grasp the true dynamics at play.

System dynamics is an approach to understanding complex systems that emphasizes the importance of feedback loops and time delays in shaping their behaviour. This approach was pioneered by Jay Forrester, a professor at the Massachusetts Institute of Technology (MIT), who developed a series of computer models to simulate the behaviour of social and economic systems. Forrester's work on system dynamics has influenced fields ranging from business management to environmental policy. One key insight into system dynamics is the importance of looking beyond simple cause-and-effect relationships and instead focusing on the complex feedback mechanisms that can cause systems to behave in unexpected ways. Another important contribution of system dynamics is its emphasis on the role of time delays in shaping system behaviour. By modelling how actions taken today can have long-term effects, Forrester's work has helped policymakers and business leaders better understand the consequences of their decisions. Overall, the system dynamics approach and the MIT analysis developed by Forrester and his colleagues have been instrumental in advancing our understanding of complex systems and shaping policy decisions in a wide range of fields (Forrester et al., 1976; Foster, 2002; Baryla & Ztanpano, 1995; Norris & Byrne, 2018).

Many methods of real estate valuation depend on the direct ownership and management of it, as they are influenced by social, economic and institutional factors, emerging risks and the taxation system. This requires finding new ways to evaluate real estate and the ability to take a global look at many current and future processes, to see their relationship and mutual influence, as well as the ability to determine strategic directions and prospects for the development of this type of market. In addition, the real estate market refers to the resource market, then it is affected by other factors that are characteristic of the resource market. This is not only competition, the level of labour costs, demand, the level of profitability, and the state of the financial sector, but also the conditions for the functioning of this market, characteristic of the existence of a market pricing mechanism.

Various factors, including demographic trends, interest rates, and consumer confidence drive demand for real estate. Economic conditions, such as GDP growth and unemployment rates, also significantly shape the real estate market. In addition, government policies and regulations can impact the market through measures such as tax incentives and zoning laws. Overall, the real estate market is a complex system that is shaped by a range of economic, social, and political factors, and understanding these dynamics is essential for policymakers, investors, and industry professionals alike. Real estate prices have been a topic of interest for economists and investors

for decades. Thus, this paper employs the system dynamics modelling approach to shed light on the specific real estate market dynamics in Almaty city.

2. LITERATURE REVIEW

The real estate market is a crucial component of any economy, and its performance can have significant impacts on economic growth and stability, according to 1. Antolin-Diaz et al. (2017), the real estate market is affected by various factors, including supply and demand forces, the state of the overall economy, and government policies and regulations. One major market aspect is the supply of available properties, which can be influenced by factors such as the level of new construction and the rate of foreclosures and bankruptcies (Albanesi et al., 2022). One historical trend in real estate prices is the cyclical pattern of booms and busts. According to Duca et al. (2021), these cycles are often driven by changes in interest rates, economic growth, and consumer confidence. For example, during the early 2000s, interest rates were low, and the economy was strong, leading to a boom in real estate prices (Norris & Byrne, 2018). However, when the housing bubble burst in 2008, it resulted in a major recession and a significant drop in real estate prices. Another historical trend in real estate prices is the impact of location. Real estate prices in desirable locations tend to be higher than those in less desirable areas. This trend has been observed throughout history, from the early days of urbanization to modern times. Additionally, there is a strong correlation between population growth and real estate prices. As populations increase, demand for housing also increases, leading to higher prices. Overall, historical trends in real estate prices are influenced by various factors, including interest rates, economic growth, location, and population growth (Norris & Byrne, 2018).

Various factors, including external factors, influence real estate prices. According to Girdzijauskas et al. (2022), external factors that affect real estate prices include economic growth, interest rates, inflation, and government policies. Economic growth impacts real estate prices by increasing property demand, leading to higher prices. Interest rates have a direct effect on the affordability of mortgages, which affects the demand for properties. Low-interest rates make it easier for people to obtain a mortgage, leading to increased demand and higher prices. Inflation also affects real estate prices, reducing the purchasing power of money, and making it more expensive for people to buy properties (Sitorus et al., 2022). Finally, government policies, such as tax incentives and zoning regulations, can significantly impact real estate prices. For example, tax incentives can encourage property investment, leading to higher demand and prices, while zoning regulations can limit the supply of properties, leading to higher prices. In conclusion, external factors such as economic growth, interest rates, inflation, and government policies play a crucial role in determining real estate prices (Olamide et al., 2022; Muellbauer, 2022).

Several internal factors affect real estate prices. The first factor is location. Properties located in prime locations, such as those near the city centre or in exclusive neighbourhoods, tend to have higher prices compared to those located in less desirable areas (Ali & Chua, 2023). The second factor is the condition of the property. A well-maintained property with modern amenities such as air conditioning, a swimming pool, and a security system will have a higher value than a poorly maintained property with modern amenities. The third factor is the size of the property. More extensive properties tend to have higher prices compared to smaller properties due to the perceived value of having more space. The fourth factor is the demand and supply of properties in the area. Prices tend to increase when demand is high and supply is low. Conversely, prices tend to decrease when demand is low, and supply is high. The fifth factor is the financing options available to buyers. When financing options are readily available, and interest rates are low, buyers are more likely to purchase properties, leading to increased demand and higher prices. Overall, these internal factors play a crucial role in determining the value of real estate properties

and should be considered by buyers and sellers (Deng et al., 2022).

The real estate market is a complex system influenced by various factors such as economic conditions, demographic changes, and government policies. Analysing this market through the lens of system dynamics can provide valuable insights into its behaviour and help identify key drivers of change. System dynamics can be used to model the interactions between different components of the real estate market, such as supply and demand, prices, and investment. By analysing these interactions, researchers can identify feedback loops and other dynamic mechanisms that contribute to the overall behaviour of the market. For example, a positive feedback loop between rising prices and increasing demand can create a bubble in the market. In contrast, a negative feedback loop between falling prices and decreasing demand can lead to a market downturn. By understanding these dynamics, policymakers and investors can make more informed decisions about managing the market and mitigating potential risks. Overall, system dynamics is a powerful tool for analysing the real estate market and can provide valuable insights into its behaviour and future trends.

3. METHODS OF RESEARCH

System dynamics modelling offers several advantages for conducting research in the real estate domain. Firstly, it enables the examination of complex feedback loops and interactions among various factors influencing market dynamics. Real estate markets are highly interconnected systems, affected by factors such as supply and demand, economic conditions, government policies, and investor behaviour. System dynamics modelling allows us to capture these intricate relationships and simulate their effects over time. Secondly, system dynamics models facilitate scenario testing and sensitivity analysis. By manipulating different variables within the model, we can assess the impacts of various policy interventions, economic changes, or external shocks on the real estate market. This capability aids policymakers and stakeholders in making informed decisions and formulating effective strategies to manage volatility and ensure market stability.

Furthermore, system dynamics models can incorporate quantitative and qualitative data, allowing for a holistic market understanding. By integrating historical market data, expert opinions, and real-world observations, we can enhance the accuracy and reliability of our analysis, providing a comprehensive picture of the Almaty real estate market.

System dynamics methodology is a tool that is used to model and analyse complex systems. It is a powerful tool that helps understand complex systems' behaviour over time. System dynamics methodology is based on the concept of feedback loops and stocks and flows. Feedback loops are the processes that help regulate the system's behaviour. Stocks, on the other hand, are the accumulations of resources or materials over time. Flows represent the rate at which resources or materials move into and out of the stocks. The dynamics of a system are influenced by the interactions between feedback loops, stocks, and flows. System dynamics methodology helps identify the key feedback loops that drive the behaviour of a system (Uriona & Grobbelaar, 2019). It also helps identify the stocks and flows that are critical to the system's behaviour. System dynamics methodology is helpful in a wide range of applications, such as business strategy, public policy, and environmental management. It helps in understanding the complex interactions between different components of a system and helps in identifying the leverage points for intervention. Overall, the system dynamics methodology provides a powerful tool for understanding the behaviour of complex systems and can be used to inform decision-making in a wide range of applications.

System dynamics methodology has been applied to various real-world scenarios to analyse and understand complex systems. According to Forrester, system dynamics is a methodology for

studying and managing complex feedback systems, such as those found in business, economics, engineering, and biology (Forrester et al., 1976). System dynamics methodology has been applied in various fields such as healthcare, environmental studies, and economics. For example, a study conducted by Sterman et al. applied system dynamics methodology to the healthcare system to analyse the impact of policy changes on healthcare costs and quality (Malakoane et al., 2020). The study concluded that policy changes could positively and negatively impact the healthcare system and that using system dynamics methodology can aid in the decision-making process. Furthermore, system dynamics methodology has also been applied to environmental studies to analyse the impact of climate change on natural resources. The methodology can aid in predicting the future state of the environment and assist in developing policies and strategies to mitigate the impact of climate change. Overall, using system dynamics methodology in real-world scenarios has proven to be a valuable tool in analysing and understanding complex systems and aiding decision-making.

The System Dynamics (SD) methodology is widely used to model complex systems, such as water resource management. However, it is essential to critically analyse the limitations of this methodology to ensure its proper application. Cumbo et al. (2020) identified several limitations of the SD methodology. One of the limitations is the difficulty of calibration and validation of the models. The models are based on numerous assumptions, which can lead to incorrect predictions if the assumptions are not tested and validated. Another limitation is the lack of transparency in the modelling process. The models are often complex and challenging to understand, which can make it hard for stakeholders to participate in the decision-making process. Furthermore, the models may not incorporate all the relevant factors influencing the system behaviour, leading to an incomplete understanding of the problem. Finally, the SD methodology may not be suitable for problems that involve nonlinear and discontinuous relationships, which can be challenging to model. Overall, while the SD methodology helps model complex systems, it is important to recognize and address its limitations to ensure its proper application.

In our model, the demand is determined by considering the population of Almaty citizens, specifically potential buyers who can purchase flats in the city. Almaty is known for its high prices, resulting in a lower willingness to pay among potential buyers than other cities. To estimate potential buyers, we divided the net increase in population by 4, representing the average number of families expected to acquire flats (see Figure 1).
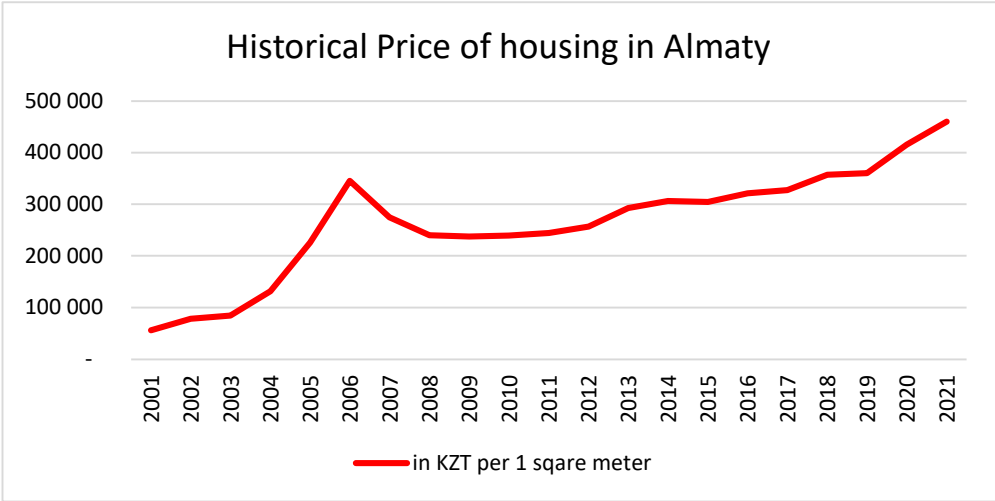
FIGURE 1. Historical price of flats in Almaty city for 2001-2022
Note: compiled by authors

On the other hand, the supply side consists of construction companies. The residential building construction market in Almaty is characterized by intense competition, which encourages innovation and provides city residents with improved housing options.

The first step is to identify the real problem and the client, which in this case is the volatility and unpredictability of pricing in Almaty, with construction companies as the client. To analyse the feedback structure of the system, we utilized Causal Loop Diagrams (CLDs). CLDs are versatile tools that visually depict the causal links between variables, indicating the cause-effect relationships through arrows. These diagrams are particularly useful for mapping the feedback structure of complex systems and capturing the mental model of the client team in the early stages of the project.

The behaviour of a system is generated by its feedback structure, which consists of fundamental patterns such as exponential growth, goal-seeking, and oscillation. Exponential growth is driven by positive feedback processes, goal-seeking by negative feedback, and oscillation by negative feedback with delays. More complex behaviour patterns, such as S-shaped growth, overshoot, and collapse, arise from the nonlinear interaction of these basic feedback structures. Understanding these patterns helps modellers discover the feedback loop structure of a system based on observed behaviour.

Positive feedback loops, also known as reinforcing loops, are denoted by a + or R, while negative loops, referred to as balancing loops, are denoted by a - or B. To determine if a loop is positive or negative, one can count the number of negative links within the loop. If the number of negative links is even, the loop is positive; if it is odd, the loop is negative. This rule works because positive loops reinforce change, while negative loops self-correct and oppose disturbances.

In our model, we consider two types of variables: Stocks and Flows. Stocks are represented by rectangles, symbolizing containers that hold the contents of the stock. Inflows are depicted by pipes (arrows) pointing into the stock, indicating the addition to the stock. Stocks introduce delays by accumulating the difference between the inflow and outflow of a process.

By utilizing these methodologies and understanding the feedback loop structure of the system, we can gain insights into the dynamics of the real estate market in Almaty and address the pricing volatility and unpredictability issues.

4. RESULTS AND DISCUSSIONS

The model is created by inputting the stocks, flows, variables and constants (auxiliaries) into an appropriate system dynamics modelling tool – Vensim PLE was used for the simulation in this paper, however, any similar simulation software is just as viable. The model is constructed by first creating the outline by selecting all of the necessary components, and then by inputting equations for these components based on Table 4. These equations are based on assumptions outlined in previous sections of this paper. In order to launch the model, first of all, we made a Causal-Loop Diagram with six loops reflecting the demand and supply of the real estate market (see Figure 2).

For this model, demand is considering the population of Almaty citizens, exactly potential buyers who are capable of purchasing flats in this city. Almaty is famous for its high prices, subsequently, willingness to pay is less in terms of purchasing by potential buyers, in comparison to other city conditions. In order to find potential buyers, we divided the net increase of population by 4, as an average number of families.
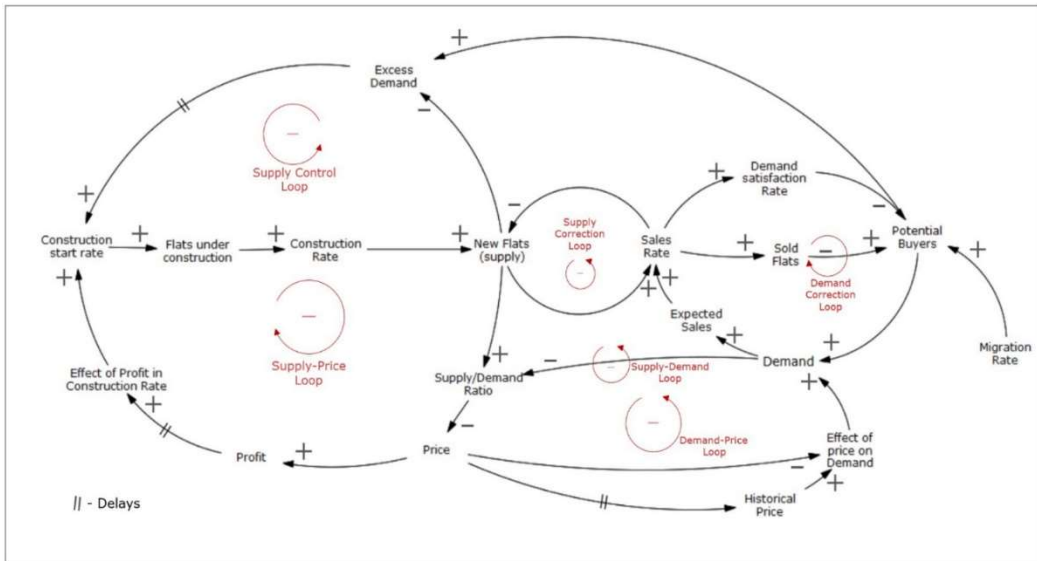
FIGURE 2. Causal and loop diagram of the real estate market in Almaty city

Note: compiled by authors

On the other hand, supply includes construction companies. Fierce competition exists in Almaty's residential building construction market, and it encourages innovation and gives city residents better homes. In this model, we identified expected cost and profit, deeply involved in understanding the mechanism of construction trends.

In our analysis, we focus on the Supply-Demand Loop, which is depicted in Figure 3.
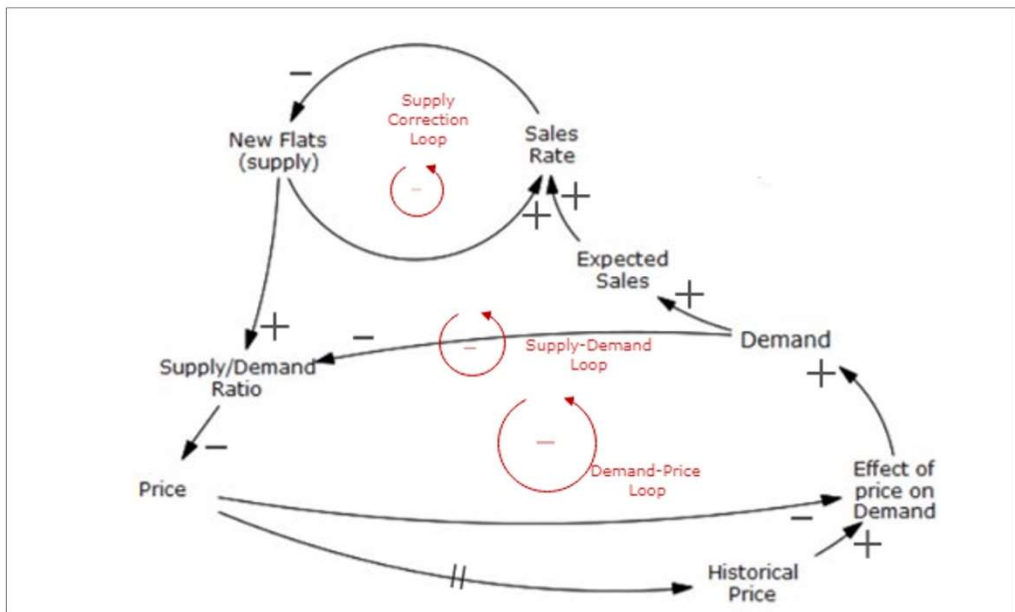
FIGURE 3. Supply-Demand Loop

Note: compiled by authors

This loop consists of several interconnected variables: Sales rate, New Flats (Supply), Supply-Demand (S/D) ratio, Price, Historical price, Effect of Price on Demand, Demand, and Expected Sales. When there is an increase in New Flats (Supply), it leads to a rise in the S/D ratio. Consequently, the increased ratio causes a decrease in Price, which, after a certain delay, impacts Historical Price. Simultaneously, Price negatively influences the Effect of Price on Demand. As a result, Demand, Expected Sales, and Sales rate are affected positively. Ultimately, the Sales rate has a negative effect on New Flats (Supply), leading to a decrease. By counting the number of negative links in this loop, we find that there are three, which is an odd number. This indicates that the loop is a balancing (negative) loop. The Supply-Demand Loop demonstrates the relationship between various factors in the real estate market. Changes in New Flats (Supply) have a cascading effect on the S/D ratio, Price, Historical Price, and other variables, ultimately influencing Demand and Sales rate. This loop plays a crucial role in maintaining a balance between supply and demand dynamics in the market.

This loop involves the variables Price, Historical Price, Demand, Effect of Price on Demand, and the Supply-Demand (S/D) ratio. In the Demand-Price Loop, there is a reverse relationship between Demand and the S/D ratio. When Demand appreciates or increases, it leads to a decrease in the S/D ratio. Additionally, this increase in Demand has a positive effect on Price and influences the Effect of Price on Demand in a favourable manner. By counting the number of negative links in this loop, we find that there is one, which is an odd number. This indicates that the loop is a balancing (negative) loop.The Demand-Price Loop demonstrates the interplay between Price, Historical price, Demand, the Effect of Price on Demand, and the S/D ratio. The loop illustrates how changes in Demand affect the S/D ratio, Price, and the relationship between Price and Demand. It plays a crucial role in maintaining a balanced dynamic between price levels and demand in the real estate market.

The next significant loop is Demand-Price Loop depicted in Figure 4.
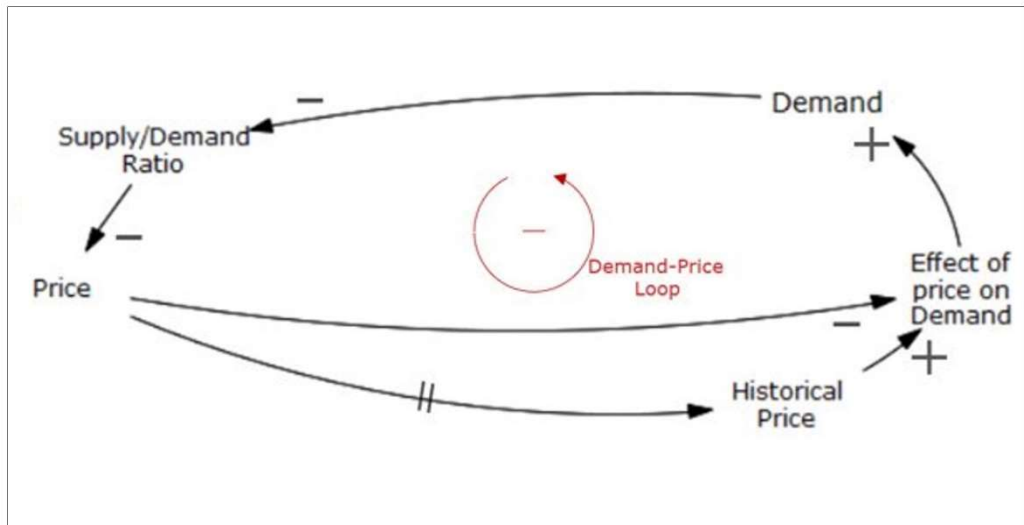
FIGURE 4. Demand Price Loop

Note: compiled by authors

The Supply-Price Loop, illustrated in Figure 5, encompasses the following variables: Construction start rate, Flats under construction, Construction rate, New flats (Supply), Supply-Demand (S/D) ratio, Price, Profit, and the Effect of Profit on Construction start rate. When there
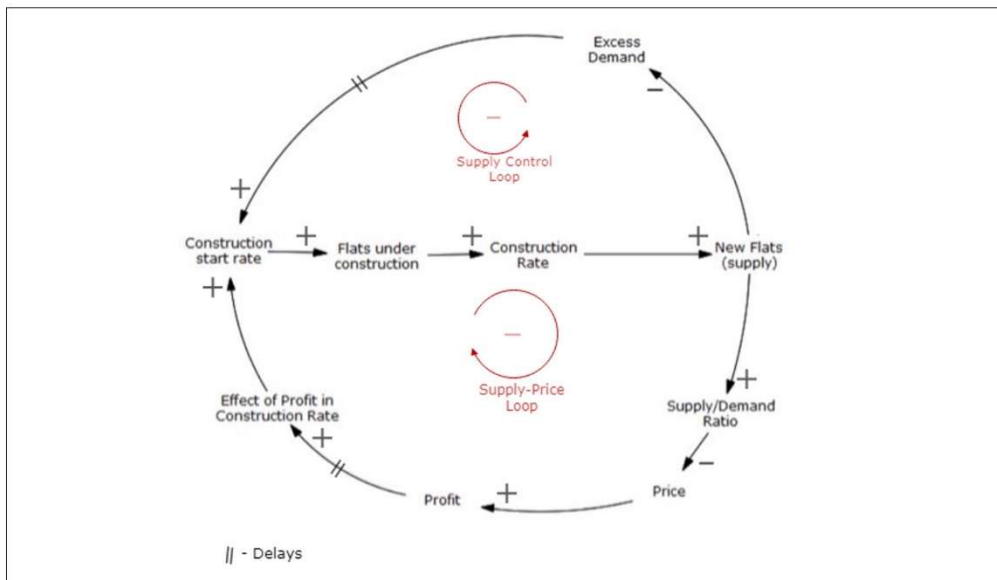
FIGURE 5. Supply Price Loop

Note: compiled by authors

is an increase in the Supply of real estate, it leads to a growth in the S/D ratio. Consequently, the increased ratio causes a decrease in Price and Profit. After a certain delay, this decrease in Profit impacts the Effect of Profit on the construction start rate. Ultimately, this effect influences the Construction start rate. In summary, the Supply-Price Loop demonstrates the relationship between various variables involved in the real estate market. An increase in Supply affects the S/D ratio, Price, and Profit, and ultimately influences the Construction start rate. This loop plays a significant role in understanding supply dynamics and its impact on price and profitability in the real estate market.

In order to quantify the flow and stocks within our model, we have identified a total of 23 variables, categorized as either stocks or flows. These variables are presented in Table 1.

TABLE 1. Flow and Stock Variables of the Model

No.	Type	Variable	Description
1	Flow	Construction preparation time	Represents the time taken for construction preparation. Measured in years. Initial value: 0.5.
2	Flow	Construction start rate	Indicates the rate at which new construction projects begin. Measured in flats per year. Equation: MAX(0, Replacement Flats + (Flats Shortage/Construction Preparation Time) * Effect of Profit on Construction Start Rate.
3	Flow	Construction time	Represents the duration of construction for each project. Measured in years. Constant value: 2.
4	Flow	Construction rate	Refers to the rate at which construction progresses. Measured in flats per year. Equation: Flats Under Construction/Construction Time.

5	Flow	Replacement flats	Represents the number of flats being demolished and replaced.
6	Stock	Flats under construction	Represents the current number of flats under construction. Calculated as Construction Start Rate minus Construction Rate. Initial value: Construction Start Rate multiplied by 3.
7	Stock	New flats	Represents the number of newly constructed flats available for sale. Calculated as Construction Rate minus Sales Rate. Initial value: 12,000.
8	Stock	Sold flats	Represents the number of flats sold per year. Calculated as Sales Rate minus Demolishing. Initial value: 5000.
9	Flow	Sales rate	Indicates the rate at which flats are sold. Measured in flats per year. Equation: New Flats divided by Sales Time.
10	Flow	Sales time	Represents the average time it takes to sell a flat. Measured in years. Constant value: 1.
11	Flow	Flat's life	Represents the expected lifespan of a flat. Measured in years. Constant value: 50.
12	Flow	Demolishing	Represents the rate at which flats are demolished. Measured in flats per year and calculated as Sold Flats divided by the Flat's Life.
13	Flow	Demand	Represents the demand for flats. Measured in the number of flats required and calculated as Increase of Population divided by 4.
14	Flow	Increase of Population	Represents the rate of population growth. Measured in the number of families. Initial value: 40,000.
15	Flow	Supply/Demand ratio (S/D ratio)	Represents the ratio of the supply of flats to the demand for flats. Measured as a unitless value and calculated as Flats Shortage divided by Demand.
16	Flow	Flats Shortage	Represents the shortage of flats in the market. Measured in the number of flats and calculated as Demand minus Sold Flats.
17	Flow	Price	Represents the price of a flat. Measured in KZT (Kazakhstani Tenge). Calculated as Cost multiplied by Accepted Profit Margin.
18	Flow	Profit margin	Represents the profit margin for each flat. Measured as a unitless value and calculated as 1.25 multiplied by the S/D ratio.
19	Flow	PROFIT	Represents the profit generated from each flat. Measured in KZT. Calculated as Price minus Cost.
20	Stock	Accepted profit margin	Represents the predetermined profit margin for each flat.
21	Flow	Cost	Represents the cost of constructing each flat. Measured in KZT. Initial value: 30,000.
22	Flow	Effect of Profit on Construction start rate	Represents the impact of profit on the rate of new construction projects. Measured as a unitless value and calculated as one divided by (Normal Profit divided by Profit).

23	Flow	Normal profit	Represents the standard profit earned from each flat. Measured in KZT. Calculated as Cost multiplied by Profit Margin.
Note: compiled by authors			

We have ensured that sufficient historical data is available for each variable, spanning from 2000 to the present. Therefore, our analysis is based on a comprehensive time horizon of 22 years. After implementing the equations and data into the Vensim system, the model depicted in Figure 6 was generated.
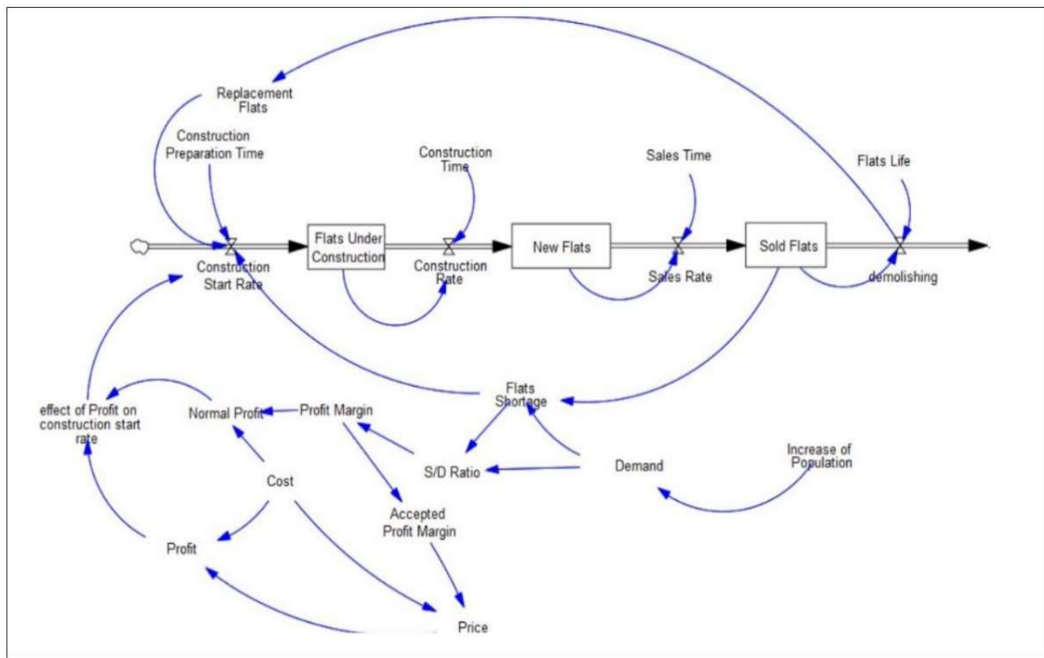
FIGURE 6. Vensim Model Visualization of Real Estate Market Dynamics

Note: compiled by authors

The Vensim program allows us to modify constant variables, such as construction time and construction preparation time, and observe the resulting impact on the entire system. This interactive platform allows us to explore different scenarios and assess their effects on the model's behaviour and outcomes, as shown in Figure 6.

The implemented model facilitated the identification of critical stocks and flows that significantly impact the real estate market, particularly in relation to the volatility of prices observed over the past 23 years. The aim was to investigate the underlying imbalance between demand and supply factors contributing to this volatility. To isolate the influence of various factors on price stability, an experiment was conducted wherein the historical price of flats per 1 square meter was removed from the model. This allowed for the observation of system behaviour and the identification of periods characterized by stable and volatile price trends.

Figure 7 illustrates the outcomes of this experiment, highlighting the fluctuations in price over time.
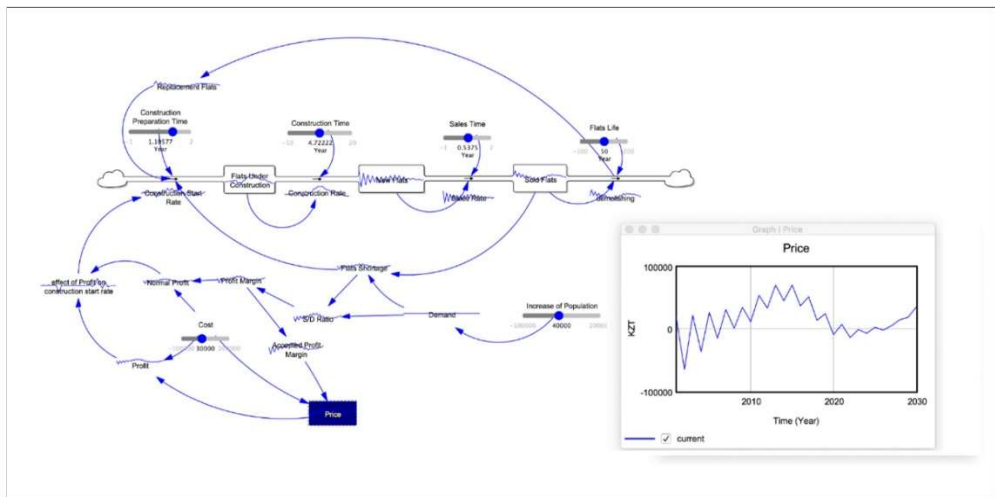
FIGURE 7. Simulation Results of Price Stability in the Real Estate Market

By examining the periods of stability and volatility, valuable insights were obtained regarding the dynamic interplay between demand and supply, as well as the factors that contribute to price imbalances. These findings hold significance in comprehending market conditions and devising strategies to mitigate volatility, fostering a more stable real estate market environment.

As illustrated in Figure 8, the oscillations in prices can be explained by modifying the Construction preparation time from 6 months to 4 months and the Construction time from 1 year to 8 months.
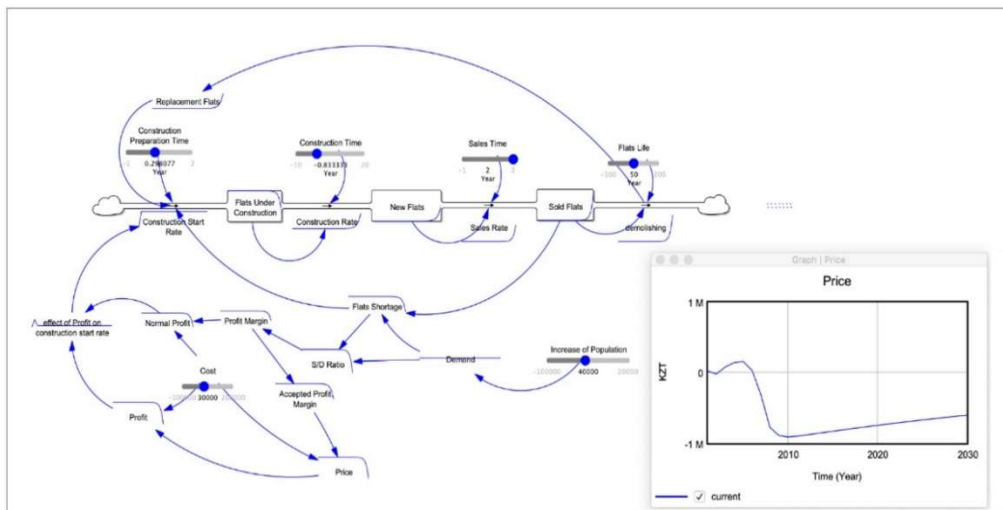
FIGURE 8. Model when the price is stable

Based on these observations, it can be inferred that a more balanced equilibrium between Supply and Demand can be achieved by decreasing the construction preparation time and construction time.

5. CONCLUSION

In conclusion, the system dynamics MIT analysis of the real estate market provides valuable insights into the complex interactions and feedback loops that drive this critical sector of the economy. By using advanced modelling and simulation techniques, researchers can explore how different factors, such as interest rates, supply and demand, and government policies, affect the behaviour of buyers, sellers, and investors. This analysis can inform policymakers, investors, and industry leaders as they make decisions about how to manage and develop the real estate market. Ultimately, the system dynamics MIT analysis offers a powerful tool for understanding the real estate market dynamics and developing strategies to support its sustainable growth.

The construction rate is an essential factor in the supply side of the real estate market. An increase in the construction rate leads to an increase in the supply of housing units, which, in turn, reduces real estate prices. Conversely, a decrease in the construction rate leads to a decrease in the supply of housing units, which increases the prices of real estate. This relationship is supported by the law of supply and demand, which states that an increase in the supply of a commodity leads to a decrease in its price. In contrast, a decrease in the supply of a commodity leads to an increase in its price. Therefore, a high construction rate results in a surplus of housing units, which lowers real estate prices, while a low construction rate results in a shortage of housing units, which drives up real estate prices.

Various factors, including economic growth, population dynamics, government policies, interest rates, and infrastructure development, influence the real estate market in Almaty city. The demand for housing is shaped by population growth, changing demographics, investment potential, government initiatives, and cultural factors. On the other hand, the supply of real estate is determined by builders in Almaty city, offering diverse housing options, construction quality, and competition among developers. Real estate markets exhibit cyclic behaviours, with oscillations in market conditions such as property prices, demand, and supply. These cycles are a natural part of the real estate market, often caused by imbalances between demand and supply resulting from delays in construction preparation and execution. In our Vensim program, we considered scenarios with long delays in these variables and observed price fluctuations, while shorter delays resulted in price stability.

We recommend implementing technological and managerial strategies to reduce construction delays based on our findings. By decreasing construction times by 50%, we can expect a gradual decrease in price cycles over time. Shortening the time spent on preparation activities allows for faster project completion and delivery, enabling quicker occupancy and revenue generation. Additionally, reduced preparation time provides flexibility to adapt to changing market demands or project requirements, enhancing the project's appeal and value. In a competitive real estate market, faster project delivery can give developers an advantage by attracting buyers, tenants, or investors who prioritize timely completion and occupancy, thereby improving marketability and profitability.

Furthermore, we suggest that construction companies have access to information on "Flats under construction" when initiating new projects. This data can assist in avoiding excessive supply and oscillations in the model by ensuring that only the necessary number of flats are built. By implementing these recommendations, the Almaty real estate market can experience more stable and efficient dynamics, leading to enhanced market performance and sustainable growth.

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