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В сборнике рассматриваются актуальные вопросы современной экономики: бизнес-технологии в контексте устойчивого развития, цифровая трансформация финансово-учетной системы, новые тренды управления в турбулентных условиях, стратегические приоритеты развития экономики. Рассчитан на широкий круг читателей, руководителей, преподавателей и обучающихся.

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Striving for sustainable development:
implementation of ESG principles in Kazakhstan

Laura Kuanova*, Akimbayeva Karlygash, Madina Sikakebieke
al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: kuanova.laura@kaznu.kz

Abstract. This article examines the Sustainable Development Goals (SDGs), examines the process of implementing the principles of Environmental, Social, and Governance (ESG) and the impact on the sustainable development of the financial sector in Kazakhstan. Considering the main business practices of leading Kazakhstan companies, scrutinizing the state's policy trajectory towards achieving balanced development, taking into account environmental, social and corporate aspects. The article utilizes descriptive research to analyze the current state and trends in sustainable development among financial institutions, focusing on environmental efficiency, social responsibility, and management transparency. This analysis informs recommendations for improvement in these areas. After reviewing the sustainability indicators and practices of leading companies in Kazakhstan, especially those leaders in ESG disclosure, the authors offer recommendations to promote a sustainable and responsible financial system. These recommendations require the incorporation of ESG principles into business practices and reporting mechanisms. The results of the study have important implications for companies in various sectors of the Kazakh economy committed to the pursuit of sustainable development.

Keywords. sustainable development, financial institutions, ESG principles, ESG reporting.

Introduction

The long-term global economic development, only concentrating on maximizing profits and minimizing costs and having no other fundamental foundations, has led to serious degradation of the natural, social and even spiritual environment. Issues such as environmental degradation, global climate change, and social and gender inequality underscore the systemic crises and global challenges facing countries, corporations, and individuals since the late 20th and early 21st centuries. This collision of interests has caused a reassessment of the global worldview and a recognition of the imperative of sustainable development.

In 1972, the United Nations Environment Programme (UN) was established, and initiated the discussion of environmental issues at the global level.

Growing awareness among people around the world has stimulated sustainable development to a central focus not only for international organizations and nations but also for corporations.The Sustainable Development Goals declared by the United Nations are increasingly being implemented in the development strategies of companies, including Kazakhstan financial institutions.

The concept of sustainable development is no longer simply a trend, but has evolved into a fundamental business standard.

ESG (Environmental, Social, Governance) principles - the principles of the company's activities based on environmental protection, the creation of beneficial social conditions, conducting business operations with integrity towards stakeholders, while adhering to principles of sound corporate governance .

Contrary to the short-term perspective summed up in the phrase "at least one flood after us",the ESG concept includes a forward-looking spirit, emphasizing responsibility towards future generations. It advocates social progress that guarantees a high standard of living today without compromising the needs of future generations.

In discussions concerning ESG, sustainable development is often quotatived; however, a distinction exists between these terms:

While sustainable development embrace a broader philosophy, ESG criteria represent a set of specific guidelines and practices that align with this overall philosophy. ESG stands for "(English, E

– environment); social responsibility (English, S – social); high quality corporate governance (English, G – governance)", and reflects the cores of sustainable business practices.

Environment (E): Emphasis on responsible environmental guardianship, containing trends in environmental stewardship, resource conservation, and pollution reduction.

Social(S): Focuses on social responsibility towards employees, business partners and customers, covering aspects such as workplace conditions, employee well-being and the elimination of gender stereotypes.

Governance (G): Refers to high-quality corporate governance, assessed through criteria like reporting transparency, anti-corruption measures, executive compensation and shareholder relations.

By adhering to ESG principles, the company strives to implement sustainable business practices that prioritize environmental sustainability, social equity and effective governance, thereby contributing to long-term economic prosperity and social well-being.

Literature review

Considering the limitations of natural resources and the importance of curbing unchecked consumption was articulated by ancient Greek philosophers. While the concept of population dynamics and resource restrictions was introduced by Thomas Robert Malthus in the early 19th century, the modern concept of sustainable development became well-known later. It wasn't until approximately 170 years after Malthus's initial publications that there was a significant resurgence of interest in the limitations of natural resources and the necessity for conscientious production and consumption. [1].

Sustainable development is a complex concept that covers all areas of human activity. The concept explains what goals need to be achieved in order to ensure well-being in the future: rational use of natural resources; reduce the risks of species destruction; combat climate change, poverty and hunger; respect gender equality.

Sustainable development is becoming a new paradigm for the existence of financial and non-financial companies. Through value chain optimization, organizations address critical objectives including sustainable resource management, environmental preservation, and ensuring human health and safety. Consequently, they attain enhanced resilience and stability [2].

To steer the financial sector towards sustainable development, the Financial Initiative of the United Nations Environment Programme (UNEP) has presented a number of guidelines, including: principles of responsible banking, 2019; principles of sustainable insurance, 2012; principles of responsible investment, 2006 [3].

These guidelines have received widespread support among financial institutions. Approximately 80 percent of investment institutions have committed to adhere to responsible investment principles,and 260 banks with assets of $70 trillion have signed the principles of responsible banking.

Incorporating ESG factors into the decision-making process of financial institutions makes financial systems more sustainable. Finance is the driving force behind sustainable development. However, in order to achieve sustainability through finance, it is necessary to rebuild and adapt the financial system to the specifics of sustainable development. Modern financial systems can be characterized as one-dimensional, focused on ensuring the economic security of transactions [4].

A more comprehensive grasp of what ESG ratings track will help banks in all industries improve compliance. Moreover, it will allow banks to better finance endeavors that align with a sustainable future. This understanding will provide banks with clearer insights into the dedication of their corporate clients to sustainability principles.With such approaches, it will be simpler to distinguish instances where banks prioritize positive ESG initiatives while overlooking negative actions[5].

Two emerging variables — digitalization and the coronavirus pandemic - determine the opportunities and boundaries of economic development nowadays. The global experience of stimulating, motivating and transferring institutions includes financial (credit rates, subsidizing

bond loans, etc.) and non-financial (funds, ratings, etc.) tools to achieve a new quality of growth. The transformation of financial markets involves the redistribution of financial flows in favor of companies with ESG policies and is an indicator of qualitative changes [6].

The ability of the financial system to respond positively to the demands of the transition to sustainable development depends on a directed transformation that includes regulatory, political, structural, theoretical and relational shifts. The UK, China, the USA, Switzerland and Japan are the main centers of advanced research in the field of sustainable finance. These nations are renowned for their productivity and host key institutions in the field.[7].

There is a growing interest worldwide in the contribution of organizations to the achievement of sustainable Development Goals involving various actors such as Governments, regulators, private enterprises, public interest organizations, financial institutions and civil society. The alignment of environmental, social and governance indicators (ESG) and Sustainable Development Goals helps scientists and practitioners observe the contribution of corporations to sustainable growth at both the micro and macroeconomic levels. There are few studies that analyze the relationship between ESG corporate indicators and the UN Sustainable Development Goals (UN SDGs) or the contribution of ESG indicators of companies to sustainable development [8].

Most business executives have identified ESG considerations as a key strategy for improving financial performance. Regression analysis shows that there is a significant positive relationship between ESG factors and company financial performance, and that digital transformation enlarges this effect. Notably, enhanced ESG practices have a more significant impact on the financial performance of environmentally harmful companies compared to environmentally friendly companies [9].

Methodology

The article uses a descriptive research method to gain a more comprehensive understanding of the current state and trends in the field of sustainable development of financial institutions and leading companies in Kazakhstan, taking into account aspects of environmental, social and managerial responsibility. Systematization and generalization techniques were utilized to organize and synthesize information effectively. Studying and researching Kazakhstan's position in the world sustainable development ranking for 2023, the rating of the Development Bank of Kazakhstan JSC on the integration of ESG criteria into its financial activities, the activities of the Kazakhstan Stock Exchange (KASE) on the issuance of green bonds, as well as the rating of Kazakhstan companies such as Air Astana, KazMunayGas, Kazatomprom, KazTransOil, KEGOC, Kazakhtelecom, Baiterek, Samruk Energy, CAEC, KAZ Minerals PLC, Halyk Bank of Kazakhstan, leaders in the disclosure of ESG information, This facilitated the formulation of recommendations for establishing a resilient and socially responsible financial system in Kazakhstan.

Results and Discussion

Sustainable development is a set of measures aimed at meeting current human needs while preserving the environment and resources, thus ensuring the capacity of future generations to fulfill their own needs.

Sustainable development is possible with the balance of three main components: economic growth, social responsibility and environmental balance.

In total, 17 global goals have been formulated, they are collected in the UN resolution "The 2030 Agenda for Sustainable Development". Each company can contribute to achieving these goals at its own level. And to assess how effectively a business contributes to the fulfillment of global tasks, ESG criteria are used. Thus, society strives to solve the following tasks: eliminate poverty and hunger, have good health, receive quality education, achieve gender equality, generate and use cheap and clean energy.

Figure 1. Sustainable Development Goals [10].

Regarding sustainable development in Kazakhstan, it can be researched that many companies often match or transcend global standards in the implementation and adoption of sustainable solutions. Approximately nine out of ten foreign investors prioritize a company's dedication to sustainable development goals.

In this regard, the role and responsibility of banks, insurance and investment companies are on the rise, which are the basis for supporting the transition of our economy to clean energy, eradicating hunger, strengthening gender equality and achieving more than a dozen other social and environmental goals.

In order to achieve greater environmental sustainability, banks, insurance companies and investors must change their business models. The developing green economy creates many new opportunities for investment and lending. Institutional investors and retail clients of banks are increasingly demanding that financial institutions comply with environmental standards. And perhaps most importantly, an increasing number of financial institutions have realized that financing fossil fuels and other environmentally damaging projects is bad for their long-term future.

Investors are more willing to support companies with high ESG scores. Trend setters are millennials: the generation born in the 80s and 90s. Nowadays, individuals aged between 30 and 45 constitute the core paying audience, shaping novel approaches to business and investment strategies. Millennials' values are not only benefit and personal comfort, but also responsibility in environmental and social issues.

Bank of Kazakhstan is re-evaluating its corporate client assessment process. Before approving a loan, banks now assess how well a client’s metrics and management approaches align with environmental, social and governance standards. This trend is rapidly gaining traction, with most lenders expected to screen borrowers for compliance with sustainability principles in the coming years.

The first ESG index appeared in 2006 and has since gained global popularity. ESG principles as we recognize them today were first proposed by former United Nations Secretary-General Kofi Annan. In 2015, the first ESG issues conference was held.

The United Nations has urged major global companies to incorporate these principles into their strategies, prompting Kazakhstan to focus more on ESG considerations. As a responsible and actively engaged member of the international community, Kazakhstan views the United Nations agenda as a comprehensive global action plan, the failure of which would constitute a strategic setback for the entire world.

Since the adoption of the Millennium Declaration in 2000, many developing countries have experienced substantial economic growth and increased access to various forms of financing.

Policymakers are tasked with accelerating the expansion of diverse financial flows to satisfy global needs while improving the quality of existing strategies, methodologies and tools designed to

address ineffective and detrimental subsidies, corruption, tax evasion, illicit capital outflows and inaction Especially in the field of environmental protection, inaction often causes greater costs than remedial measures. Achieving this goal will require a transformation of funding organizations in both the public and private sectors.

The results of the analysis are described in the form of nine basic principles. First, each country has the responsibility for its own development, and the international community has the responsibility to create a good environment and provide international assistance. Second principle emphasizes, effective government policies are the cornerstone of sustainable development financing strategies. All actors, including the private sector, operate within the framework and enabling environment established by public policies, which highlights the importance of developing effective policy solutions that incorporate principles of transparency and good governance.

As the sustainability movement grows in popularity, investor demand for financial instruments that help increasing a green economy and alleviate risks related to climate change and social factors is on the crease. Capital providers adhere to the principles of sustainable financing, that is, evaluating investment opportunities based on ESG standards to provide a basis for investment and financing decisions.

Despite the fact that the banking sector is not a direct source of greenhouse gas emissions, finance is the key to the large-scale economic transformations necessary to abandon fossil fuels and achieve zero levels by investing in green business. Thus, in world practice, 90% of banking leaders already consider the topic of emissions to be significant when compiling ESG reports. For Kazakhstan financial institutions, economic performance considered at first stage, followed by diversity and equal opportunities, as well as anti-corruption. Compared to Kazakhstan banks, the global ones pay 50% more attention to the product portfolio and introduce their own ESG methodologies for evaluating portfolios. There is also a noticeable trend towards increasing the level of interaction between employees and management, in order to create effective functional dynamics of the workplace.

When addressing social issues, 70% of global banks surveyed disclosed material aspects related to “human rights” and “local communities”. This is because banks, as project implementers, have a need to ensure that their activities do not harm human rights or hinder the efforts of civil society.

Ratings agencies use materiality as a tool to identify priority areas that are critical to a company's sustainable operations in ESG matters. Basic topics are tailored to industry specific conditions and the assessment considers issues that have a significant impact on a company's financial performance. The ratings methodology helps identify industry leaders and laggards based on the ESG risks they face and their proficiency in managing those risks relative to their peers.

ESG principles are gaining traction globally. In the early 2000s, there were only 20 ESG rating companies in the United States, and by 2020 this number had ballooned to nearly 800. ESG principles are also spreading rapidly in the CIS countries. Kazakhstan leads Central Asia in ESG indicators and has well-established regulations on sustainable development. The Kazakhstan Stock Exchange (KASE) is at the forefront of promoting sustainable development, joining the Sustainable Stock Exchanges Initiative (SSE) in 2015 and publishing ESG reporting guidelines based on the SSE methodology in 2016.

Last year, the Kazakh government developed an investment policy concept through 2026, which included plans for an in-depth analysis of ESG practices and green financing methods. This year, there may be proposals to integrate ESG principles into national planning systems, along with an analysis of support measures for companies that adhere to ESG principles. Kazakhstan’s adoption of ESG standards is driven by government initiatives and international investors’ requirements for local companies to comply with ESG.

To get a good ESG score, a company needs to meet development standards in three categories: social, that is, how the company treats its staff, suppliers, customers, partners and consumers. Working conditions, gender equality and investments in social projects are important. Kazakhstan has one of the best indicators in this regard.

The second category relates to managerial aspects, including the quality of corporate governance: reporting transparency, executive compensation, working environment, shareholder relations and anti-corruption measures. Finally, the third category relates to environmental factors,

reflecting a company's commitment to environmental management. Achieving sustainability requires a balance between all criteria.

As of the end of 2023, Kazakhstan ranked 66th out of 166 countries, with a score of 71.6 points (out of 100 points). Kazakhstan’s performance in the points system improved compared to the previous year (2022 – 71.1 points). However, its ranking dropped one spot from the previous year (2022 – 65th).

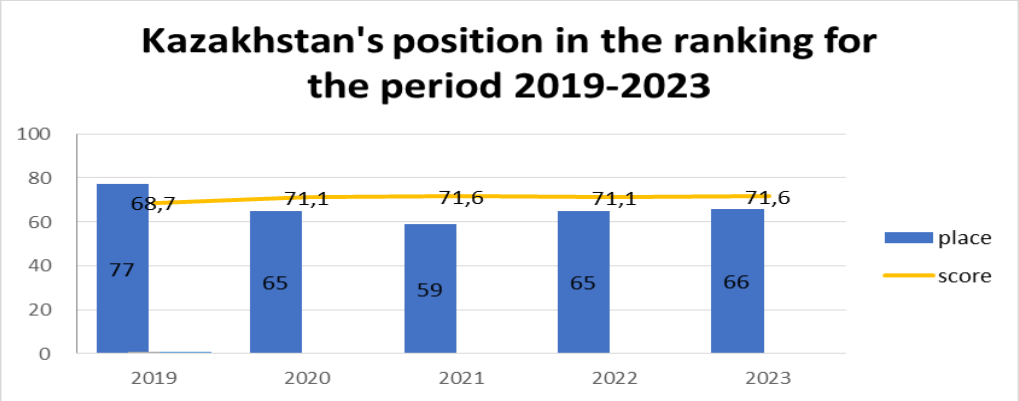

Figure 2.

Kazakhstan's position on sustainable development [11].

According to the Global Report on Sustainable Development for 2023, there is an improvement trend in poverty eradication.

There has also been improvement in the attainment of national indicators for the following goals:

- good health and well-being;
- clean water and sanitation;
- decent work and economic growth;
- industrialization, innovation and infrastructure;
- fighting climate change;
- peace, justice and effective institutions;
- partnership for sustainable development.

Kazakhstan is ahead in the ranking of such countries as, for example, Turkey (72nd place), Malaysia (78th place), the United Arab Emirates (79th place), Mexico (80th place). Among the Central Asian countries, Kyrgyzstan took 45th place, followed by Uzbekistan (69th place), Tajikistan (85th place), Turkmenistan (91st place).The top five countries include Finland (1st place - 86.8 points), Sweden (2nd place - 86.0 points), Denmark (3rd place - 85.7 points), Germany (4th place - 83.4 points), Austria (5th place - 82.3 points).

The leaders among the post-Soviet countries are Estonia (10th place), Latvia (14th place), Belarus (34th place), Ukraine (38th place), Russia (49th place).

The ESG rating is formed by independent research agencies - Bloomberg, S&P Dow Jones Indices, JUST Capital, MSCI, Refinitiv and others. They evaluate the development of companies according to three criteria - E, S and G - and assign points on a one-hundred-point scale.

Sustainability Fitch Ratings has assessed for the first time the sustainability of the business of the Development Bank of Kazakhstan (DBK), a subsidiary of JSC NUH Baiterek, with an ESG rating of "3" out of 60, which is a high rating for Kazakhstan's financial institutions. The ESG rating highlights the bank's emphasis on Kazakhstan's socio-economic development, robust corporate governance practices and efforts to integrate ESG standards into its financial operations and those of its borrowers.

The agency's report notes that the ESG rating of the Development Bank of Kazakhstan reflects its initiatives and actions in the field of sustainable development. In accordance with the bank's new long-term strategy for 2024-2033, the strategic direction "Sustainable Development" has been defined, within which the strategic efficiency "ESG-rating" is provided. The presence of an ESG rating is one of the indicators of attractiveness for investors, including those focused on financing projects that have a positive impact on the environment.

The rating agency notes that the ESG rating is positively influenced by the financing of DBK projects in the field of renewable energy, which account for 6% of the total volume of loans to customers by the end of 2022, as well as the desire in the future to increase the volume of green projects, including renewable energy sources, to at least 10% in the structure of the portfolio of funded projects annually [12].

In addition, in 2023, the DBK, together with the Asian Development Bank, developed a roadmap for the implementation of ESG principles for the medium term.

On March 29 of this year, the bank issued the first green bonds on the Kazakhstan Stock Exchange (KASE) for 10 billion tenge. The debut issue of DBK green bonds received the conclusion of the second party from the AIFC Green Finance Center. Also, as part of the implementation of the ESG roadmap, the bank will continue to work on the issue of green bonds, the funds from which will be used to finance projects in the field of renewable energy.

The ESG rating was also positively influenced by the disclosure of information in the annual report for 2022 on greenhouse gas emissions of the bank and its borrowers, as well as the dynamics of reducing electricity, heat and water consumption, and solid waste generation. The Bank has developed a green office concept, which reflects the bank's targets for reducing its environmental impact, which also had a positive impact on the result of the ESG rating.

At the same time, Sustainable Fitch positively assessed both DBK's social indicators and corporate governance indicators. Thus, the bank actively participates in sponsorship and charity activities, promoting youth initiatives, sports events and financing projects in the field of healthcare. In addition, DBK conducts quarterly customer surveys to assess the level of satisfaction, the results of which are published on the corporate website. The Bank is distinguished by inclusiveness and gender equality in the composition of employees and management, the presence of internal audit and risk management functions and the presence of independent directors on the Board of directors of DBK, which was also positively noted by the agency.

Previously, Central Asia was often considered a region far removed from the ESG agenda, especially given its status as an energy-centric country. However, in 2021, experts monitoring ESG developments in the East, including those at RBC Trends, note that the region is increasingly engaging with the sustainability agenda.

Many ESG initiatives are underway in the region, often in partnership with international financial institutions and organizations such as the United Nations Development Programme, the International Finance Corporation and the European Bank for Reconstruction and Development.

Kazakhstan, Uzbekistan, and Kyrgyzstan have all signed and ratified the Paris Agreement and approved various documents aimed at implementing the concept of sustainable development. For example, Kazakhstan adopted the “Concept of Transition to a Green Economy” in 2013 and plans to increase alternative energy generation to 50% by 2055.

While Uzbekistan and Kyrgyzstan have yet to enact carbon regulations, Kazakhstan has been actively pursuing ESG and sustainability policies since the early 2010s. Foreign experts recognize that Kazakhstan has one of the most advanced ESG legislative frameworks in the CIS region. It is worth noting that Kazakhstan formulated the Environmental Code and launched the Carbon Exchange (ETS-KZ) in 2013, keeping pace with advanced countries in environmental governance.

Many Kazakhstan companies have partially included the SDGs in their development strategies – oil and gas companies, large banks, system-forming organizations, including the country's leading air carrier Air Astana.

ESG reporting is not yet mandatory in any of the CIS countries. ESG reporting is non-financial reporting that reveals the goals and objectives of responsible business conduct.

By December of the following year, my country plans to formulate content requirements for annual ESG reports of listed companies. In addition, the Financial Market Supervision and Development Authority of the Republic of Kazakhstan plans to implement requirements for banks to establish ESG risk assessment systems and disclose ESG information by the end of 2025.

During Astana Finance Days on June 7, 2023, the agency announced its intention to adopt guidance on ESG disclosures for banks and financial organizations, which is expected to be mandatory from January 1, 2024. Currently, about 57% of companies listed on the Kazakhstan Stock Exchange The stock exchange is preparing voluntary reports.

PwC Kazakhstan has been compiling ESG disclosure ratings for several years. As part of its 2020 research, a list of the 50 companies with the best ESG disclosures was created. The top 10 companies include KazMunayGas, Kazatomprom, KazTransOil, KEGOC, Kazakhtelecom, Baiterek, Samruk Energy, CAEC, KAZ Minerals PLC and Halyk Bank of Kazakhstan.

"Disclosure of information on environmental, social and managerial aspects has moved from the status of "it would be nice to have" to the status of "mandatory" in terms of annual reporting or as a separate ESG report. ESG information is needed primarily to assess real changes in the business in order to ensure its long-term sustainable development."

Economic uncertainty, political turmoil, as well as environmental and social issues have significantly affected today's business environment, affecting both consumers and companies. Investors are demanding that companies prioritize innovation and financial performance. Financial discipline is paramount, and companies are expected to articulate the significance of sustainable development within their strategies, the cost of fulfilling sustainable development commitments (including climate-related goals) and the impact of risks and opportunities in the field of sustainable development on the assumptions underlying financial statements.

The increased reliability of the information in the reports is also crucial. Investors would undoubtedly like to have more confidence in reporting. External reassurance will increase their confidence in sustainability reporting. At the same time, reducing greenhouse gas emissions occupies a lower line in the list of investors' priorities. However, over the next five years, investors expect that threats related to climate change and cyberspace (including hacker attacks and disinformation) will increase significantly. They also see opportunities for companies to become more effective both in managing climate change and innovation, and in reporting on this work.

The risks and opportunities associated with ESG factors are becoming increasingly apparent, highlighting the importance of developing an effective ESG reporting strategy. Effective communication with a wide range of stakeholders is critical to the successful development of the business. As investor attention increases, regulatory requirements change, and consumer expectations continue to evolve, there is increasing pressure on companies to disclose their ESG initiatives and demonstrate progress in their implementation.

Environmental and social impact reports and metrics are important indicators for assessing a company's overall health and long-term prospects. They reflect a company's impact on society and ecosystems, its success in managing that impact, and its contribution to addressing key global challenges.

Air Astana, which is in the TOP 50 in ESG information disclosure in all ratings for 2019-2020-2021, has approved six of the seventeen UN Sustainable Development Goals (SDGs) for itself: quality education, gender equality, decent work and economic growth, reducing inequality, combating climate change, partnership for development. By focusing on this list of goals, Kazakhstan's largest airline is scaling up and making its efforts in the field of following the principles of sustainable development more sustainable.The company plans to become a leader in shaping the best ESG practices in the industry [13].

This year, Air Astana has developed an ESG strategy for 2023-2032. Thus, it has expanded its initiatives in social responsibility and corporate governance in compliance with high ethical standards. In order to reduce the carbon footprint, although the aviation industry accounts for no more than 2% of global CO2 emissions, Air Astana has developed a low-carbon Development Program, which includes the modernization of the aircraft fleet. And within the framework of partnerships with the EBRD and KazMunaiGas, the airline participates in a study on the potential of production and consumption of ecological aviation fuel in the Republic of Kazakhstan.

Conclusion

Sustainable business development based on ESG principles is one of the main trends on the agenda of the global and financial community. The introduction of ESG principles is inevitable for Kazakhstan companies, as it contributes to the achievement of national development goals of the Republic of Kazakhstan.

Failure to adapt to current trends and adhere to the agenda can result in the loss of customers, partners, and employees. Ignoring stewardship, social responsibility and environmental stewardship

principles can lead to scandal surrounding a company or brand. Reputational risks can arise from mistreatment of employees, bribery, data breaches or environmental harm. Failure to comply with environmental regulations may result in fines and more severe penalties. Ignoring sustainability principles can result in losing the support of key market players such as banks, charities and insurance companies. In order to maintain customer loyalty and attract new audiences, it's crucial to stay on top of trends. Falling behind in the information environment may result in a loss of market position, while those competitors who embrace business transformation and evangelize it will become leaders.

The financial sector plays a momentous role in advancing ESG principles, facilitating financing for the "green" economy and encouraging companies to transform their business models to ensure sustainability [14]. Banks incorporate ESG ratings into their lending decisions, underscoring the importance of integrating ESG principles into the agenda of financial institutions.

ESG reporting is becoming increasingly important in Kazakhstan's business environment, driven by investor interest and international best practices. Companies are improving the quality of reporting and integrating ESG practices into corporate governance processes across various economic sectors.

The United Nations Sustainable Development Goals (SDGs) aim to address major global challenges such as inequality, hunger, resource sustainability, climate change, gender equality and healthcare. Adherence to these principles not only benefits individual companies, but also helps promote the welfare of wider society.

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Comparative analysis of the development of digital banks in China and Kazakhstan

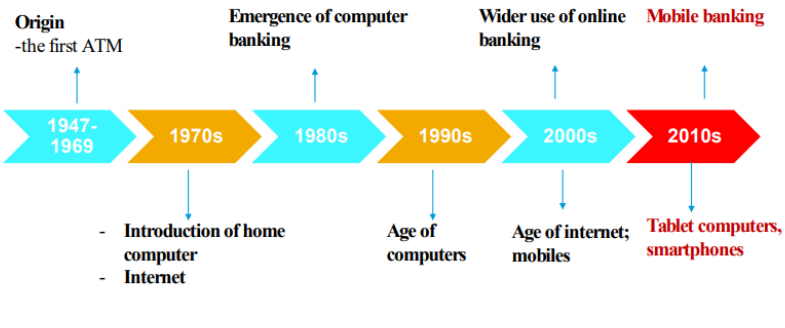
Laura Kuanova*, Madina Sikakebieke,Talgar Sauletkan
al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: kuanova.laura@kaznu.kz

Abstract. The banking industry has witnessed a dramatic shift towards digitalization, driven by rapid advances in technology and changing consumer preferences. From online banking platforms to mobile payment apps, digital banking has revolutionized the access and delivery of financial services, ushering in a new era of convenience, efficiency, and innovation. The goal of the authors is analysisthe digital banking development process in China and Kazakhstan based on the cases of China Construction Bank and Kazakhstan Kaspi Bank. Furthermore, the article reveals the similarities and differences in digital transformation between two countries through comparative analysis methods. China Construction Bank has quickly gained popularity in the digital banking industry and has become an integral part of daily life in China as it actively responds to competitive pressures from technology giants such as Alibaba and Tencent. Kaspi Bank of Kazakhstan has made some progress in digital transformation, but it still faces challenges such as the dominance of traditional banking services and limited adoption of digital channels. Through an in-depth analysis of the national conditions of the two countries, the authors suggest that Kazakhstan can learn from the successful experience of China Construction Bank, including strengthening digital infrastructure construction, promoting policy support, and promoting financial technology. Innovate and strengthen regulatory compliance to accelerate digital transformation, bank growth and improve competitiveness.

Keywords:digital banks,traditional banks,digital payments,innovation,fintech companies

Introduction：Bank digitization is the basis for the realization of digital banking, and digital banking is regarded as a specific manifestation of bank digitization. Digital banking is a broad concept often used to describe banking models that leverage digital technologies and innovations to provide financial services. This includes digital-only banks and virtual banks, as well as the various digital services and channels adopted by traditional banks in their digital transformationjourney.

Figure 1. History of Digital Technology



Countries like China and Kazakhstan are at the forefront of this digital revolution, each with their own unique trajectory and challenges in embracing digital banking. In China, digital banking has become a part of everyday life thanks to tech giants like Alibaba and Tencent, whose digital payment platforms have spread across the country. Meanwhile, in Kazakhstan, digital banking is still in its infancy, with traditional banking services dominating and adoption of digital channels limited.

Despite different levels of digital maturity, both countries are poised to reap the benefits of digital banking, from greater financial inclusion and access to innovative financial products to

improved operational efficiency and customer engagement. However, realizing these benefits requires overcoming various barriers, including regulatory obstacles, technological barriers, and cultural resistance to change.

Against this backdrop, this comparative analysis aims to explore the digital banking landscape in China and Kazakhstan, examining the key trends, drivers and implications for the future of the banking industry in these countries. By examining the successes, challenges and lessons learned in each case, this analysis aims to provide valuable insights into the ongoing digital transformation of the banking industry and its impact on stakeholders in the financial ecosystem.

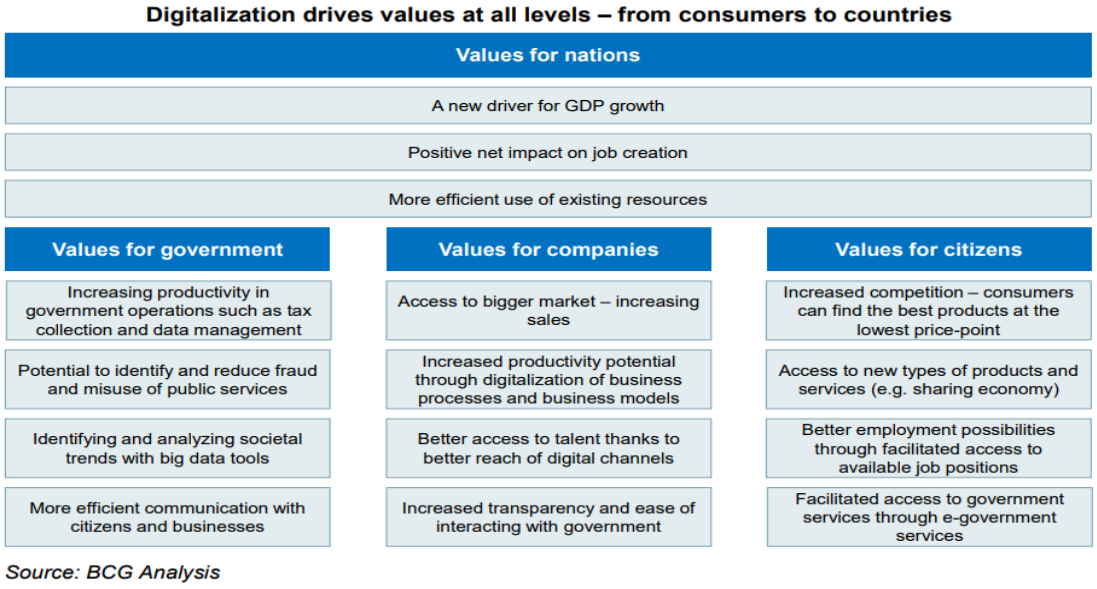


Figure 2. Digitalization drivers

Literature Review：

Digital banks emphasize the use of technology to enhance customer experience, streamline business processes, reduce costs, and often have faster response times and wider service coverage. We choose a Digital-only banks as an example for analysis. Digital-only bank is a banking model that provides services entirely based on digital channels and has no physical branches. All banking transactions are processed and completed via the internet, mobile apps or other digital platforms. This banking model typically features a high degree of automation and online transaction processing capabilities.

Digital-only banks have been used interchangeably with virtual banking, digital banking, or internet banking, making it difficult to distinguish them from digital services provided by traditional banking. However, the fundamental difference is the existence of the physical branches where digital-only banks rely solely on the digital infrastructure to cover all types of transactions. They offer neither brick-and-mortar offices, nor face-to-face tellers and customer services, and operate fully virtually (Fathima, 2020; Sha & Mohammed, 2017). As a result, it cuts the service costs, particularly all services traditionally carried out in a branch (Fathima, 2020; Sha & Mohammed, 2017).

Literature on banking and financial services shows that digitalization and customer acceptance of services have already been embraced for decades, such as through self-service kiosks, mobile banking, and Internet banking (Kaushik & Rahman, 2015) Table 1.compares the features provided by digital-only banks and the mobile and internet banking services provided by traditional banks(BTPN, 2021; DBS, 2021; Otoritas Jasa Keuangan, 2021a)

Table 1
Differences between digital banking with mobile and internet banking.

Factors	Digital Banking	Mobile and Internet Banking
Registration	Fully online through pre-downloaded app; cards are sent directly to the customer (no contact with the bank employee)	Register through the bank and download the app
Physical Form	Branchless, has no physical bank	Has physical bank and branches
Account Verification	Digital sign, online and biometric verification	Physical and in-person verification by coming to the bank
Features (financial service) offered	Including investment account opening (i.e. mutual funds, bonds, time deposit, etc.); e-wallet with NFC top-up	Limited to day-to-day transactions
Financial advisory	Provided in the app	Provided in the branch office

Source: BTPN (2021), DBS (2021); Otoritas Jasa Keuangan (2021a)

According to the Indonesian government, digital-only banking provides and carries activities through electronic channels; they have a head office without having any or limited physical offices (Otoritas Jasa Keuangan, 2021b). The Hong Kong government also has a similar definition of digital-only banks as Indonesia, which defines virtual-only banks as banks that primarily deliver retail banking services through the Internet or other forms of electronic channels instead of physical branches (Hong Kong Monetary Authority, 2021)

Research on digital-only banking mostly discusses regulatory,financial inclusion, and business-related perspectives (Boskov, 2019;Fathima, 2020; Lau & Leimer, 2019; Tosun, 2020). Digital-only banks are revolutionary fintech applications that break away from conventional banking norms, completely paperless, signature-less, and branchless banks. Thus, it changes the financial ecosystem landscape and how businesses operate, which improves operational efficiency while also facing security and privacy challenges (Dharamshi, 2019).However, despite its massive adoption, limited empirical studies have been published in peer-reviewed journals regarding digitalonly/virtual/internet-only banking from the perspective of customer and customer experiences.

Customer experiences in digital banking

It is common for customers to open accounts in several banks. Younger customers easily compare the services provided by banks and switch banks (Clemes, Gan, & Zhang, 2010). This drives banks to provide unique and exceptional services through Internet technology.

The use of technology such as digital banking in service innovation to meet clients' needs is best understood through its relationship with service users and how they perceive the service (Ababa, 2018). Customers expect to utilize digital banking similar to social media, and they can use the services anytime, anywhere, and under any conditions (Dootson, Beatson, & Drennan, 2016). However, the bank's digitalization also has implications for users, such as privacy, security, time, and performance risk, and other associated risks (Mbama&Esepue, 2018; Alkhowaiter, 2020).

Besides convenience, digital banks offer more financial and psychological benefits than traditional banks do. For example, the two main digital banking players in Indonesia, Jenius, and Digibank offer monetary advantages that traditional banks have never provided, such as free transfers to other banks, no initial account fees, high interest deposits, and free withdrawals from any ATM. In addition, they offer non-monetary benefits such as virtual customer services, expenditure tracking and allocation, splitting bills, etc. The study explored whether or not these features are attractive enough to lure customers into using this service.

Customer experience is an important factor that marketers must analyze to generate a marketing strategy (Sorofman, Virzi, & Genovese, 2015). Meanwhile, advanced technology enables the banking industry to deliver its services in many forms, leading to positive or negative experiences for customers and affecting how a bank outperforms the competition. Customer experience is defined as the customer's cognitive and affective assessment of all direct and indirect encounters with the firm relating to their purchasing behavior (Klaus &Maklan, 2013). Digital banking experiences include service quality, functional quality, perceived value, service customization, service speed, employee-customer engagement, brand trust, digital banking innovation, perceived usability, and perceived risk (Mbama&Esepue, 2018).

In particular, there are some differences in experiencing digital services for younger customers. Young (vs. older) consumers are more likely to rely less on heuristic processing (Yoon, 1997). As consumers move through their life cycle, their needs and responses to marketing programs tend to

shift to be more benefit-oriented (Akturan& Tezcan, 2012; Khan, Fatma, Shamim, Joshi, & Rahman, 2020). Customer experience develops younger customers' affective commitment but not older customers'. For younger (vs. older) customers, a stronger effect of customer experience on affective commitment confirms that consumers with different age profiles experience brand-related stimuli differently. The development of experiential value-laden interactions seems most promising for young customers (Khan, Hollebeek, Fatma, Islam, &Riivits-Arkonsuo, 2020).

Methodology

The purpose of this chapter is to analyze the digitalization of the banking in China and Kazakhstan based on a systems approach. To achieve this goal, we apply a number of representative methodologies, including the following key steps:

Literature review:

We first conduct a comprehensive literature review to understand the theoretical foundations, trends, and challenges of digitalization in the global banking industry, with a particular focus on China and Kazakhstan. In this process, we used various academic databases such as Google Scholar, Elsevier, etc., as well as academic journals such as Journal of Banking and Finance to collect relevant studies, reports and articles to provide theoretical framework and basic knowledge for research.

Case study:

To gain insight into digitalization efforts in the banking industry in China and Kazakhstan, authors selected representative case studies. During the selection process, authorstook into account the importance of the bank, the scale of its digital initiatives, the availability of data and information, and the variety of strategies and approaches adopted.

Comparative analysis:

The authors use benchmarking to assess the strategies and outcomes of digitalization of the banking sector in China and Kazakhstan. By analyzing key aspects such as technology infrastructure, digital service delivery, customer adoption, regulatory environment and impact on financial inclusion and efficiency, foridentification similarities, differences, patterns and trends in both scenarios. There has been chosen China's representative bank, CCB, and Kazakhstan's representative bank, Kaspi Bank.

Through the comprehensive application of the above methods, the authors gain a comprehensive and in-depth understanding of the status quo, trends and factors affecting the digitalization of the banking industry in China and Kazakhstan, providing a solid basis for subsequent research.

Overview of China's Bank Digitalization : Nowadays, China's banking industry has undergone significant changes driven by rapid digitalization. This evolution was driven by the emergence of new digital players, most notably Alibaba and Tencent, which revolutionized the financial landscape. As a newcomer to China's financial market, Alibaba has experienced unprecedented growth, achieving a staggering 408% growth over the past four years and establishing itself as a leader in the lending industry. In 2017 alone, Alibaba issued 446 billion yuan in loans to small and medium-sized businesses, and its subsidiary payment platform Alipay received 1.6 trillion yuan in deposits, equivalent to 89% of Bank of China deposits. Likewise, Tencent has made significant progress in expanding its payment services, accounting for more than 80% of online transactions in China today.

Traditional banking services have undergone profound changes, moving from traditional face-to-face interactions to dual online and offline channels. Offline services continue to cater to various banking needs at physical branches, while online services are provided through a powerful mobile banking app, providing customers with seamless and convenient banking services anytime, anywhere.

As the Internet and online services became more and more common, most traditional banks in China sensed the status quo and began creating platforms called Mobile Banking that offered various traditional services to their customers through bank apps. Mobile banking, as one of the common services in China in recent years, synthesizes the current trend of mobile communication with the digitization of money. Riding this huge wave of transformation, China Construction Bank's

(CCB) mobile banking app has surpassed other banks' apps and quickly taken root in the Chinese market. Therefore, the authors used CCB mobile banking as an example to analyze its features and possible improvements towards fully digital platforms.

It can be seen that, CCB's mobile banking not only copies the traditional business in bank branches, but also builds its own platform around the integration of business and finance, which plays a big role in the process of "pipeline business". On this e-commerce platform, people use their credit cards to purchase their desired products with interest-free installments. But there are some flaws in the platform's design that make CCB's mobile banking pale in comparison to new players like Alibaba and Tencent. Recently, some traditional e-commerce platforms in China have begun to share the huge pie of the Chinese financial market, attacking CCBs and other traditional banks from both the "pipeline service" side and the "digital platform service" side, collecting real-time information and creating more value. from them.

As China continues to digitally transform its banking industry, it is at the forefront of global innovation and is setting an example for other countries. Next, authors took a closer look at the digital banking landscape in Kazakhstan and explore the similarities and differences in the two countries' approaches to digital banking development.

Table 2. Banking tools digitalization

Functions	Illustrate	Improvement
Request for an account	This feature is able to meet the needs of customers to immediately obtain relevant information about the registered bank account, and also provides users with a control balance, a summary of transaction details and an asset statement.	Improve the query speed and interface friendliness, simplify the operation process, and ensure that users quickly and conveniently obtain the information they need.
Transfer accounts and money transfers	Apart from traditional transfer modes, CCB became extremely attractive when it pioneered the 'C2C' mode of mobile banking, which allows direct transfers from one consumer to another.	Improve transfer speed and convenience, and introduce more payment methods (such as scan code payment, QR code payment, etc.) to meet the needs of different users.
Bill payment and online payment	This feature mainly offers customers the service of paying phone bills and some daily needs such as electricity costs, making people's lives convenient without any fuss. Online payment is further guaranteed with advanced technologies such as dynamic password and USB key, which are used to secure the payment process. And users have the opportunity to check consumption records for several months.	Strengthen payment security measures, enhance users' trust in the online payment process, improve user experience, and further expand the application scenarios of online payment.
Investments and finance	Users purchase foreign exchange, gold, funds, government debt and other general investments through CCB mobile banking.	Provide more investment product choices, improve the transparency and convenience of investment and financial management, increase wealth management functions, and meet the diverse investment needs of users.
Credit management	This feature offered loan repayment record history query, overdue loan reminder, and prepayment calculation.	Simplify the loan application and approval process, speed up loan disbursement, improve user satisfaction with loan business, strengthen risk control, and reduce the risk of non-performing loans.
Business with credit cards	The application helps customers check bills and points, make payments, process installments, etc. In addition, when purchasing from CCB Shanrong online shopping mall, customers using CCB credit cards will receive some points to offset part of the price according to the ratio of 1000 to 2, which reduces the cost of production.	Improve the convenience and flexibility of credit card business, launch more preferential policies and activities, attract more customers to use credit cards, and enhance user stickiness and customer loyalty.

Overview of Kazakhstan's Bank Digitalization : China is a global leader in digital banking with a strong ecosystem supported by tech giants Alibaba and Tencent. Their innovative

platforms, such as Alibaba's Ant Group and Tencent's WeBank, have revolutionized financial services and driven significant growth and adoption across the country. On the contrary, the digital banking industry in Kazakhstan is still in its infancy and faces various challenges and opportunities as it strives to keep up with global trends.The development of digital banking in China is characterized by the rapid growth and widespread adoption of online and mobile banking services. The country's large population and tech-savvy consumers have fueled demand for convenient and easy-to-use financial solutions, leading to the proliferation of digital banking platforms. Alibaba's Alipay and Tencent's WeChat Pay have become ubiquitous in daily transactions, bringing payment convenience to millions of users. Additionally, digital lending platforms such as Alibaba Online Banking have democratized access to credit, making it easier for small and medium-sized enterprises (SMEs) to obtain financing.

Compared to China, digital banking penetration in Kazakhstan is still relatively low, and traditional banking services still dominate the market. However, the situation is changing rapidly due to factors such as rising smartphone penetration, expanding Internet connectivity and changing consumer preferences. Kaspi is Kazakhstan's leading digital bank and has played a key role in promoting digital adoption by offering a wide range of online banking services, including payments, transfers and investments. Despite their dominance, Kazakhstan's traditional banks have been slow to go digital, facing challenges such as aging infrastructure, regulatory restrictions and cultural barriers.

Kaspi has Super App, the most popular mobile app in Kazakhstan and the basis for everything the bank offers to its retail and consumer banking customers. Super App currently has 10.2 million monthly active users. While the fintech company is primarily active in its home country, it is now expanding to provide banking solutions to Central Asia's large unbanked population. While fintech banking apps, led by Russia and Ukraine, have proliferated in the region, fintech-focused Kaspi Bank has emerged as a major competitor in the space due to its proven track record.

Kaspi started out as a bank in the former Soviet Union of Kazakhstan. Now, as a participant in the 21st century fintech revolution, it is quickly becoming a major service provider in peer-to-peer lending and online marketplaces. In fact, fintech providers are the backbone of Kazakhstan’s economy, with Super App providing more than 60% of government COVID relief funds to eligible citizens.

Building on its successful experience in Kazakhstan and its ability to leverage fintech during the pandemic, Kaspi expands into Azerbaijan with a leading e-commerce platform for real estate, automobiles and second-hand goods. With strong financial performance and seamless technology support, Kaspi has also attracted investors, as evidenced by its successful IPO. Uzbekistan is also included in the growth company's development plans.

Large investments in technology infrastructure and regulatory reforms are urgently needed to accelerate the adoption of digital banking in Kazakhstan. Building a strong digital ecosystem requires collaboration between banks, fintechand regulators to create an enabling environment for innovation and growth. Initiatives such as the launch of instant payments systems and the development of open banking stimulates interaction and competition, helping to create a more dynamic and inclusive digital banking environment.

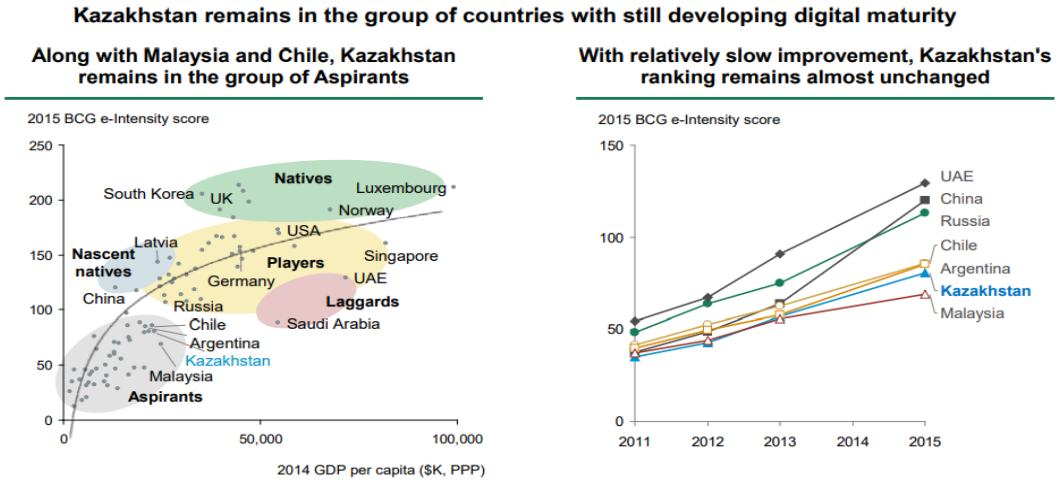


Figure 3. Kazakhstan position

Source: BCG Analysis

In addition, Kazakhstan can gain valuable insights from China's experience in using advanced technologies such as artificial intelligence, blockchain and big data analytics to improve customer experience and operational efficiency. By embracing digital transformation and harnessing the power of technology, Kazakhstan opens up new opportunities for financial inclusion, economic growth and social development.To sum it up, while China is leading the way in digital banking innovation, Kazakhstan has the potential to forge its own digital path. By addressing key challenges and seizing emerging opportunities, Kazakhstan accelerates its digital banking transformation and position itself as a global leader in financial technology. With the right policies and investments, Kazakhstan creates a more inclusive, efficient and sustainable financial system that benefits individuals, businesses and society as a whole.

Digital banking is becoming the norm for people and businesses in the UK, US and beyond. But did you know that it is also growing rapidly in Kazakhstan, the largest country in Central Asia? Online banking penetration is projected to reach 23% in 2024, which is slightly behind some European countries, but that's only part of the story.

Geographical necessity

Digital banking brings unique benefits to the country with the demographics and geography of Kazakhstan. First of all, Kazakhstan is the ninth largest country in the world by area, with a population density of only 7 people per square kilometer, one of the lowest in the world. Although the majority of people in Kazakhstan live in urban areas, as of 2022, 44% do not, meaning millions of Kazakhs have limited access to cash and physical banking services.

Lack of access to financial infrastructure has a chilling effect on rural economies, reducing investment and employment. The digital banking offering of banks like Jusan is therefore a lifeline for those living in less accessible parts of the country and a key part of economic development.

Fast growth

The introduction of digital banking services in Kazakhstan is proceeding at a rapid pace. In 2017, when the data was first collected, 54% of people in Kazakhstan made payments online, and by 2021 this figure has grown to 78%. Over the same period, the share of people making purchases using mobile devices more than doubled, and the volume of non-cash transactions skyrocketed from $5 billion to more than $150 billion.

Supercharging business

Digital banking has traditionally started with retail customers - typically the less sophisticated customers to develop services for. Under the leadership of our new Chairman of the Board, GalimzhanYessenov, along with our well-established digital retail banking offering, in recent years we have focused on building out our suite of digital banking services focused on businesses and entrepreneurs.

The authors believe that eliminating inefficiencies in business banking is our primary way of contributing to the benefit of our clients and overall economic growth. The Jusan Business banking app has been specifically designed to make the user experience as easy as possible for businesses, allowing everything from onboarding and onboarding, payment terminal management, accounting and taxation, and of course deposits and transactions to be completed in one super business app. banking.

Our user feedback on this approach has been strong: as of 2023, the Jusan Bank business app was the most popular business banking app in Kazakhstan and was ranked among the top 30 apps in Kazakhstan by market research firm Markswebb.

Democratization of investment

In addition to retail and business banking services, digital banking infrastructure is also driving the rapid growth of retail investment in Kazakhstan, providing a major pathway to increased consumer wealth. The number of retail investment accounts has more than doubled, from 218,000 in 2021 to 581,000 in 2022, according to the Kazakhstan Agency for Financial Market Regulation and Development. Thanks to legislative reforms in 2020, digital infrastructure now allows loyal customers to access what was previously impossible. reserve of financial institutions and institutional investors.

Result and discussion

This article analyzes the cases of China Construction Bank and Kaspi Bank of Kazakhstan, and deeply explores the formation process and current situation of digitalization of banks in the two countries. This article uses literature and comparative analysis methods to reveal the similarities and differences in digital transformation between the two countries. China Construction Bank has quickly gained popularity in the digital banking industry and has become an integral part of daily life in China as it actively responds to competitive pressures from technology giants such as Alibaba and Tencent. Kaspi Bank of Kazakhstan has made some progress in digital transformation, but still faces challenges such as the dominance of traditional banking services and limited adoption of digital channels.

Through an in-depth analysis of the national conditions of the two countries, this article puts forward a number of suggestions that Kazakhstan can learn from the successful experience of China Construction Bank, including strengthening digital infrastructure construction, promoting policy support, and promoting financial technology. Innovate and strengthen regulatory compliance to accelerate digital transformation, bank development and improve competitiveness. In particular, Kazakhstan learns from the successful experience of China Construction Bank to build a comprehensive mobile banking platform, promote financial technology innovation, strengthen digital infrastructure construction, formulate relevant policies and regulations, and cultivate digital financial business and technical talent teams to cope with regulatory requirements. Competition, regulatory hurdles and market pressures are driving greater success in banks' digital transformation.

Conclusion and recommendation : Therefore, through a comparative analysis of the development of digital banks in China and Kazakhstan, it can be seen that the development trajectories and maturity levels of the digital banking industries in the two countries are different. China has become a global leader in digital banking innovation, with strong infrastructure and extensive digital payment platforms, while Kazakhstan's digital banking development is still in its early stages, with traditional banking services dominating and digital channel penetration limited.

Despite their differences, both countries are expected to benefit significantly from the further digitization of digital banks. Digital banks have the potential to expand financial inclusion, improve operational efficiency and promote innovation in financial services, ultimately boosting economic growth and development. However, realizing these benefits requires a concerted effort from policymakers, regulators, financial institutions and other stakeholders.

Kazakhstan urgently needs to accelerate the adoption of digital banking technology and create an ecosystem that promotes innovation and entrepreneurship. This may require investing in digital infrastructure, promoting collaboration between traditional banks and fintech startups, and improving people's financial literacy and digital skills. In addition, the regulatory framework must

adapt to the continued development of digital banking and ensure consumer protection, data security and financial stability. This may include creating an enabling regulatory environment that encourages innovation and protects against risks and vulnerabilities associated with digitalization.

In China, digital banking is already very mature and the focus should be on leveraging advanced technologies such as artificial intelligence, blockchain and big data analytics to further improve customer experience, personalize financial services and reduce risks. Additionally, efforts must be made to address issues related to data privacy, cybersecurity and regulatory compliance to maintain trust in digital banking platforms.

Overall, the future of banking lies in digitalization, and China and Kazakhstan have a unique opportunity to leverage technology to drive inclusive and sustainable growth. By embracing digital banking innovation and cross-sector collaboration, these countries pave the way for a more sustainable, efficient and inclusive financial ecosystem that benefits all stakeholders.

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The impact of financial technologies on the development of the banking sector

Doszhan R.D.*, Shadkam A.S., Kuanova L.A.
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: raiguldos2011@gmail.com

Abstract. The financial sector, particularly commercial banks, plays a pivotal role in the economy of Kazakhstan. This study aims to investigate how the adoption of financial technologies influences the development and evolution of the banking sector in the country. Employing a comprehensive methodology combining quantitative data analysis and qualitative case studies, the study explores the impact of financial technology adoption on commercial banks. Additionally, the article examines various forms of collaboration between commercial banks and FinTech startups in Kazakhstan. The findings indicate that the extent of financial technology adoption and the nature of interactions between commercial banks and FinTech startups significantly influence the formulation of future development strategies and transformation initiatives for commercial banks.Based on prevailing market conditions, it is anticipated that the FinTech industry will witness primary growth within the banking sector and through extensive collaboration with commercial banks.

Keywords: financial technologies, commercial banks, FinTech, banking sector

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Introduction

Financial technology, commonly known as fintech, has become a key innovation in the financial industry, which is booming thanks to favorable regulation and widespread adoption of information technology around the world. Fintech promises to revolutionize the financial landscape by reducing costs, improving the quality of financial services and creating a more diverse and stable environment. Special attention should be paid to the increasing integration of digital technology in the banking sector, which offers users greater access to financial services and eliminates disparities in banking infrastructure for different demographic groups. This transition to digital financial services offers numerous benefits, including cost reduction for banks, process optimization and increased competition within the industry.

Fintech, a fusion of finance and technology, has its roots in the financial services technology consortium created by Citigroup in the early 1990s. This innovative concept represents a new paradigm in finance that uses technology to provide a wide range of financial services through online platforms, mobile payments and cloud computing. The digital revolution, accelerated by events such as the COVID-19 pandemic, has driven greater adoption of fintech services, which has changed consumer behavior and created serious challenges for traditional banking models.

In Kazakhstan, as in other parts of the world, the deep digitization of the financial sector has become an urgent necessity, encouraging financial institutions to integrate innovative technologies into their operations. The degree to which banks adopt fintech technologies has a profound impact on their business models and shapes the emerging financial ecosystem. Against the background of the COVID-19 pandemic, Kazakhstan's financial sector is experiencing remarkable trends, including the introduction of new technologies to improve efficiency, the increase in the number of digitally savvy consumers, and the emergence of innovative business models by both traditional players and technology companies.

This study focuses on the role of financial technologies in the transformation of commercial banks in the economy of Kazakhstan. By assessing the degree of integration of fintech technology and its impact on the banking sector, the study aims to provide valuable information on the current evolution of the financial landscape in Kazakhstan.

Literature review

Before analyzing the impact of financial technology on the banking sector of the Kazakh economy, it is worth studying the approaches to defining the term "fintech" (financial technology) and determining its essence. The views on the definition of fintech can be divided into two: fintech, or financial technology, can be defined as a set of innovative technologies in the financial sector of the economy, as well as a set of organizations that provide revolutionary technological financial solutions. R. Alt et al. In their work, they see fintech as an obvious combination of two applied areas: finance and technology. In this case, the first part of fintech, finance, is considered a financial services provider. And the second part is technology as a way to organize things, coordinate and simplify processes. I.D. kotlyarov defines financial technologies strictly as a combination of information technologies and financial services or as a combination of innovative financial services with innovative financial technologies. This process is interrelated, since financial technologies generate new financial products, and the financial products created have a greater impact on the development of the relevant financial technologies. V.V.Maslennikov in their work, they define fintech as a group of young companies that provide technology, software and infrastructure to provide financial services. The Financial Stability Board defines fintech as "financial innovation based on the use of technology that can lead to the creation of new business models, applications, processes or products with a corresponding significant impact on financial markets, institutions and the provision of financial services. In its review, the auditing and consulting firm Ernst & Young also defines fintech as "organizations that combine business models and innovative technologies to provide financial services, as well as their significant improvements and changes. It should also be noted the definition of fintech given by the central bank of Kazakhstan: "provision of financial services and services using innovative technologies such as Big data, artificial intelligence and machine learning, robotics, blockchain, cloud technologies, biometrics, etc.".

In the context of this study, it is necessary to distinguish between the concepts of fintech and fintech startups. According to the definition of Henner Gimpel et al., "Fintech is characterized by the use of digital technologies such as the Internet, mobile computing and data analytics to provide financial services, innovate or give them up. Fintech startups are newly established companies that offer fintech-based financial services."

In this study, we adopt an approach according to which fintech is defined as a combination of innovative technologies in the financial sector of the economy based on the use of innovative and digital means of communication and data processing. Fintech is transforming both the business models of traditional organizations in the financial market and the interaction between market participants. However, the study will also examine fintech startups as separate organizations that provide innovative financial services.

Methodology

This study uses a comprehensive methodology combining quantitative data analysis and qualitative case studies to study the impact of financial technologies on the development and evolution of the banking sector in Kazakhstan.

3.1 Quantitative data analysis

Quantitative data analysis is a fundamental component of this study in order to study trends and patterns in the introduction of financial technologies by commercial banks in Kazakhstan. The analysis focuses on the following aspects:

Trends in attracting digital capital: A quantitative analysis will be conducted to assess trends in digital capital raising activities among commercial banks in Kazakhstan in the period from 2017 to 2024 with forecasts extended to 2028. This analysis will include the collection of relevant financial data, including the amount of digital capital raised by banks, and the application of statistical methods to identify patterns and fluctuations over time.

Introduction of digital payments: Another key aspect of the quantitative analysis includes the study of the introduction and growth of digital payments in the banking sector of Kazakhstan. Data from 2017 to 2024 will be analyzed to track the spread of digital payment methods and their

growing importance in the country's economy. Forecasts up to 2028 will also be considered to predict future trends in the introduction of digital payments.

3.2 Qualitative case studies

In addition to quantitative data analysis, qualitative case studies will be used to gain a deeper understanding of the dynamics of cooperation between commercial banks and financial technology startups in Kazakhstan. Representative case studies will be selected to illustrate the various forms of collaboration between banks and start-ups in the field of financial technology, including partnerships, investments, joint ventures and ecosystem cooperation. Each case study will provide detailed descriptions of joint initiatives, highlight successful strategies, challenges encountered and lessons learned. Using a mixed-method approach, this study aims to provide valuable information about the changing landscape of financial technology adoption in the banking sector of Kazakhstan, considering both quantitative trends and the dynamics of qualitative cooperation.

Results and Discussion

The rapid development of financial technology (fintech) is changing the global economic landscape, and Kazakhstan is no exception to this transformative trend. As companies increasingly move towards digitization and online operations, the fintech sector in Kazakhstan has witnessed significant growth and evolution. In Moderna conditions, it is the digitization and transition of online business that indicates the rapid development of fintech all over the world, including in Kazakhstan. Figure 1 shows the dynamics of the fintech transaction volume in Kazakhstan from 2017 to 2024, the forecasts for the future until 2028.

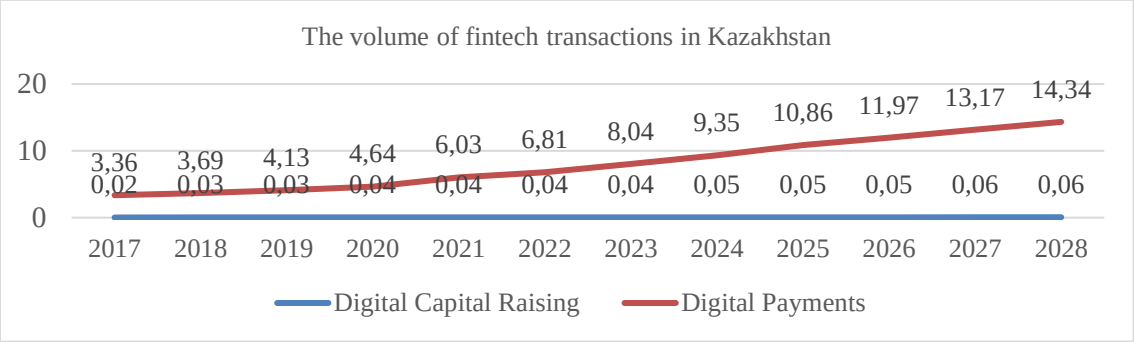

Figure 1. The volume of fintech transactions in Kazakhstan in the period from 2017 to 2024, and future predictions up to 2028 by segment (in millions of US dollars

Notes: Data shown is using current exchange rates and reflects market impacts of the Russia-Ukraine war.
Source: compiled by the author according to the report "Fintech in Kazakhstan, 2024", Statista

Based on the data provided, it shows the trends in digital capital raising and digital payments in Kazakhstan from 2017 to 2024, with predictions extended up to 2028.

The data show that the attraction of digital capital started from a low level in 2017 and amounted to 0.02. Throughout the analyzed period (2017-2024), the attraction of digital capital remained relatively stable with slight fluctuations. By 2024, the cost of raising digital capital has increased to 0.05, which indicates some growth, but still at a modest level. The future forecast for 2028 suggests a slight additional increase to 0.06. Unlike the attraction of digital capital, digital payments began at a significantly higher level in 2017, amounting to 3.36. During the analyzed period, the volume of digital payments increased significantly, increasing to 9.35 by 2024. The trend of digital payments indicates steady growth and a significant increase in the number of users and users. The future forecast for 2028 suggests further growth, and digital payments are expected to reach 14.34 percent.

Overall, the data suggest that while digital capital raising has remained relatively stable and moderately growing, digital payments have undergone significant expansion and adoption. This trend reflects a shift towards digitalization of financial transactions and indicates the growing

importance and recognition of digital payment methods in the economy of Kazakhstan. It also entails a growing reliance on digital financial services and infrastructure, which could have implications for the banking sector, consumer behavior, and economic development in general.

Through our mixed-method approach, which combines quantitative data analysis with qualitative case studies, we strive to provide detailed information about the developing fintech ecosystem in the banking sector of Kazakhstan. By combining quantitative trends with qualitative dynamics of cooperation, we provide stakeholders with valuable perspectives for strategic decision-making and policy development. Ultimately, this section serves as a comprehensive study of the multifaceted impact of financial technologies on the development of the banking sector in Kazakhstan. These case studies provide insights into various forms of collaboration, from partnerships and investments to joint ventures and ecosystem cooperation. By analyzing successful strategies, emerging issues and lessons learned, we strive to provide a holistic understanding of how the integration of financial technologies shapes the banking landscape in Kazakhstan.

Digitalization of various sectors of the economy, from agriculture to information technology (IT), places significant demands on companies operating in the fintech industry. The profitability and success of companies in these sectors increasingly depend on their ability to effectively use fintech solutions. With such high demand, the fintech sector is experiencing rapid growth and increasing competition. Figure 2 shows the 6 largest financial companies in Kazakhstan in terms of total financing in 2021, highlighting important players in the country's fintech market. These companies are at the forefront of innovation and shaping the future of financial services in Kazakhstan, which once again underscores the importance of financial technology in the country's economic landscape.

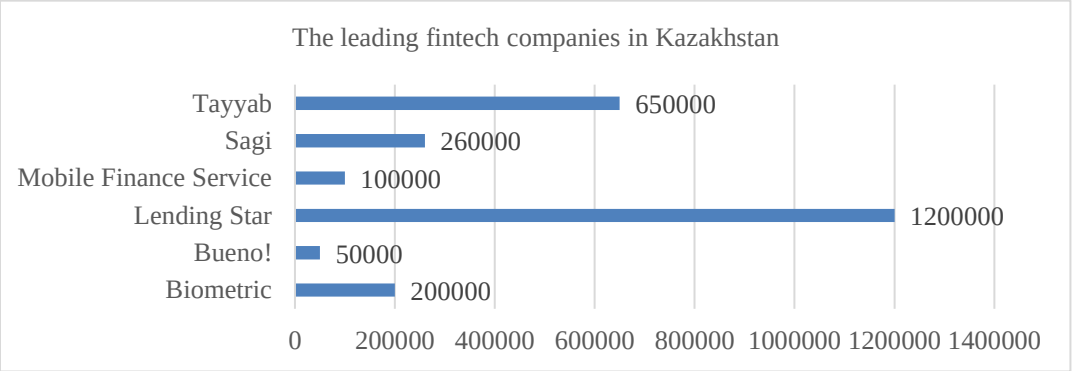

Figure 2. The leading fintech companies in Kazakhstan in 2021 by total funding (in millions of dollars). Source: compiled by the author according to the report "The Fintech Startup Landscape in Kazakhstan", AIFC Tech Hub.

The impact of fintech on the activities of commercial banks.Unlike some foreign markets, the fintech landscape in Kazakhstan can be described as relatively monopolized, with a significant concentration of financial technology development, mainly in the largest banks, but also to a lesser extent in telecommunications and IT companies. Such a concentration can be explained by several factors.

First of all, the financial market in Kazakhstan is relatively mature and well-established, the industry is dominated by well-known players. Secondly, the regulatory conditions in Kazakhstan, where a large part of financial transactions are regulated by state regulations, also contribute to this trend.

In our opinion (fig. 3) in Kazakhstan, there are four main types of interaction between banks and fintech startups: creation of accelerators, business incubators and hackathons; multi-level partnerships; participation in the authorized capital of fintech startups; cooperation within the ecosystem. It is also worth paying special attention to financial technologies, which are created by commercial banks themselves.

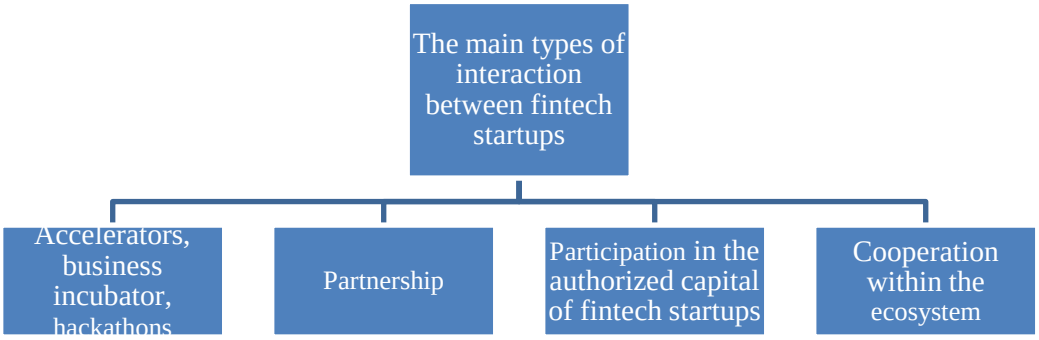

Figure 3. Primary types of interaction between banks and fintech startups in Kazakhstan
Noted: complied by the author.

The creation of accelerators, business incubators and hackathons is the most initial form of interaction between banks and fintech startups, usually at this stage fintech startups receive competencies, knowledge and customer base from banks, and banks, in turn, at this stage can carefully observe, evaluate and decide on further cooperation. It is worth noting that the creation of accelerators, business incubators and hackathons is a rather time-consuming and expensive process, so only a small part of the participants may eventually receive the necessary investments to develop their business and become interesting for the organizers of accelerators and incubators. Associations

Different levels are the second stage of interaction, at this stage banks can use fintech startups as counterparties to solve certain tasks within their business. The third stage of interaction between fintech startups and banks is the entry into the company's capital. At this stage, banks become co-founders of startups with direct investments, create joint ventures, etc., or absorb and buy them, turning them into their own structural divisions. The fourth stage of cooperation between fintech startups and banks can be called cooperation within the ecosystem that the bank forms, this format of cooperation can be quite individual and mainly depends on the structure of the ecosystem that the bank itself forms.

Thus, it follows from the above analysis that Kazakhstani banks are actively developing in the era of digitalization, becoming leaders in introducing innovative technologies into operations and forming large ecosystems with which millions of customers interact daily.

Conclusions

The impact of financial technology on the development of the banking sector in Kazakhstan is undeniable, as evidenced by our extensive study. Through a combination of quantitative data analysis and qualitative case studies, we highlight the transformative role of fintech in shaping the country's financial landscape.

Our analysis revealed significant trends in the attraction of digital capital and digital payments, highlighting the sustained growth and adoption of digital financial services in Kazakhstan. While digital capital raising has shown modest growth, digital payments have expanded significantly, reflecting a broader shift towards the digitization of financial transactions. This trend underscores the growing importance and acceptance of digital payment methods in Kazakhstan's economy, indicating a growing dependence on digital financial services and infrastructure.

In addition, our research on the dynamics of cooperation between commercial banks and fintech startups sheds light on the developing fintech ecosystem in Kazakhstan. From the creation of accelerators and business incubators to partnerships and investments, banks are actively working with fintech startups to drive innovation and improve the services they offer. This collaboration is necessary for banks to remain competitive in an increasingly digital world, using fintech solutions to optimize processes and improve the customer experience.

Overall, our study highlights the key role of financial technology in driving the development and evolution of Kazakhstan's banking sector. By introducing innovations in the field of financial

technology, Kazakhstan's commercial banks are not only modernizing their activities, but also shaping the future of financial services in the country. As the fintech industry continues to evolve, it is imperative that stakeholders remain flexible and proactive to adapt to the changing market dynamics, ensuring the continued growth and success of Kazakhstan's banking sector.

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Modern problems of performance audit in Kazakhstan and consideration of foreign experience

O.Yu. Kogut*, L.A.Bimendiyeva, M. Akbalik
[1]Al-Farabi Kazakh National University,Almaty, Kazakhstan
*e-mail: kogut.1108@gmail.com

Abstract. Currently, the system of state audit and financial control in the Republic of Kazakhstan is represented by the Accounts Committee, audit commissions at the local level, and the authorized body for internal state audit. For Kazakhstan, the state audit is seen as a holistic and independent assessment of the effectiveness of the audit facilities, covering not only financial issues but also all areas of their activities. The system of internal state audit and financial control bodies in the Republic of Kazakhstan is represented by the authorized body for internal state audit and the internal audit services of central state and local executive bodies. The authorized body for internal state audit is responsible for conducting an audit of the financial statements of state bodies, compliance audit in a truncated form, as well as conducting desk control. State audit plays an essential role in economic management as one of the key elements. It is necessary to improve and develop the audit of the effectiveness of the use of budgetary funds, considering the accumulated international experience. State audit bodies play an important role in ensuring the effective functioning of State organizations and control over the use of public funds.

Keywords:state audit, performance audit, state control, Internal audit, entrepreneurship
JEL codes: M42; M48; O53

Introduction

In modern international practice, decentralized and centralized models of the organization of the internal audit system are being implemented.

In a decentralized model, each ministry is fully responsible for monitoring the use of budget funds.

The centralized model is characterized by the Ministry of Finance's direct control over each ministry's revenues and expenditures(Beisenova L.Z., et al., 2017).

In most countries of the world, constitutional systems recognize and guarantee the independence of State control bodies.The Lima INSTOSAI Declaration (1977) and the Mexican Declaration of Independence (2007), as well as the ISSAI 11 International Standard on the Basic Principles and Best Practices of INTOSAI regarding the independence of the Supreme Audit Institution, are fundamental tools to support and strengthen the independence of supreme audit institutions around the world.Representatives of all countries' legislative and executive authorities should know the contents of these documents and use them to strengthen state control.A historic milestone was the UN Declaration on the Autonomy and Independence of the Supreme Audit Institutions, adopted in 2011. This declaration also helps to strengthen the positions of the state audit bodies and is one of the elements of their support(Artyomov N. M., Ponomarenko K. S., 2018).

The internal state audit is aimed at improving and increasing the efficiency of the activities of central state and local executive bodies. It has a preventive character, unlike the system of state financial control aimed at detecting violations and taking response measures (Beisenova L.Z., et al., 2017).

The role of internal audit, according to international experience, is to conduct an audit of the internal practices and procedures of a public authority to achieve final results by the organization's goals.In government agencies, internal audit is a necessary internal expert body that allows timely measures to be taken to prevent violations and deficiencies and improve efficiency, profitability, and productivity.

Internal audit helps an organization achieve its goals by using a systematic and consistent approach to evaluating and improving the effectiveness of risk management, control, and corporate governance processes(Beisenova L.Z., et al., 2017).

Literature review

The main mechanism of influence that the European Court of Auditors (ECB) has at its disposal to improve financial management in the European Union is the publication of reports.The special reports of the ESP, as a rule, analyze the systems, programs, and organizations involved in the execution of the EU budget (or European Development Funds), according to one or more indicators of effective management (efficiency, productivity, and effectiveness).Evaluating and quantifying the impact of performance audit reports and conclusions are considered mandatory elements of the accountability cycle. The existence of follow-up control over the implementation of the auditors' comments and recommendations is in itself an incentive for their implementation (Artyomov N. M., et al., 2018).

Studying the world experience, we have concluded that efficiency audit has a significant impact on the quality of execution and decision-making by public executive authorities in the field of public finance management, as well as contributing to increasing responsibility, transparency, and accountability of government agencies.The processes of global globalization have contributed to standardization in the field of public audit. With the expansion of the representation of countries in the International Organization of Supreme Audit Institutions (INTOSAI), the International Organization of Supreme Audit Institutions (INTOSAI) has provided an opportunity for a broad exchange of experience (Shakirova G.A., et al., 2019).In international practice, as performance auditing has developed, various terms have been used to name this type of audit and these formulations are discussed in Table 1.

Table 1 - Terminology of performance audit in international practice

№	Name of the State	The appropriate control body	The name of the term in different countries	The purpose of the performance audit
1	Kazakhstan	Supreme Audit Chamber	Performance audit	The purpose of the performance audit conducted by the internal audit services is to form an independent, competent, and objective assessment of the activities of the object of state audit and the formation of recommendations…
2	Russia	Accounts Chamber of the Russian Federation	Performance audit	Determination of the effectiveness of the use of public funds received by audited organizations and institutions to achieve planned goals, solve set socio-economic tasks, and perform assigned functions
3	Canada	The Office of the Audit General	Auditing the benefits of using money	Assessment of the activities of public authorities, control, and reporting systems, focused on the results of the use of budgetary funds
4	Great Britain	National Audit Office	Auditing the benefits of using money	It is aimed at collecting evidence that allows us to conclude that the funds spent, and the results obtained correspond
5	USA	The Government Accountability Office (GAO)	Operational audit	Provide objective information to legislators or taxpayers about whether a particular government agency or program is fulfilling its tasks and how effectively it uses resources. Often, data from the state agency itself about its activities is not always objective, in addition, there is a direct motivation for it not to disclose all existing problems
6	Australia	Australian National Audit Office, ANAO	Performance audit	Review or study of any aspect of the operational activities of an individual or organization of users of budgetary funds, and provides for an audit of the effectiveness of the Accounting Chamber itself
7	New Zealand	Audit office	Performance audit	Providing Parliament and the public with guarantees that government organizations do what is required of them and act lawfully and honestly
8	Denmark	The Supreme Body of State Financial Control	Audit of execution or management	Assessment of the use of budgetary funds to achieve planned results, as well as the activities of government agencies in general
	Norway	The Accounting Chamber		
	Sweden	State Control and Audit Department		
9	Finland	National Audit Office of Finland	Performance audit	Does the activity of the audited entities correspond to the real socio-economic needs of the company, and have the set goals been achieved at the lowest possible cost
10	Turkey	Turkish Accounting Chamber (TCA)	*Audit of performance results*	Measuring performance to tasks and indicators defined by public administrations
11	Netherlands	Accounting Chamber of the Netherlands	Performance audit	Establishing the facts of inconsistency between the planned and actual activities of the performance audit facilities
12	France	Cour descomptes	Performance audit	Determining whether the objectives set for the objects of control have been achieved.

Note – compiled by the author based on sources (Shakirova G.A., et al., 2019;Bogdanovich I. S., et al., 2017;Milakhina D., 2019; Kovalenko S.N., et al., 2017;Procedural standard…, 2018; Tachyurek M. Ch.; Kovalenko G.V., 2012; Lozitskaya O.I., et al., 2020)

There are both coincidences and differences in the domestic and foreign experience of conducting an efficiency audit. The common ones are: defining the criteria, goals, and objectives of the audit; achieving increased responsibility, transparency, and accountability; and the need to select possible topics and objects of performance audit when planning an audit.At the same time, it is necessary to take into account and evaluate the quantitative values of various criteria, which include the socio-economic significance of the topic, the degree of external and intra-system risks, a detailed assessment of the possible results of the audit, the amount of expenditure carried out by public funds, as well as familiarization with the results of previous inspections in this area or at these facilities.When choosing the topics and objects of verification during the performance audit, it is necessary to consider that there is a sufficient degree of confidence that the results of the planned performance audit will contribute to solving specific socio-economic problems of great public importance.

Methodology

The opportunity to study the experience of other countries is also necessary for the practical application of efficiency audit in your country, taking into account its characteristics, which will increase the effectiveness of efficiency audit (Bogdanovich I. S., et al., 2017).

World experience proves that the use of performance audits as an independent type of control improves the process of managing public resources by providing complete, reliable, and objective information about the effectiveness of the functioning of organizations that use budgetary funds (Kovalenko S.N., et al., 2017).

The problem of auditing the effectiveness of state-owned enterprises is fundamentally new to Russian science and public administration practice and is currently at the stage of scientific development. The priority in conducting an efficiency audit is to determine the criteria for the effectiveness and efficiency of the use of public financial resources. Since the audit of the effectiveness of the use of budgetary funds can have many different goals due to the variety of activities of state audit facilities, a variety of criteria can be developed corresponding to them (Shakirova G.A., et al., 2019).

The targeted responsibility of officials implementing programs, as well as increasing the level of accountability and efficiency of the use of public funds, is important in the application of the program evaluation tool in foreign practice. Also, a feature of the assessment used in foreign countries is the need for the presence of specific indicators in the budget, which provides an opportunity for evaluating the implemented state programs.In addition, there is a focus on evaluating the effectiveness of government programs from the perspective of a citizen, consumer, and taxpayer and involving external experts in it.

For most developed foreign countries with a results-oriented budget, an efficiency audit is aimed at assessing the level of effectiveness of the management activities of government agencies in achieving planned results (evaluation maps).At the same time, the efficiency audit technology is implemented in the following models:

– in the first model, the main attention is paid to the quality of the management systems and procedures existing at the audited facility, their focus on ensuring conditions for savings, productivity, and effective use of budgetary funds;

– in the second model, the verification of management reports of organizations on the results of the work done, which are provided to the relevant government agencies, that is, in essence, the preparation of an audit opinion on the reliability and completeness of the implementation of the audited organization on the effective use of allocated budgetary funds in the submitted reports;

– the third model is implemented if the audited organization does not submit a report on the results of its work and, depending on the chosen topic and the tasks set, it is checked and efficiency and efficiency or effectiveness is evaluated (Alikulova L.B.,2022).

Results and Discussion

As practice shows, the concepts of performance audit and audit of government programs are often separated. It is believed that an efficiency audit is conducted only to determine the effectiveness of the use of state and other resources obtained by the objects of audit (control) to achieve planned goals and solve set socio-economic tasks.

At the same time, research shows that in foreign practice, efficiency audit, being included together with financial and compliance audits in the state audit, has the main purpose of identifying whether actions, programs, and institutions comply with the principles of efficiency and whether there are additional opportunities for their improvement.

Consequently, the audit of the effectiveness of government programs has the main purpose - to identify whether actions, programs, and institutions comply with the principles of economy, efficiency, and effectiveness and whether there are additional opportunities for their improvement. The effectiveness is evaluated in comparison with the relevant criteria, and the reasons for deviation from these criteria and other identified problems are analyzed. The purpose is to answer the key audit questions and provide recommendations for improvement (Alikulova L.B., 2022;State audit… The auditor's report, 2021).

In compliance with the requirements of the Law of the Republic of Kazakhstan "On State Audit and Financial Control", the Accounts Committee for Control over the Execution of the Republican Budget adopted procedural standards for external state audit and financial control for evaluating the activities of state audit and financial control bodies. The procedural standard of external state audit and financial control for evaluating the activities of state audit and financial control bodies defines the purpose, objectives, directions, criteria, and procedural requirements for evaluating the activities of state audit and financial control bodies (Procedural standard…, 2018).This procedural standard is a kind of methodology for evaluating the effectiveness of the activities of state audit bodies, although the word "effectiveness" is missing from the title. In support of this, we can define the concept of "efficiency of the activities of a public authority" as the ability to achieve the best direct and final result using a smaller amount of budget funds.Since the purpose of the procedural standard is to measure the level of results achieved and improve the quality and effectiveness of the work of state audit bodies (Procedural standard…, 2018), this suggests that all this corresponds to the concept of efficiency. Thus, the procedural standard defines the procedure for evaluating the effectiveness of the work of state audit bodies (Dulambayeva R. T., et al., 2018).

A joint regulatory resolution of the Supreme Audit Chamber of the Republic of Kazakhstan and an order of the Minister of Finance of the Republic of Kazakhstan approved the Rules of interaction between state audit and financial control bodies (On approval of the Rules…, 2023). These rules regulate the issues of planning, conducting audit activities, registration of the results, and implementation of materials of parallel and joint audits, as well as the preparation of reports on the work of state audit bodies.

The process of legislative and methodological consolidation of the basic concepts and procedures for performance audit as an integral part of state financial control has not been completed (Lozitskaya O.I., et al., 2020).

Due to its role in public administration, the effectiveness of public audits is very important, and continuous improvement of its effectiveness is one of the ways to improve the effectiveness of public administration in general. State financial control is aimed at ensuring the efficient use of resources in all sectors of the economy (The Law "On State Audit and Financial Control", 2015).

Conclusion

Modern world experience has already proved that the use of efficiency audit in state bodies as a separate independent type of control makes it possible to improve the process of organizing and managing state assets and budget funds by providing reliable, objective, and complete information about the effective activities of organizations that are users of budget funds (Shakirova G.A., et al., 2019).

Since inspections are carried out according to programs that most often last several years, it is necessary to include a section on the socio-economic impact of the measures taken in the performance audit report, as well as to use criteria such as the efficiency and productivity of using public financial and material resources (Bogdanovich I. S., et al., 2017).

For our country, the issues of the organization of the financial control system are quite relevant and significant. In this context, an important role is played by the interaction between the state audit bodies, which is a key factor for ensuring the quality of audit in the implementation of the functions of state audit and financial control (Aliev M.K., et al., 2018).

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Analysis of the practical implementation of the family policy of the Republic of Kazakhstan

L.B. Dospayeva*, T.S. Sokira
Al-Farabi Kazakh National University, Almaty, Kazakhstan.
*E-mail: dospayeval@gmail.com(corresponding author)

Abstract

The family is the main source of formation of the values of the younger generation. It is a basic social institution, the functioning of which directly affects the well-being and stability of the state. Therefore, the primary goals of the state family policy are to support, strengthen and protect the family, create the necessary conditions conducive to its physical, intellectual, spiritual, and moral development.

Keywords: government regulation, family policy, gender policy, goverenmental goals, strategy.

JEL codes : A14, H19, H70

Introduction

The Head of State, in his congratulations on Family Day (Tokayev K.K.:09.10.2023), noted that the family occupies a special place in everyone's life. It plays a crucial role in educating the younger generation, introducing children to national values. No wonder they say: "The motherland begins with the family." Respect for traditions and patriotism originate from the native hearth. The institution of the family makes a decisive contribution to the formation of a new quality of the nation, promotes the rooting in society of such qualities of a responsible citizen, "Adal Azamat", as hard work, the pursuit of knowledge, solidarity [1].

In accordance with the Strategy "Kazakhstan-2050: a new political course of an established state", the republic has launched accelerated modernization and industrialization. A concept was developed for Kazakhstan's entry into the top 30 most developed countries in the world, within which Kazakhstan intends to apply a 15-20-year "window of opportunity" to implement five strategic directions: the development of human capital, improving the institutional environment, the formation of a knowledge-based economy, the formation of modern infrastructure and deepening international integration [2].

The attribution of human capital to the number of objectively paramount conditions for social modernization has put on the agenda the need to transform economic, social and socio-political institutions. To this end, in 2014 the Government approved the Concept of Social Development of the Republic of Kazakhstan until 2030. The concept is aimed at creating conditions for improving the quality and competitiveness of human capital, as well as achieving a high standard of quality of life for all Kazakhstanis. The concept reflects strategic objectives for the reform of social and labor relations, the health care system, education and social protection with a separate focus on social support for motherhood, childhood and vulnerable groups of families [2].

During the formation of Kazakhstan as a democratic state, the first socially significant structures on women, motherhood and childhood were formed. Kazakhstan has joined the fundamental UN documents in the field of women's empowerment and protection.

The adoption and implementation of the Gender Equality Strategy for 2006-2016 (hereinafter referred to as the Gender Strategy) allowed a more balanced approach to issues of rights and opportunities not only for women, but also for men.

Following the results of the third and fourth periodic reports on the implementation of the provisions of the Convention on the Elimination of All Forms of Discrimination against Women, the UN Committee gave a positive assessment to the creation of a legislative framework on equal rights and opportunities for men and women.

In September 2015, Kazakhstan joined the UN Sustainable Development Goals, among which 12 out of 17 are gender-sensitive. At the same time, these goals required national adaptation and, accordingly, a revision of all strategic directions and tasks of the state previously developed.

Due to the completion of the first stage of the implementation of the Gender Strategy, favorable opportunities have arisen to link the new stage of the state gender policy with international trends in sustainable development, national strategic priorities and new principles of social policy.

Results and Discussion

In the existing documents of the state planning system, the institution of the family is considered exclusively as an object of social protection. At a new stage of development, it is important for Kazakhstan to form its own approaches to the formation of family policy, since among all social institutions that affect the quality of human capital, the family plays an important role.

As international practice shows, gender relations models have a significant impact on the level of functional stability of the family. The higher the level of gender equality, the greater the responsibility, parity and effectiveness in the performance by family members of their household, economic, moral, educational, protective and other important functions.

Thus, it becomes obvious that the formation of conditions for the formation of a modern stable family and the achievement of gender equality is an inseparable process of social modernization of society.

The development of a comprehensive Concept of family and gender policy in the Republic of Kazakhstan (hereinafter referred to as the Concept), as a link between existing concepts in the field of competitiveness and social development, seems to be an obvious and justified necessity and one of the fundamental conditions for the successful integration of the Republic of Kazakhstan into the world community.

The concept was developed on the basis of the Constitution of the Republic of Kazakhstan, the Strategy "Kazakhstan 2050", the National Plan "100 Concrete Steps", the Concept of Kazakhstan becoming one of the 30 most developed countries in the world, the United Nations Convention on the Elimination of All Forms of Discrimination against Women, the SDGs and other ratified international treaties and agreements.

Decree of the President of the Republic of Kazakhstan dated December 6, 2016 No. 384 approved the Concept of Family and Gender Policy of the Republic of Kazakhstan until 2030.

Introduction of a Digital family card

Family policy in the Republic of Kazakhstan is an important component of the entire social policy of the state.

In order to strengthen the institution of the family, provide comprehensive measures to support families, Family Support Centers will be established, resolve family conflicts and provide temporary accommodation for women with children.

On September 1, 2022, the introduction of a Digital Family Card was launched, which is an information system providing assistance to citizens in a proactive format, that is, without waiting for a statement from the recipient. The introduction of a Digital family Card has made it possible to increase the efficiency and improve the quality of public services, and reduce corruption risks. according to the Ministry of Labor and Social Protection.

Six million Kazakhstanis have received social assistance with the introduction of a Digital family Card. You can now apply for a pension, benefit or targeted assistance automatically, without an application. All data on the social status and financial situation of citizens are in the digital family card. It accumulates information from various government agencies – place of residence, number of children, income, payments to the pension system, CSHI and much more. The introduction of the card has greatly simplified the work of government agencies. But, most importantly, currently citizens can receive almost all public services remotely. [3]

To update the data, the Ministry of Labor and Social Protection of the Republic of Kazakhstan, together with other central authorities and akimats, is currently conducting large-scale work clarifying information about families, which is conducted for several categories of persons. Government agencies are counting children who are not covered by preschool and school education, young people of the NEET category, persons not included in the CSHI system and other information. During the revision of the data, it was revealed that 152 thousand children are in the queue for places in kindergartens, about 143 thousand are registered in the queue for housing [4].

Youth (18-35 years old)	
Informally employed	167000
Unregistered unemployed	96000
Total population (18-63)	
Citizens who are not covered by the OSMOSIS system	2800000
Informally employed	More than 1000000
unemployed	658000
Inactive, non-deducting individual entrepreneurs	372000
Created by the author based on the source [3]	

An analysis of information on youth, which now includes citizens from 18 to 35 years old, showed that 167 thousand people are informally employed, and 96 thousand are unregistered unemployed. 2.8 million citizens of the country are not covered by the CSHI system, 658 thousand of them are unemployed, more than 1 million are informally employed, and there are also self–employed, housewives and workers through registration on various social platforms. Updating the data also revealed that 372 thousand individual entrepreneurs, peasant and farm enterprises are inactive, do not deduct taxes and social payments, and over 1 million people in the republic do not live at the place of registration [4].

Improvement of labor legislation providing for the definition of the right of single parents to a remote work format and a reduced employment regime.

Kassym-Jomart Tokayev instructed the Ministry of Labor to identify a special category of workers – parents raising children alone. Women are much more likely than men to have to combine work and childcare responsibilities, not to mention the problem of organizing proper childcare. The President noted that in developed countries, employers provide special working conditions for single mothers, and large companies open children's rooms in their offices. This practice should become the norm in our country. It is necessary to introduce effective mechanisms for regulating the working regime, which will take into account the interests of this category of workers. [5]

One of the priorities of the state policy is to support motherhood and childhood, the President noted, speaking at a meeting of the National Council of Public Trust (NCOD). "We have to admit that women are much more likely than men to have to combine work and child care responsibilities. If a mother takes maternity leave, she loses her professional skills and competencies. As a result, women are becoming less competitive in the labor market" [?].

The most difficult thing, according to the president, is for single parents, who find it difficult to organize proper care for their children. Special working conditions must be created for them. Therefore, at the legislative level, it is necessary to provide for the right of single parents to a remote work format and a reduced employment regime. Such experience is already available abroad. Increasingly, large companies are opening children's rooms in their offices. This practice should become the norm in our country. In these situations, on the one hand, it is necessary to introduce effective mechanisms for regulating the working regime that take into account the

interests of this category of employee, on the other hand, to ensure the continuity of labor processes and appropriate productivity [6].

Opening of women's entrepreneurship centers.

Currently, there are 4 centers for the development of women's entrepreneurship in 14 regions of Kazakhstan, which were opened within the framework of the partnership of the Solidarity Fund of the Ministry of National Economy, the National Commission for Women and Family and Demographic Policy under the President of the Republic of Kazakhstan and NCE "Atameken".

The first three centers for the development of women's entrepreneurship in Turkestan, Almaty and Mangistau regions were opened in November-December 2021. The initiative is funded by the Asian Development Bank and implemented by the United Nations Development Program in Kazakhstan [7].

To date, more than 500 women have applied to the Centers opened in November 2021, and an analysis of the needs of women entrepreneurs in these regions has been conducted to identify the main topics of training. The first trainings on the identified needs of women will be conducted in the near future.

The centers are designed to become a platform for non-financial support for women entrepreneurs, where they will be able to receive a number of services to launch startups, further expand and develop existing businesses, as well as participate in training programs and networking events.[7]

As part of the package of measures to support families with children, the State provides economic support through the payment of social benefits and the provision of free services. The system of providing social benefits includes allowances for the birth of a child and for the care of a child under one year old, for the upbringing of a disabled child, a state allowance for children under 18 years old, a special state allowance for mothers with many children and families.

In 2008, social payments were introduced in cases of loss of income due to pregnancy and childbirth, adoption of a newborn child (children), and also in connection with the care of a child upon reaching the age of one year from the compulsory social insurance system.

Since 2014, in order to ensure an adequate amount of pension savings for working women for recipients of social benefits for child care, additional subsidies for mandatory pension contributions have been provided. To assist in the upbringing of children in the family, material incentives for adoptive parents and caregivers, one-time payments are provided to citizens who adopted and adopted orphaned children, allowances to guardians or trustees for the maintenance of an orphan child and a child left without parental care, payments to foster carers.

According to the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the population as of January 1, 2024 amounted to 20,033,546 people, including:

citizens – 12,451,004 (an increase of 1.9%),

Rural residents – 7,582,542 people (an increase of 0.3%). [8]

In 12 months, 387.9 thousand children were born in Kazakhstan (403.5 thousand in 2022), of which 200.3 thousand were boys, 187.6 thousand were girls. [8]

120 thousand marriages were registered in 12 months of 2023. Compared to the same period in 2022, the number of marriages decreased by 5.9%. The marriage rate was 6.07 per 1,000 people. Also, during this period, 16.7 thousand divorces were registered (according to the RAGS authorities, excluding court decisions on divorce), which is also 5.3% less than the level of 2022. The divorce rate was 0.84 per 1,000 people.

The Law of the Republic of Kazakhstan "On Special Social Services" adopted in 2009 significantly expanded the range of services provided to individuals and families in difficult life situations.

Access to free medical, social, legal and socio-psychological services was provided to family members with disabilities, socially significant diseases, released from prison, victims of violence and abuse, lonely elderly people.

The activities of family support resource centers have been organized. Public associations of fathers involved in the moral and patriotic education of schoolchildren have been developed in the formal education system.

Family Day has been established, and the National competition "Mereyli otbasy" is held annually. The National Plan for Strengthening Family Relations, moral and ethical and spiritual and Moral Values for 2015-2020 has been approved, which is being implemented in three directions: strengthening family values, forming a healthy lifestyle, building a Society of universal labor. The institution of the Commissioner for Children's Rights has been introduced, designed to ensure the protection of the rights and legitimate interests of children.

In Kazakhstan, there are a number of holidays dedicated to the institution of the family. Since 2013, Family Day has been celebrated in Kazakhstan every second Sunday in September. In 2023, Mother's Day (celebrated on the second Sunday of May) and Father's Day (celebrated on the third Sunday of June) were added to the national holiday calendar of the country. Children's Day, as in many countries of the world, is celebrated on June 1 [9].

In addition, there are 36 crisis centers and 31 family support centers in all regions of Kazakhstan. These institutions provide psychological, social, legal and other necessary assistance to every family in a difficult life situation, as well as comprehensive support in the development of the family institution.

Child support occupies a special place in the country's family policy. Children aged 1 to 6 years, from among the recipients of targeted social assistance, have a guaranteed social package. It is planned to provide assistance to 212 thousand children by the end of the year. Since the beginning of the school year, children from 1st to 4th grade of secondary schools have been provided with free meals. Also this year, the issue of free meals in kindergartens for 97 thousand children from socially vulnerable families has been resolved. In 2023, the implementation of the national project "Comfortable School" was launched, within the framework of which 369 schools will be built. In addition, a fund has been established to support the education infrastructure, which accumulates funds returned to the state as part of anti-corruption measures. To date, the Fund has received 120 billion tenge, of which 97 billion tenge has been allocated for the construction of 62 schools.[9]

Conclusion

Despite the measures taken by the State to provide comprehensive family support, the following trends are taking place in society that require urgent solutions.

Divorces and the birth of a child out of wedlock tend to increase. Almost every third marriage breaks up. The share of divorces of spouses with minor children has increased. In 2020, 160.5 thousand marriages accounted for 44.9 thousand divorces (28%), in 2023, 148.7 thousand marriages accounted for 53.3 thousand divorces (35%).

The number of single-parent families is growing. In 2021, their share increased by 6.8% compared to 2011. Of these, more than 400 thousand women raise more than 700 thousand children, and more than 60 thousand men – more than 300 thousand children (15.1% of children live with one mother, 6.4% of children live with one father). Thus, every 5th child lives in a single-parent family.

The gender-based freedom of men leads to a weak participation of fathers in the upbringing of children and the problem of child support payments. As of January 1, 2023, 279 thousand cases are pending.

Based on the results of a multi-indicator cluster survey (hereinafter referred to as MICO) In the Republic of Kazakhstan in 2015, only 6.6% of children under the age of 5 receive support from their fathers in the process of their early education, while 50.7% of children receive such support from their mothers.

Men who raise children alone still do not have the same rights that women have in similar situations. In the process of ensuring equal opportunities for men and women, the presence of persistent stereotypes in society regarding the social roles of men and women affects.

There is a certain prevalence of "civil" and intermarriage marriages among some representatives of ethnic groups. Cases of consolidation of the union of men and women not in civil

registration bodies, but in religious institutions have become more frequent. At the same time, unacceptable family values are cultivated that contradict the modern position of a woman in the family, her social activity and employment. In the future, conflicts occur in such families, leading to the dissolution of marriage.

There are cases of abduction and forced marriage of girls, which is a crime in a legal and secular state, and not a revival of national customs and traditions.

Preventive measures are insufficiently developed, so work with the family is carried out mainly upon the occurrence of a difficult life situation. At the same time, in order to receive assistance, it is necessary to contact various authorities, social services are provided by various departments, and they are often provided to a family member with simultaneous isolation from his family. This entails the loss of family ties, a decrease in the level of socialization of a family member, whereas the assistance provided should be focused on preserving and strengthening the family.

The issue of reproductive health of men and women remains relevant. About 16% of marriages are infertile, for which both men and women are equally responsible. Men's destructive attitude to their health, abuse of bad habits, and a tendency to risky behavior in the workplace lead to chronic diseases and mortality at an economically active age. In addition, Kazakhstan ranks first in terms of the prevalence of cancer in women.

Cases of termination of unwanted pregnancy are increasing. In Kazakhstan, one in five pregnancies ends in abortion. According to the MICO, the coverage of women with contraception is within 50%. At the same time, the indicator of unmet needs in modern methods of contraception is 9.8%.

There is a problem of early marriage, teenage pregnancy, and early abortion, which is especially common in rural areas. More than two million teenage girls and girls under the age of 18 live in Kazakhstan, which is one fifth of the total female population of the republic. Over the past 5 years, 33,051 cases of teenage pregnancy have been registered, including 9,906 abortions among girls aged 15 to 18. The number of abortions in the age group from 15 to 18 years remains quite high and amounts to about 2 thousand abortions per year, or 0.1% of the total number of teenage girls and girls under 18 years of age.

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Universal digital model of material flow in a transport corridor

Azat Zhumanov[1], Zhandos Kegenbekov[2], JurijsTolujevs*[3]

[1]Al-FarabiKazakhNationalUniversity, Almaty,Kazakhstan
[2]Kazakh-German University, Almaty, Kazakhstan
[3] Transport and Telecommunication Institute, Riga, Latvia
*E-mail: tolujevs.j@tsi.lv (corresponding author)

Abstract. By transport corridors in this paper, we mean international transport corridors (ITCs), which are created for the transportation of goods through the territories of several countries using different modes of transport. ITC is considered a chain consisting of nodes, where delays of transported goods can be observed, and transport channels, each of which uses a certain mode of transport. Most often, the analysis and forecasting of processes in ITC are based on macroeconomic modeling, and their results are not oriented to be applied bythe participants of the transportation process in the mode of operational or tactical planning. This paper proposes a universal conceptual model in which the processes in ITC are represented at the level of material flows. The main point of the proposed method of modeling processes in a transport corridor is to determine the dynamics of stocks in storage facilities and the content of transport channels during a given time interval based on the forecast data of transportation demand and resource availability in the nodes of the corridor. Thepaper shows an example of model implementation in MS Excel environment and using Vensim package. Recommendations are given on how to create models using Discrete Event, and Agent-based process modelingparadigms.

Keywords: international transport corridor, material flow, transportation node, simulation model

JEL codes: C15, C51, L92

1 Introduction

International Transport Corridors (ITCs) are multimodal routes for the transportation of passengers and cargo, including air, sea, rail, and road links. Transport corridors are designed to create predictable and transparent routes for all participants of the global logistics market. The main goal of the ITC organization is to unify national legislation, harmonize transport systems and create a single transport infrastructure with common technical parameters and transportation technologies. ITCs not only contribute to the development ofthe global economy, but also have a strong impact on the economy, politics, and social processes in the countries through which such corridors pass.

Today, there are about ten ITCs that run mainly through the European Union. Several corridors link China with Central Asia and Europe. For countries such as Azerbaijan, Georgia, and Kazakhstan, one of thesecorridors, called the Middle Corridor, is of greatest importance. A recent report by The World Bank (World Bank, 2023) notes the role of the Middle Corridor not only as a land bridge between China and Europe, but also as a location for important investments to modernize railroads, intermodal facilities, and ports in Azerbaijan, Georgia, and Kazakhstan. To coordinate processes in the national segments of the Middle Corridor, an international association "Trans-Caspian International Transport Route" (TITR) was established, which unites and represents today the interests of a few countries and companies located in the regions through which the historic Great Silk Road passed (Fig. 1).

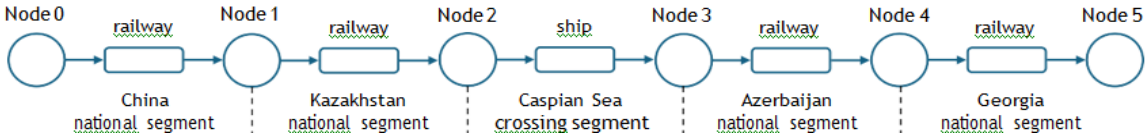

Figure 1. General scheme of the Trans-Caspian International Transport Route

An important component of TITR is rail transportation through the territory of the Republic of Kazakhstan between the border with PRC and ports on the Caspian Sea coast. TITR is one of the routes being developed under the Central Asia Regional Economic Cooperation Program (CAREC). In 2017, the eleven member countries of the CAREC Program approved the Railway Strategy (CAREC, 2017) to expand the role of rail transport in the region. The strategy aims to accelerate the identification, preparation, and financing of feasible railroad investment projects and, at the same time, to promote the commercialization and reform of railroads to improve their efficiency. The demand for utilization of TITR resources is constantly increasing. In addition to freight transportation from China to Europe, TITR helps member countries realize their interests in exporting their products to the world market.

There are many works on analyzing and forecasting the development of various ITCs, including TITR, being carried out in the countries of the world. Most of these works are based on macroeconomic modeling of ITC functioning, and their results are not oriented to be applied by the participants of the transportation process in the mode of operational or tactical planning. An example of such modeling is the section "Trade and transport modeling methodology" in the above-mentioned paper (World Bank, 2023). An example of the broad international interest in TITR is (Palu and Hilmola, 2023), which provides information on the current state of TITR and estimates the possible positive impact of the corridor on the economies of countries located far from the Caspian Sea, such as Finland and Estonia.

This work is focused on modeling processes in ITC at the level of material flows. ITC is considered as a chain consisting of nodes where delays of transported goods can be observed, and transportation channels, each of which uses a certain mode of transportation (Fig. 1). After reviewing the works, which their authors refer to the field of simulation modeling, a universal conceptual model of processes in ITC is proposed and ways of implementing this model in MS Excel environment and with Vensim package are shown.

2 Literature review

The main reference point in the search and analysis of publications was simulation models that evaluate the indicators of movement and handling of cargo flows in real transport corridors. It should be noted at once that the authors of these publications put different meanings into the concept of simulation. Sometimes they talk about complex models in which there is no time factor. Such models are static, and they are not usually referred to in the class of simulation models. Also, the concepts of macroscopic, mesoscopic, and microscopic modeling are applied without clear boundaries. An important characteristic of a model is the way time is represented as a continuous or discrete value. Also, the modeled flows themselves can be shown as continuous or discrete processes. Sometimes one of three well-known process modeling paradigms can be explicitly specified for a model: System Dynamics, Discrete Event, and Agent-based (Borshchev, 2013). Within the proposed review, the authors will attempt to point out some of the properties of specific models listed here.

A large review of macroscopic modeling methods for international transport corridors is presented in (Kabashkin and Sansyzbayeva, 2024). Most of these methods belong to the field of macroeconomics, and they do not provide for the possibility of dynamic representation of material flows. The authors propose using so- called Evaluation Nets (E-Nets) for dynamic modeling of processes in transport corridors in order to evaluate transportation time, costs and logistics efficiency. The proposed model is scalable, allowing analysis from an international perspective to country-specific segments.

The paper (Kumagai et al. 2021) describes the application of a numerical simulation model that the Institute of Developing Economies in Japan has been developing since 2007. The model

is called Institute of Developing Economies-Geographical Simulation Model (IDE-GSM). IDE-GSM is characterized as a general equilibrium simulation model based on spatial economics. One of the objectives of the model's development is to assess the impact of trade and transport measures on the regional economy at the sub-national level. The model belongs to the global class, as the IDE-GSM dataset already covered more than 3000 regions in 98 countries as of early 2019. The model's form of existence is a set of formulas for high-dimensional matrix calculations. Using IDE-GSM, the authors estimate the impact of CAREC and TITR corridors on industries in the regions that surround these corridors.

The authors (Watanabe et al., 2021) developed the GLINS (Global Logistics Intermodal Network Simulation) model to simulate freight flows in a global intermodal transport network and now apply it to the Eurasian continent. Particular attention is paid to modeling the impact of TITR on the economy of Kazakhstan. As input data of the model the demand for freight transportation, as well as the cost of delivery, frequency, speed, and distance of transportation are used. As modeling results, the authors show the annual number of containers transported by land transport from PRC to the South Caucasus, Turkey, and Iran. These volumes are calculated for different scenarios, which include not only infrastructure development measures, but also reducing the cost of using ferries and railroads, as well as reducing border barriers between the countries.

In (Yatskiv and Savrasov, 2010) a macroscopic simulation model of freight transportation in the Riga- Minsk transport corridor with a length of about 300 km is presented. The model was developed using specialized software for simulation of transport systems VISUM. The model is static, as it does not consider the process of vehicle movement in time. The developed model consists of a transportation network model and a demand model. The demand model is presented by two origin-destination matrices. Within the framework of a specific project, two scenarios of road transport organization were investigated with the help of the model. A large number of works on microscopic modeling of transport channels and corridors use the agent-based concept. These models show the movement of individual vehicles, such as trucks or freight trains. Corridor modeling for road transport between countries is described in (Pal, 2015). The concept of multi-agent- based simulation was used to implement the model. The model shows the loading/unloading of vehicles and their customs processing at borders at a microscopic level. The simulation results can serve as a potential guide for making decisions on the optimal allocation of service resources in a transport corridor. In (Holmgren et al., 2013) an agent-based TAPAS-Z model for analyzing road transportation is described. The geographical location of suppliers and consumers located in different geographical regions is randomly varied for each shipment. This approach allows estimating the effects of transportation policy and infrastructure measures. In (Zhumanov et al., 2024), the travel time of railroad trains on the Kazakhstan section of the Trans-Caspian International Transport Route is estimated. An agent-based model is used to investigate the dependence of this time on the methods of passing the junctions on single-track railroad sections.

The application of System Dynamics to transportation modeling is of particular interest because it is the paradigm that is the closest to the universal model proposed by the authors. In (AlKhereibi et al., 2022) a conceptual model of System Dynamics showing Transit Oriented Development (TOD) in a region is presented. Integrating the principles of TOD into urban planning in Qatar will lead to better implementation of sustainability at the levels of the built environment, transportation system, and economy. The object of the simulation in (Zhao and Wu, 2022) is a transportation corridor called multi-airport logistics system (MLS). Simulations of different policies and sensitivity analysis of the model are used to find effective strategies to accelerate the sustainable development of Jing-Jin-Ji MLS in China. The thesis (Postorino, 2018) shows a System Dynamics model that has been developed as a tool to support investment in the Dubai Logistics Corridor, whose main components are an airport and a seaport. The model is used to estimate the required capacity of these facilities in the near future. In (Tolujew et al., 2018) a possible passenger flow on the Rail Baltica high-speed rail line under construction is modeled using System Dynamics. The transportation of approximately 1.2 million passengers during a year is investigated, considering the dynamics associated with the seasons.

3 Methodology

The proposed universal model is based on a well-known formula for calculating the stock level in any storage facility

$$S(t) = S_0 + \int_0^t \lambda(t)dt - \int_0^t \mu(t)dt\ , \quad (1)$$

where:

S_0 – initial stock at the moment of observation beginning, which is measured in Quantity;

$\lambda(t)$ – intensity of the input flow, which is measured in Quantity per time unit;

$\mu(t)$ – intensity of the output flow, which is measured in Quantity per time unit.

If time takes specific values t_i, and between the moments t_{i-1} and t_i the flow intensities do not change,then a formula that is a discrete analog of formula (1) will be fair

$$S(t_i) = S(t_{i-1}) + \lambda_i \Delta t_i - \mu_i \Delta t_i\ , \quad (2)$$

where:

$\Delta t_i = t_i - t_{i-1}$ is the time step;

λ_i – constant intensity of the input flow at step number *i*;

μ_i – constant intensity of the output flow at step number *i*.

The step Δt_i in formula (2) should not necessarily be a constant value. Piecewise constant flows, which change their intensities at arbitrary moments of time t_i, are very convenient to apply when describing the model input data. In addition, such intensities are a prerequisite for the application of a modeling paradigm called Discrete Rate (Krahl, 2009; Reggelin and Tolujew, 2011).

For an ideal transport channel with constant delay time r_{tr} and input flow intensity $\mu(t)$ (see Fig. 2), we can assume that the intensity of its output flow will lag behind $\mu(t)$ by the value of r_{tr}, then formula (1) for the case of the transport channel will have the form:

$$C(t) = \int_0^t \mu(t)dt - \int_{c_{tr}} \mu(t - r_{tr})dt\ . \quad (3)$$

The ideal transportation channel is assumed to be empty at the time the observation begins ($C_0 = 0$), since in a purely theoretical model there is no possibility to specify the input flow $\mu(t)$ for time $t < 0$, i.e. before the observation begins. It will be shown below that this problem is solved in the framework of the modelproposed in this paper, which is oriented to practical application.

If we assume that the time in the model is discrete, the step Δt is constant, and the output flow of the transport channel lags behind the input flow by *m* steps, then formula (3) takes the form:

$$C(t_i) = C(t_{i-1}) + \mu_i \Delta t - \mu_{i-m} \Delta t \ . \quad (4)$$

The following features of the conceptual model of a transport corridor node allow it to be called auniversal model:

- it can be used as a basis for building a transportation corridor model with any structure;
- any of the known paradigms: System Dynamics, Discrete Event, Agent-based or Discrete Rate can beused to build a specific corridor model;
- model can be implemented numerically using both universal programming languages or spreadsheetsand simulation software that supports the selected paradigm.

4 Results and Discussion

If the technical implementation of the process involves the transportation of containers by rail, the objects of the material flow are containers arriving in batches at transshipment or customs processing points, and the storage sites or railroad tracks where containers awaiting further transportation accumulate become storage areas. It is known that in real transport corridors, the travel time from origin to destination for a particular batch of containers strongly depends on the situation at the nodes of the corridor at the time when the batch enters the storage facilities of the respective nodes. The following sections will describe how the general conceptual model can be applied to a particular transport corridor, and how the primary and secondaryresults of the numerical processing of the model can be obtained.

Conceptual model of transport corridor node

A graphical illustration of the conceptual model of a transport corridor node is Fig. 2 mentioned above.It is assumed that the intermediate node not only handles the main input flow but can also receive additional cargoes that are introduced into the main flow. It is also envisaged that for some of the cargoes this node is the end point of the route, and they form a local output flow. If a node is numbered 1 (see Fig. 1), it will have onlyone input and one output flow. The last node of the route will consist of only one virtual storage facility, whichrecords the total number of cargoes that arrived as part of the input flow. Fig. 3 shows an example model in the Vensim package notation that implements all three types of transport corridor nodes. Only one intermediatenode is used in this example, but any number of such nodes can be used in any other model.

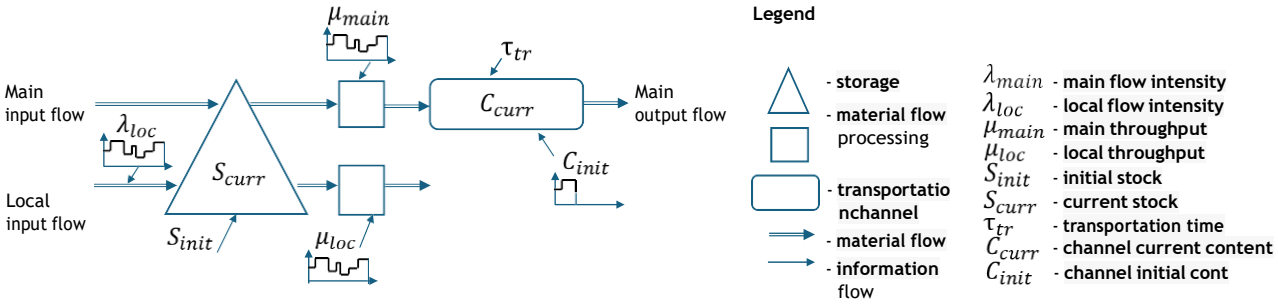

Figure 2. Structure of the conceptual model of a transport corridor node

The main feature of the proposed method of creating a specific model is the use of intensity plots for all input flows $\lambda(t)$ of the corridor and throughput plots $\mu(t)$ for all stages of cargo flow processing as input data. Since we are talking about a modeling horizon ranging from a month to a year or even several years, continuous modeling paradigms in the form of System Dynamics or Discrete Rate are preferred. These models do not represent individual shipments, but only their flows, which are measured in Quantity per time unit. Intensity plots $\lambda(t)$ reflect the demand for transportation in a particular transport corridor. They can be the result of short-, medium-, or long-range planning for the use of a transport corridor. The modeling horizon is determinedby the planning horizon, i.e., the time for which the model user can prepare sufficiently adequate input data.

The capacity plot $\mu(t)$ for a particular node is determined by the amount of technical or organizational resources on which the delay time of cargoes before their departure into the transport channel depends. For example, the model user may know that the throughput of a particular rail node is approximately 100 containersper day during the winter months and approximately 150 containers per day during the summer months. The model user can reflect in the $\mu(t)$ plot any planned repair or expansion of the infrastructure of the railroad node or the following track section. It should be noted that the technical resources include not only the lifting and transportation equipment of the railway node, but also the means of cargo transportation in the form of locomotives and wagons, which are needed to send cargo from this node. Thus, the throughput $\mu(t)$ is both the rate of storage facility release and the intensity of the input flow of the transportation channel.

A constant transit time r_{tr} is shown for the transport channel. In real corridors, this time is a relatively stable value, while the delay time in the storage facility can vary widely. Using System Dynamics or Discrete Rate paradigms, the transport time r_{tr} can either remain a constant value or change its value by a jump at timeswhen the transport channel is empty. If the model is based on the Discrete Event or Agent-based paradigm, the time r_{tr} can be assigned to each shipment individually.

Since the model start time must be linked to a specific calendar date, information on the actual number

of cargo units in each storage facility in the corridor must be available to the model user. In Fig. 2, this quantityis labeled as S_{init}. The model also considers the fact that there may already be a certain quantity of cargo in the transport channels when the model is run. This quantity cannot be specified as a single number, but rather described as a separate flow C_{init}, where the quantity of incoming cargo is linked to the expected arrival time.

Methods of model numerical realization

As mentioned above, the model can be implemented numerically using either general-purpose programming languages or spreadsheets, or simulation software that supports the chosen paradigm. Fig. 3 shows a demonstration model of a transportation corridor implemented using the Vensim package, which supports the System Dynamics paradigm. The model is based on a direct application of formulas (2) and (4). The planned input flow rate schedule "input 1 plan", as well as the throughput schedules "output 1 plan" and "output 2 plan" are specified in the model in graphical form using "Lookup" type variables.

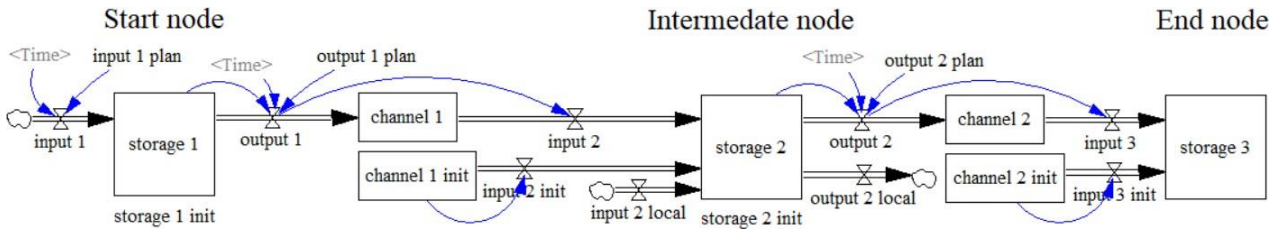

Figure 3. Example of Vensim model with three types of transport corridor nodes

The same model can be easily implemented in tabular form in MS Excel environment (see Fig. 4). The model shows only 10 days of operation of the transport corridor. The planned numerical values of the "input 1 plan", "output 1 plan" and "output 2 plan" plots are shown in the first three columns of the "Input data" section. The same charts are shown in Fig. 5 and Fig. 6. These charts show the same data, but the chart in Fig. 6 is to be preferred because the total column area of each plot will be equal to the total quantity of cargo recorded in the corresponding flow. These flows use discrete times (day one, day two, etc.), and the continuous lines in Fig. 5 hide this fact. For example, we can assume that for the point "time=1.5" the intensity of the input flow is 150 TEU/day, which does not correspond at all to the real data on this flow.

Input data								Simulation results						
day no.	input 1 plan	output 1 plan	output 2 plan	storage 1 init	storage 2 init	input 2 init	input 3 init	input 2	input 3	storage 1	storage 2	storage 3	channel 1	channel 2
#	TEU/d	TEU/d	TEU/d	TEU	TEU	TEU/d	TEU/d	TEU/d	TEU/d	TEU	TEU	TEU	TEU	TEU
0				1000	2000					1000	2000	0	500	700
1	100	200	100			300	400			900	2200	400	400	400
2	200	250	120			200	300	200		850	2480	700	250	220
3	100	300	140					250	100	650	2590	800	300	260
4	200	200	160					300	120	650	2730	920	200	300
5	100	250	180					200	140	500	2750	1060	250	340
6	200	300	200					250	160	400	2800	1220	300	380
7	100	200	220					300	180	300	2880	1400	200	420
8	200	250	240					200	200	250	2840	1600	250	460
9	100	300	260					250	220	50	2830	1820	300	500
10	200	200	280					300	240	50	2850	2060	200	540

Figure 4. Tabular representation of the transport corridor model

The initial stock levels "storage 1 init" and "storage 2 init" in storage facilities are shown as inputs. It is also assumed that from the transport channel "channel 1" to "storage 2" the residues of the "old" flow of 300 and 200 TEU/day will arrive. In a similar way, it is shown that from the transport channel "channel 2" to"storage 3" the residuals of the "old" flow of 400 and 300 TEU/day will arrive. The model does not use macros written in VBA language, but only MS Excel spreadsheet formulas.

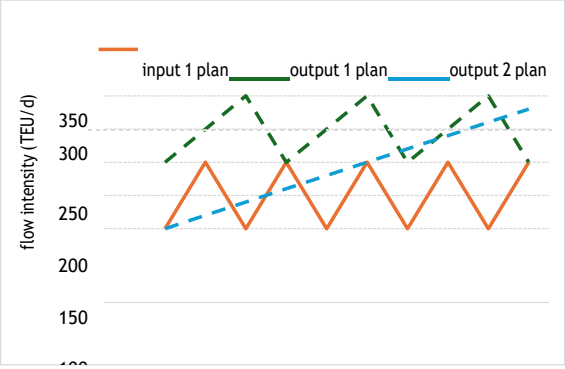

Figure 5. Model input data in the form of a "Line" type diagram

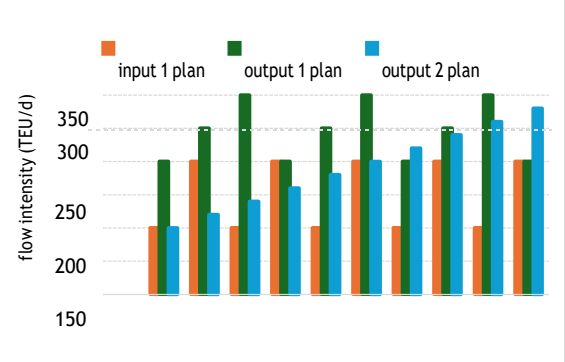

Figure 6. Model input data in the form of a "Column" type diagram

Estimation of storage facility and channel contents as primary indicators

Primary indicators of the simulated process are calculated as normal variables of the simulation programduring model processing. As intermediate data, the table in Fig. 4 shows the "input 2" and "input 3" flows, which lag behind the "output 1 plan" and "output 2 plan" flows by a transportation time of one and two days, respectively. Fig. 7 shows the number of waiting cargo units, measured in TEUs, in all three storage facilities of the model, and Fig. 8 shows the number of cargo units in transit in both transportation channels.

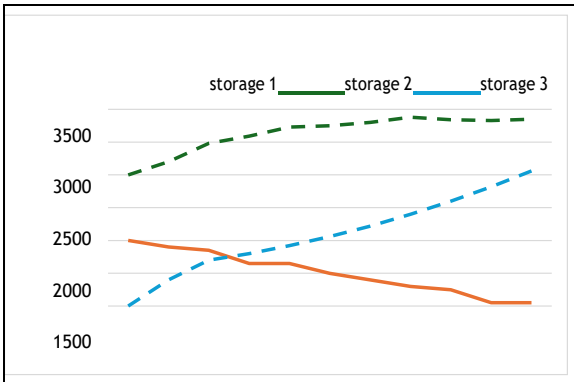

Figure 7. Number of cargo units in storage facilities

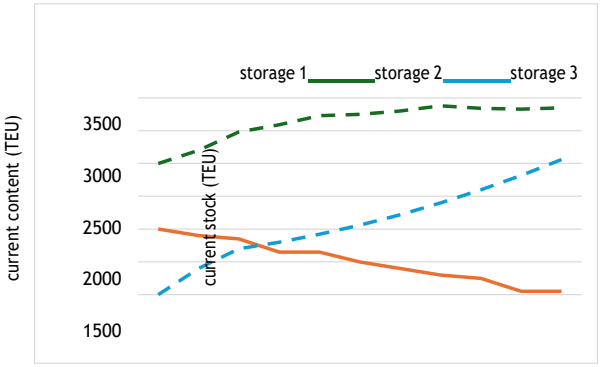

Figure 8. Number of cargo units in transportation channels

Estimation of transit time as a secondary indicator

Secondary indicators are not part of the normal modeling results that the model user can observe after each model run. Such indicators need to be calculated after the model is run using the primary modeling results, as well as additional reference and normative data. When estimating economic indicators, such data are, first of all, all kinds of prices and tariffs. Calculation of such indicators is most often reduced to simple proceduresbased on basic arithmetic operations.

The model described above allows the estimation of such an important secondary indicator as cargo transportation time between two given nodes in a transport corridor. It is understandable that the total transport time of a shipment cannot be less than the sum of the transportation time in the route channels, but it can increase dramatically due to delays in waiting areas due to limited capacity of cargo transshipment or handling facilities. It is also important to note that the procedure described below can only be applied if the shipments are moving through the waiting areas in FIFO order. If the considered cargo batch has absolute priority and is not delayed at all by waiting time, the calculation of total transportation time becomes a trivial task. In the absence of information on the strategy of moving shipments through the waiting areas, such a calculation becomes impossible.

Since the model represents the flow of anonymous cargoes, in which specific discrete objects cannot be selected, the transportation time countdown starts with the selection of the time of the control batch arrival at the initial node of the selected route. The size of the batch itself does not matter, since its processing time is usually much shorter than the time spent in waiting areas. The method of estimating the transportation time of a control batch based on the simulation results shown in Figs. 4 and 7 will be shown below. As additional primary modeling results, cumulative volumes "output 1" and "output 2" are used, which are obtained as a result of summation of cargo portions in "output 1 plan" and "output 2 plan" flows.

Let a batch of cargo arrive at "storage 1" at the end of the first day of the simulated process, which corresponds to point A on the time axis (see Fig. 9). At this time, 900 TEU are already in this storage facility (see point B). The control batch will start leaving "storage 1" only when, starting from time point A, 900 TEU will be sent to the "channel 1" (segment *a* corresponds to this cargo volume). We repeat point A as point C on the right diagram and transfer segment *a* to this diagram. Using points D and E we define point F, which shows the moment when the control batch starts moving to "channel 1" (about 4.5 days from the beginning of the process). Since the transportation time in this channel is one day, we obtain point G, which shows the moment when the control batch arrives at "storage 2" (about 5.5 days from the start of the process and 4.5 days from the arrival of the control batch at "storage 1"). We repeat point G as point H and determine point I and the volume of cargo that should leave "storage 2" (segment *b* corresponds to about 2780 TEU). Transfer this segment to the right-hand diagram (points J and K) and we see that 2,780 TEU will be directed to "channel 2" in about 10 days, i.e. about 15.5 days from the start of the process. This will occur if the throughput of the "output 2 plan" maintains its slightly increasing trend. Clearly, such an event is outside the range of the diagrams shown in Fig. 9. If we assume that this event occurs at 15.5 and add two days for transportation to "channel 2", then the arrival time of the control batch at "storage 3" will be 17.5 days and the total transit time will be 16.5 days.

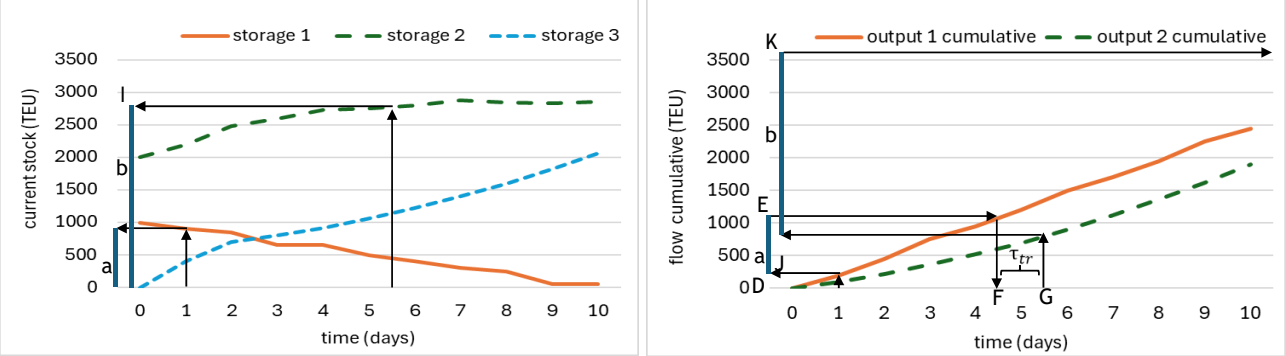

Figure 9. Graphical method for estimating transit time

Discussion of modeling results

The demonstration model of the transport corridor shown in Fig. 4 in the form of a table is an implementation example of almost all the ideas that were formulated during the development of the conceptual model, the structure of which is shown in Fig. 2. All numerical results of the modeling are absolutely transparent, and any expert can check their correctness.

Since the complexity of the presented model is minimal, there was no attempt to find a way out of some special situations that did not occur in this modeling example but may occur with other initial data. For example, it is an open question what the throughput of a node should be if the storage facility stock is not large enough, so that the output flow of the node cannot meet the targets. This problem becomes even more complicated if there are one or more local output flows, between which the available storage facility stock must be distributed. While keeping the tabular form of model display in MS Excel environment, it is recommended to use VBA or Python programming language to develop models of increased complexity. Any specialist who knows how to work with Vensim or any other simulation modeling package will be able to solve problems related to resource management of a transport corridor node without much difficulty.

The logic of the transit time estimation procedure shown in Fig. 9 is quite simple, but in order to automate it, it would be necessary to write a program whose complexity would probably exceed that of the model itself. Such a program would be a very useful addition designed to handle the primary results of the simulation. It should be noted that this problem arises only when modeling continuous processes using System Dynamics or Discrete Rate paradigms. In models based on

Discrete Event and Agent-based paradigms, estimating the residence time of a discrete object in any model space is a trivial task.

5 Conclusion

In writing this paper, the authors tried not only to present their view on the fundamentals of material flow theory, but also to propose a model that could be applied to analyze and plan the transportation process in a particular transport corridor. Many specialists involved in freight planning and forecasting can easily implement the proposed modeling concept in the form of a computer program. The main feature of this concept is the direct use of data on the current state of transport corridor components, as well as on the expected dynamics of traffic demand development and planned changes in infrastructure. It is the preparation of such data that can be a major challenge when trying to apply the model to practical problems. The best way to overcome such difficulties would be for the user of the model to be the national sector management agency of the transport corridor, such as the state-owned enterprise Kazakhstan Temir Zholy.

In the absence of real input data, the model can be applied as a conventional laboratory tool for transport corridor studies. Deterministic input data related to input flows and throughput can be replaced by appropriate input parameters described by theoretical or empirical distribution laws. In this way, conditions will be created for conducting simulation experiments according to well-known principles of statistical modeling.

In conclusion, the proposed way of working with a transportation corridor simulation model is associated with two concepts that are popular nowadays. Since the model must receive data from a real transportation corridor before it is run, it acquires the properties of a *digital twin*. If the model is created and applied not only in a time-limited simulation project but takes a permanent place and is regularly applied in the transport corridor sector management agency, then we can talk about a *sustainable* process of applying the model.

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The use of marketing tools in the activities of road freight transportation

Rashid O. Tazhiyev*
Elmira E. Baimukhanbetova
Al-Farabi Kazakh National University, Almaty, Kazakhstan.
*Email: rashidpostt@gmail.com

Abstract

Road freight transport is an essential component of global supply chains, facilitating the movement of goods over various distances. As demands for efficiency and environmental friendliness continue to grow, marketing strategies are playing an increasingly important role in optimizing automotive cargo operations. This article examines the modern marketing landscape in the field of road freight transportation and highlights key areas such as digitalization, customer-oriented approaches and sustainable branding. The purpose of this article is to determine the contribution of marketing to the renewal and rethinking of the road freight transportation market in Kazakhstan. Additional research methods used in this study are comparative analysis, generalization and synthesis, as well as grouping and comparison methods. The authors present and substantiate a list of areas that have the greatest impact on the formation of trends in the development of the global road freight market. Based on the conducted research, key features, key success factors and directions for further development of the transport and logistics services market have been identified. In addition, as the results of the study show, the situation with low activity in the application of basic marketing promotion of basic cargo transportation for road freight transport shows that the demand for marketing is high. Still, the implementation does not show the highest level. Through the study of relevant literature and case studies, this article provides insight into how marketing can be used to solve problems and exploit opportunities in the industry.

Keywords. Logistics, marketing technologies, marketing, road freight transport.
JEL codes: M31, M37, O32, O33, R40

Introduction

In the global chain sphere, road freight transportation is a fundamental pillar contributing to the efficient and reliable movement of goods over long distances. As the demands of modern supply chains continue to evolve, the trucking industry is at a critical stage where traditional paradigms are being challenged by the imperatives of efficiency, sustainability and customer focus. In response to these challenges, the integration of marketing principles has become a strategic imperative for stakeholders in the road freight transport sector.

The use of marketing technologies in high-tech projects in the market of transport and logistics services, in particular in the field of road freight transportation, is characterized as one of the narrow areas, although it affects most industries and spheres of public life. Being present at all stages of public life, the concepts of logistics and marketing promotion are of pronounced importance. Transport logistics is currently at the stage of a paradigm shift, in the process of transition from traditional to innovative development. Participants in the road transport logistics market face the need to develop infrastructure and organizational spheres daily. Within the framework of this direction of road transport development, the phased application of digital technologies and the integration of information are also envisaged to create a single information space convenient for all users (Tazhiyeva, et al., 2023).

The purpose of this article is to explore the multifaceted role of marketing in solving the complex problems and opportunities inherent in road freight transportation. By summarizing information from the scientific literature, industry reports, and case studies, we aim to clarify the various aspects by which marketing strategies can be used to optimise operational efficiency, increase customer satisfaction, and promote sustainable industry development.

The rapid pace of technological progress has ushered in a new era of digitalization in logistics, revolutionizing the way goods are transported, tracked, and managed. Digital technologies

- from advanced telematics systems to real-time data analysis - offer unprecedented opportunities for road transport operators to optimize route planning, minimize fuel consumption and increase supply chain transparency. Against this background, marketing strategies play a key role, allowing companies to use the opportunities of digitalization to provide customers with higher value while remaining flexible and responsive to market dynamics.

The process of changing technological paradigms is complemented by other objective and subjective factors that create a complex system that requires substantive study (Pantano et al., 2018). Currently, the transportation and logistics services sector is in the process of accelerating the adoption of breakthrough technologies (Parry & Kawakami, 2017), such as the growing emphasis on customer focus underscores the need for road transport operators to align their services with the unique preferences and requirements of their clientele. Through market segmentation, targeted marketing campaigns and personalized service offerings, companies can develop deeper customer relationships, increasing loyalty and recurring business. By integrating customer feedback mechanisms and using advanced analytical tools, road transport operators can obtain valuable information about customer behaviour, which allows them to continuously improve and optimize the provision of services. For example, the use of high-tech projects in the form of IT products that ensure the reliability and transparency of supply chain management, in which road transport is directly involved, requires registration, storage and sharing of the same data by all participants in the process (Nuseir, 2020).

Moreover, the imperative of sustainable development has become a defining challenge for the road freight industry in the 21st century. As concerns about environmental degradation and climate change increase, companies are under increasing pressure to adopt environmentally friendly practices and reduce their carbon footprint.

The delivery of small cargoes within megacities and large cities has now begun with the introduction of unmanned aerial vehicles, which offer advantages due to high speed, minimal costs and adaptable delivery times (Perera et al., 2020). Postal companies worldwide (UPS from the USA, Swiss Post from Switzerland, DHL from Germany) and retail delivery companies (JD.com from China, Wing from the USA, Rakuten from Japan, DDC from Canada) are already widely using drones for deliveries (DHL Global, 2022; Corrigan, 2020). Drones are operating at increasingly high speeds, and the logistics network is becoming decentralized with the growth of the number of "last mile" warehouses, which leads to lower operating costs, overhead costs and delivery times (Perera et al., 2020).

Marketing strategies play a crucial role in shaping consumer perception and behaviour, thereby stimulating the introduction of sustainable transportation solutions such as electric vehicles, and alternative fuels and optimizing mode change. By incorporating environmental friendliness into their corporate identity and corporate messages, road transport operators can stand out in the market, contributing to the achievement of broader public goals for environmental protection.

To summarize, this article attempts to provide a comprehensive overview of the role of marketing in stimulating innovation, efficiency and sustainability in the road freight transport sector. Using an interdisciplinary approach, we aim to offer ideas and recommendations that will enable industry stakeholders, policymakers and researchers to navigate the changing landscape of road freight transportation in an era of profound technological, environmental and social change.

The difference between this article and previously published works is that it analyzes and suggests the use of marketing that takes into account the specifics of the field of road freight transportation.

Literature Review

Road freight transportation is an integral part of modern supply chains, providing the basis for moving goods over various distances. As the industry faces changing market dynamics and growing environmental challenges, integrating marketing principles has become an essential strategy to optimize operational efficiency, increase customer satisfaction and promote sustainable development. The continuous growth of competition and the emergence of technological solutions give impetus to the development of new approaches to the theory and practice of high-tech project

management and are becoming increasingly important. This literature review aims to provide insight into the intersection of marketing and road freight transport, focusing on key topics such as digitalization, customer-centric approaches and sustainable branding.

Digitalization has revolutionized logistics by providing road transport operators with unprecedented opportunities to streamline operations and improve decision-making processes. Technologies such as GPS tracking, telematics systems, and real-time data analysis enable carriers to optimize route planning, minimize fuel consumption, and increase supply chain visibility (Wang & Zhang, 2020). According to Devaraj, Sharma, and Sohail (2018), digital platforms facilitate seamless communication and collaboration between stakeholders, promoting transparency and trust throughout the supply chain.

In addition, customer-oriented approaches have become widespread in the road freight transportation industry, due to the need to meet the changing needs and preferences of shippers. Market segmentation, targeted marketing campaigns and personalized service offerings enable carriers to develop deeper customer relationships, increasing loyalty and recurring business (Han, Zhang, & Xu, 2019). By using customer relationship management (CRM) systems, companies can increase customer satisfaction and retention while simultaneously gaining valuable information about customer behavior (Wu & Li, 2019).

In addition to customer focus, sustainable branding and corporate social responsibility (CSR) are becoming increasingly important factors for road transport operators seeking to stand out in the market and conform to public values. Seuring and Müller (2008) emphasize the role of sustainability initiatives, such as carbon offset programs and green logistics solutions, in mitigating environmental impacts and enhancing brand reputation. Similarly, Hsu, Kuo, and Chen (2018) emphasize the importance of sustainable branding to communicate a company's commitment to the environment and attract environmentally conscious customers.

Despite the potential advantages of marketing in the field of road freight transportation, several problems and gaps remain. The introduction of digital technologies may be hindered by factors such as cost constraints, interoperability issues, and organizational inertia (Lu, Ye, & Zhu, 2020). Moreover, the implementation of customer-oriented approaches may require cultural and organizational changes within companies, which will require the involvement of leaders and employee training (Yang, Jia, & He, 2021). In addition, the measurement and evaluation of sustainable development initiatives pose significant methodological challenges that require the development of reliable indicators and performance indicators (Klassen & Vereecke, 2012).

According to the state program "Digital Kazakhstan", the purpose of the program is to accelerate the pace of development of the republic's economy and improve the quality of life of the population through the use of digital technologies in the medium term, as well as create conditions for the transition of the republic's economy to digital technologies. Kazakhstan is entering a fundamentally new development trajectory that ensures the creation of the digital economy of the future in the long term. One of the main goals of the program is the digitalization of transport and logistics (Strategy 2050, 2021).

Thus, the literature review highlights the multifaceted role of marketing in stimulating innovation, efficiency and sustainability in the road freight transportation industry. By summarizing knowledge from various disciplines, researchers can contribute to a deeper understanding of the challenges and opportunities inherent in road freight marketing, informing future strategic initiatives and policy interventions in the industry. In the field of road freight transportation, marketing promotion channels are not used enough and require development in several directions. The first is based on the use of marketing in the field of transport and logistics services, the second involves a more accurate promotion of modern digital products that are no longer relevant to the general information content of the population, the third is based on a review of existing practical applications of marketing technology in the promotion.

Methodology

The study used a mixed methodological approach to explore the role of marketing in road freight transportation. This approach combines various collection methods to provide a

comprehensive understanding of the phenomenon being studied. Qualitative methods were used to examine the subjective experiences and perceptions of industry stakeholders, while quantitative methods were used to analyze objective data and trends within the sector.

Data collection was carried out from secondary sources such as industry reports, government publications and scientific research. These data included statistical information on market trends and consumer preferences related to road freight transportation.

Data analysis involves identifying key themes and patterns through comparative analysis. In conclusion, the approach based on the methods used in this study provided insight into the role of marketing in road freight transportation. Combining qualitative information with quantitative analysis, the study aimed to identify practical ideas and recommendations for industry stakeholders.

Results and Discussion

Freight forwarding companies use new forwarding technologies.

But this is not enough. For the successful development of activities and constant demand in the freight transportation market, it is necessary to use some additional marketing tools. Such as:

- continuous analysis of the freight market, study of the latest trends and criteria determining the requirements of cargo owners for the transportation of goods, preparation and application of them in their work;
- regular audit of own transport operations aimed at identifying and preventing claims from cargo owners (as a rule, customers are primarily concerned about 3 criteria: cargo safety, compliance with delivery deadlines, and cost);
- cost analysis, search for rational routes;
- and also the most important thing for any client is a flexible price policy.

This is the primary task of management and the above-mentioned marketing tools will help him in this.

Transportation services are usually considered as a means of implementing various trade transactions. At the same time, a wide range of transport services provided by enterprises of the transport sector, representing an independent type of entrepreneurial activity, has its characteristic features and specifics of marketing activities.

Transport marketing (marketing of transport services) is a set of measures aimed at effectively meeting the needs of consumers in transport services, as well as in related services, ensuring an improvement in the quality of the main service. This is an activity aimed at promoting transport services to the market.

From the point of view of marketing, a strategy for the development of the transport sector should be developed both by industry and by individual transport enterprises.

The marketing strategy for the development of transport involves the adoption of necessary measures for the further commercialization of enterprises of road freight transport. At the same time, the road network should be developed.

The implementation of the "QAZAVTOJOL" programs, adopted by the same highway development program, contributes to the development of the economy of remote settlements, increasing the economic efficiency of economic ties, traffic safety and improving public transport services.

There is a need to improve the operational properties and durability of highways by improving the standards of their design, construction technology, repair and maintenance, and improving design solutions and materials used.

Marketing opportunities in the implementation of professional activities in road transport contribute to the following:

- the formation of a single market for motor transport services;
- expansion and development of the work of road transport;
- organisation of insurance activities;
- effective implementation of leasing operations;
- rational use of motor vehicles, increasing their service life;

- designing new promising routes;
- improving the business efficiency of road transport enterprises, etc.

In modern conditions of the growth of the automobile fleet and the full-scale development of the motor transport system, consumer service methods are noticeably improving and improving, and the scope of transport services is expanding.

The Results and Discussion section presents the results of a study on marketing in the field of road freight transport, followed by an in-depth discussion of the implications and conclusions arising from the results.

Based on the presented results of a marketing study in the field of road freight transportation, including a comparative analysis of marketing strategies and key performance indicators.

AccordingtotheanalyticalagencyResearchandMarkets(ResearchandMarkets,2022),the volumeofthe global market for transport and logistics services reached $9,525.1 billion in 2021. At the same time, experts are confident that due to the rapid development of IT technologies, in thenextfiveyears-intheperiodupto2028,themarketwillcontinuetodevelopsteadilywithan average annual growth of about 5.7% and 2027 will reach a volume of 13,326.3 billion dollars (Fig. 1).

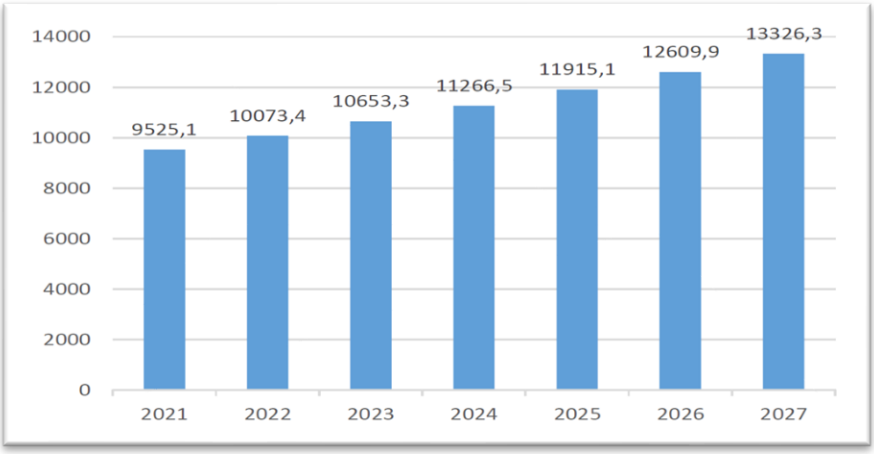

Fig.1. Dynamicsoftheglobalmarketoftransportandlogisticsservices,billiondollars (Research and Markets, 2022)

According to the data, all areas of transport and logistics services are indicated, but in particular, the field of road freight transport is characterized by a high level of competition. The market shows consistently strong performance, but not too strong growth rates, and market participants are not fully aware of the digital products used in road transport. In addition, in search of a sustainable position in the market and ensuring long-term development, transport, and logistics companies focus on the introduction of marketing.

According to the analytical report of the KAZLOGISTIC Association on the topic: "Analysis of problems and ways of development of forwarding activities in road transport in Kazakhstan" (KAZLOGISTIC report, 2020), the volume of the road transport market in 2022 reached 3,742 million tons of cargo. Even though the data provided by the state statistics bodies are incomplete, even based on the available ones, some conclusions can be drawn: To a greater extent, motor transport is used to carry out intra-republican cargo transportation; The largest volumes of international cargo transportation by road fall on the delivery of imported goods, while the structure of cargo transportation in 2022 has changed somewhat: if in the previous two years goods were imported in large volumes from countries outside the EAEU by road, then in 2022 the largest volumes were imported from the EAEU. The geography of international road transport by Kazakhstani transport companies is very extensive. The main volume of transport work (90% of export and 62.5% of import traffic) is carried out with the CIS countries, mainly with Russia. Among the European countries, quite significant volumes of transportation are carried out with Germany, Italy, and Poland. In communication with Asian countries, China is the undisputed leader, followed by Turkey and Japan (Figure 2).

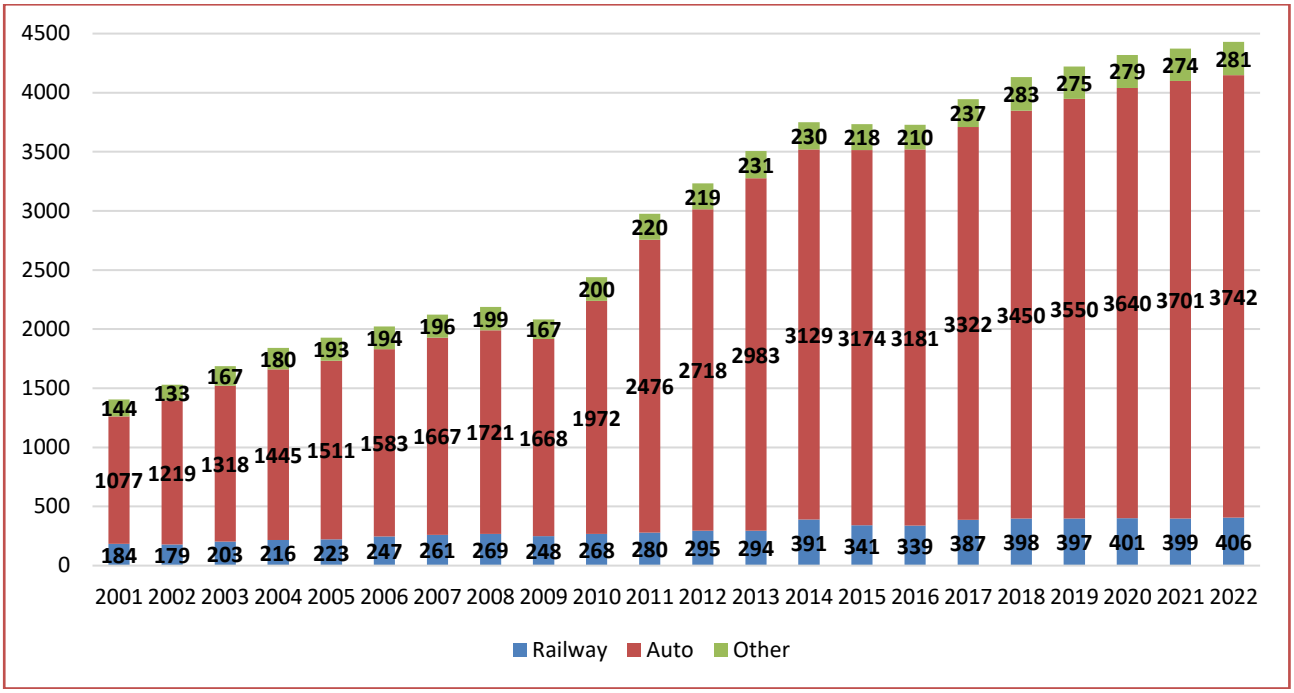

Figure 2. The volume of cargo transportation by various modes of transport is million tons (The diagram was compiled by the author according to KAZLOGISTICS report and statistic data RK)

The activities of vehicles engaged in freight transportation in the market of Kazakhstan belong to various persons, which the association conducted in the form of statistics. Distinguishing the dynamics of statistics on the number of trucks, it is possible to note the growth of owners and attracted individuals.

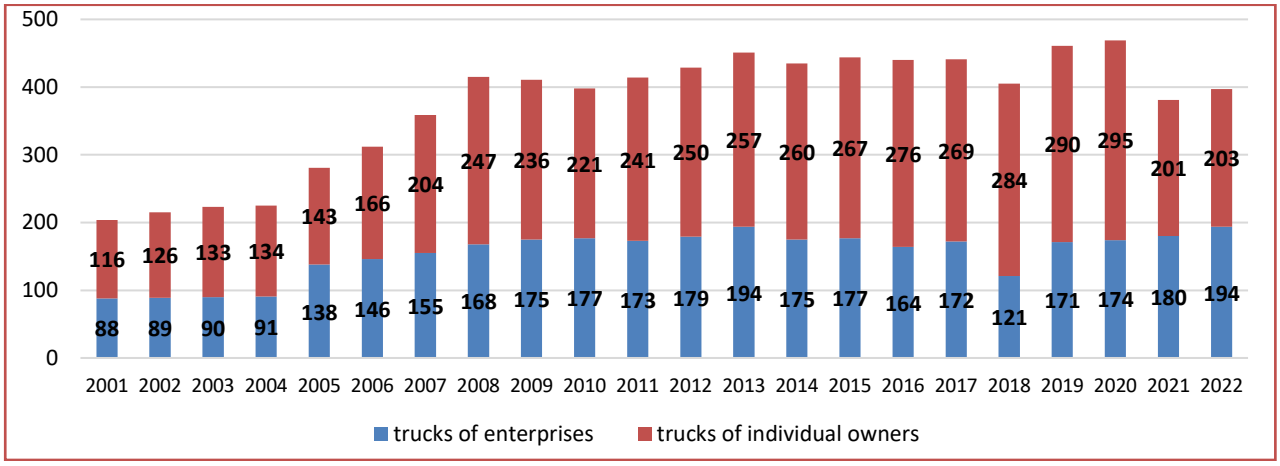

Figure 3. Availability of trucks, thousand units (The diagram was compiled by the author according to KAZLOGISTICS report and statistic data RK)

From the diagram shown in Figure 3, it can be seen that, since 2001, most of the trucks belong to individual owners. In 2022, this share was already 63%. Thus, a large number of individual entrepreneurs working under a patent operate in the truck transportation market (that is, they do not report on the types and volumes of work, as well as on income). This fact significantly complicates the possibility of collecting reliable statistics and a full-fledged analysis of the trucking market, monitoring changes taking place in it, which makes it very difficult to take timely measures to monitor and regulate the market. Even state statistical agencies provide only estimated (calculated) data on the volume of transportation performed by individual entrepreneurs. Therefore, state statistical agencies are forced to obtain these data only by calculation. The data obtained in this way does not make it possible to conduct a full-fledged analysis of the structure of road transport in the directions, track the changes taking place, and take timely measures to monitor and regulate the market. The lack of reliable statistics is also a significant limitation for fiscal authorities, since,

working under a patent, private carriers do not provide complete income data. The predominance of private drivers (individual entrepreneurs) in the truck transportation market significantly complicates the process of regulating this market (KAZLOGISTIC report).

Considering the increase in both individuals and enterprises involved, it is possible to note the development of competition in the market, which in turn needs the application of marketing in this environment. In their research, Lammgård and Catrin created and proposed a model with the theory of marketing and logistics, procurement and environmental protection on each of the four sides, and the overall concept is value for stakeholders. The boundaries between the fields of theory are not clear, but rather blurred, since there are studies that combine them. For example, the concept of marketing channels is positioned during the transition from marketing to logistics theory. The chapter will follow the proposed model in Figure 4. Initially, there will be a brief discussion of the concept of value, then marketing (1), then logistics (2), procurement (3), environmental management (4), and then back to marketing (1).

Figure 4. Model of major theory developments in marketing, logistics, purchasing and environmental management, along with their interconnectivity (Lammgård & Catrin)

The authors note that according to the theory of marketing and logistics, there are many similarities and interconnections where marketing in freight transportation is applicable, in particular road freight transportation.

Value can be viewed from different perspectives, and the most obvious one is related to finance. The fundamental goal of a business is to create financial value, that is, to make a profit that exceeds the cost of capital. The typology of stakeholder participation in environmental decision-making by the company was presented that the requirements for responsible management stem from three common sources: primary stakeholders (e.g. owners, employees, customers, suppliers); secondary stakeholders (e.g. NGOs, activists, communities, governments).; as well as general social trends and institutional forces. In general, pressure from various stakeholders forces companies to take an active position on environmental issues. This includes companies offering logistics services that play a vital role in all supply chains.

In the case of freight transport, stakeholder groups are interested in ensuring that companies perform them in the best possible way from an environmental point of view. This fact can be used in communication strategies about stakeholder groups, for example, clients, politicians, and representatives of interest groups. One of the methods of informing about the company's multiple goals is the use of a balanced scorecard, where the mission and strategy are transformed into goals from four points of view: financial, customer, internal business process, as well as training and growth. From the consumer's point of view, value represents the attributes that companies provide through services and products to create loyalty and satisfaction in target customer segments, and also includes image. Environmental aspects are attributes of a transport service that can affect a company's image. However, not all customers are interested in greener transportation, but by identifying those who are interested, it is possible to identify target groups for marketing these shipments, and environmental considerations can be used as a competitive advantage in the sale of freight transportation. From a marketing perspective, customer value is important.

The analysis showed that digitalization has significantly affected road freight transportation, revolutionizing operations and providing greater efficiency and transparency throughout the supply chain. Participants stressed the importance of technologies such as GPS tracking, telematics systems and real-time data analysis to optimize route planning, improve fleet management and improve customer service. Digital platforms have been identified as key means of collaboration and communication between stakeholders, facilitating smooth coordination and decision-making.

The participants emphasized the growing importance of customer-oriented approaches in road freight transportation, due to the need to differentiate services and meet changing customer expectations. Market segmentation, personalized service offerings, and customer relationship management (CRM) systems have been identified as key strategies to increase customer satisfaction and loyalty. The participants stressed the importance of understanding customer preferences in terms of pricing, reliability and quality of service and appropriate adaptation of offers. It has been found that customer-oriented approaches have a significant impact on customer satisfaction and loyalty in the automotive freight transportation industry. Market segmentation analysis revealed different customer segments depending on traffic volume, frequency and service requirements.

The analysis revealed a growing emphasis on sustainable development and corporate social responsibility (CSR) in the road freight transportation industry. The participants emphasized the role of sustainable branding in informing about the company's commitment to respect the environment and attracting customers who care about the environment. Sustainable development initiatives such as carbon dioxide compensation programs, optimization of mode changes and environmentally friendly logistics solutions have been identified as key factors of competitive advantage and corporate reputation. Sustainable branding has become a key distinguishing feature for road transport operators, and consumers increasingly prefer companies with strong environmental commitments.

The results highlight the multifaceted role of marketing in stimulating innovation, efficiency and sustainability in the road freight transportation industry. Digitalization provides carriers with unprecedented opportunities to streamline operations and improve customer service, while customer-centric approaches allow companies to stand out and develop deeper customer relationships. Moreover, sustainability initiatives are increasingly becoming a strategic imperative for road transport operators as consumers and regulators demand greater environmental responsibility.

Integrating marketing principles into road freight transportation represents a paradigm shift in the industry that requires organisational flexibility, strategic alignment and a commitment to continuous improvement. By using digital technologies, understanding customer needs and adhering to the principles of sustainable development, companies can position themselves to achieve long-term success in a rapidly changing market landscape.

The results highlight the importance of marketing strategies to increase efficiency and competitiveness in the road freight transportation industry. Digitalization opens up opportunities for companies to improve operational efficiency and customer service, which ultimately improves their

competitive position in the market. Customer-oriented approaches allow companies to stand out and build stronger customer relationships, which leads to increased loyalty and repeat business.

Moreover, sustainable branding and CSR initiatives have become key factors in brand reputation and customer trust. Companies that prioritize sustainable development not only contribute to the preservation of the environment but also benefit from increased brand equity and market differentiation. By aligning marketing strategies with broader organizational goals, road transport operators can create value for both shareholders and society as a whole.

Conclusions

The findings of this study shed light on the intricate relationship between marketing strategies and key performance indicators within the road freight transportation industry. Through a rigorous analysis of the data, several significant conclusions emerge:

The results underscore the pivotal role of digitalization in enhancing operational efficiency within road freight transportation. Technologies such as GPS tracking and telematics systems have demonstrated a strong positive correlation with key performance metrics such as on-time delivery rates and fuel efficiency. Companies that leverage digital solutions are better equipped to navigate complex logistical challenges, optimize resource allocation, and respond effectively to customer demands.

The analysis reveals a clear link between customer-centric approaches and improved customer satisfaction levels. Tailoring services to meet the unique needs and preferences of individual customers leads to higher satisfaction scores and increased loyalty. Market segmentation and personalized communication strategies emerge as effective tools for building strong customer relationships and differentiating services in a competitive market environment.

Sustainability initiatives play a crucial role in shaping brand reputation and attracting environmentally conscious customers. Companies that prioritize sustainability and corporate social responsibility (CSR) activities are perceived more favourably by consumers, leading to increased brand loyalty and market share. By aligning their marketing efforts with sustainability goals, road freight operators can not only reduce their environmental footprint but also gain a competitive edge in the marketplace.

The insights derived from this study have significant implications for industry practitioners. Road freight operators are encouraged to embrace digitalization, customer-centricity, and sustainable branding as integral components of their marketing strategies. Investing in digital technologies, understanding customer needs, and communicating sustainability efforts effectively can lead to improved operational performance, enhanced customer satisfaction, and sustainable long-term growth.

While this study provides valuable insights into the impact of marketing strategies on road freight transportation, several avenues for future research remain unexplored. Longitudinal studies could provide insights into the long-term effects of marketing initiatives on business performance and sustainability outcomes. Additionally, comparative studies across different regions and industry sectors could offer valuable insights into variations in marketing practices and their impact on performance metrics.

In conclusion, the findings of this study underscore the importance of marketing in driving efficiency, customer satisfaction, and sustainability within the road freight transportation industry. By embracing innovative marketing strategies and aligning them with organizational goals, road freight operators can navigate the challenges of an increasingly competitive market landscape and position themselves for sustained success in the future.

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Sustainable Consumer Behavior: A Comparative Analysis Examining Generations Y and Z in Kazakhstan

Kakitayeva Zh*., Kazhmuratova A.
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: kakitayeva@gmail.com

Abstract. This article explores the sustainable consumer behavior of Generation Y and Generation Z in Kazakhstan, shedding light on their attitudes and practices towards sustainable consumption. Drawing upon quantitative and comparative research methods, an online survey was conducted with 88 respondents, comprising 50 from Generation Y and 38 from Generation Z. The findings reveal a high level of awareness among both generations regarding the negative environmental impacts of human activities and the importance of sustainable consumption. While Generation Y demonstrates a slightly stronger commitment to sustainable practices, both generations prioritize saving water and electricity. Interestingly, Generation Z places greater emphasis on the role of production and processing companies in promoting sustainability. The study underscores the significance of understanding generational differences in consumer behavior to develop targeted strategies for promoting sustainable consumption. Ultimately, concerted efforts from stakeholders are essential in driving meaningful change towards a more sustainable society in Kazakhstan.

Keywords. Sustainable consumer behavior, conscious consumption, generational theory, generation Z, generation Y.
JEL codes: M31, Q56, J13

Introduction

Environmental pollution is one of the most difficult problems to solve in most countries of the world. This issue is reflected in many UN programs, and on September 25, 2015, the 2030 Agenda for Sustainable Development was adopted at a meeting of world leaders. It lists 17 Sustainable Development Goals, which include issues such as combating inequality and injustice, eradicating poverty, and preventing climate change and pollution. Among them, SDG 12 "Responsible Consumption and Production" and SDG 13 "Combat Climate Change" focus on protecting the environment (UN, 2015). Work on the implementation of the Sustainable Development Goals is also underway in Kazakhstan. At the World Summit held in Dubai, the President of the Republic of Kazakhstan K.K.Tokayev noted that "the shared responsibility for preserving our planet and ensuring a sustainable future for everyone lies with all of us" and showed the importance of jointly addressing environmental issues (Tengrinews, 2023).

Consumption complicates environmental problems in many ways. Consumption of services and goods has not only changed people's lifestyles but has also had a negative impact on the depletion of natural resources and ecosystems (Hubacek et al, 2007). Since consumers are human beings, it is very important to study their consumer characteristics and analyze their consumption behavior and habits. One of the considerable factors when considering consumer characteristics of consumers is age. The generational theory of N. Howe and W. Schwartz is often used. That is, people born in the same period have similar values and attitudes because they have experienced the same historical periods, and according to this theory such generations as baby boomers, X, Y and Z are known. Currently in Kazakhstan the labor market in Kazakhstan has representatives of gen Y, while the youth of gen Z are already employed and the latter are at school age. In Western countries, studies comparing lifestyles, attitudes and consumption patterns of generations are widely conducted.

For Kazakhstan, as a country with big goals and in the age of digital technologies and the Internet, it will be very important to study the differences and similarities of consumers. Therefore, the main purpose of this article is to analyze the sustainable consumer behavior of representatives of generations Y and Z in our country, to compare their sustainable consumer behavior and to assess

the potential for transition to conscious consumption. The following section presents the hypotheses discussed based on the literature review on this topic.

Literature review

Sustainable consumer behavior

In recent years, consumption rates of goods and services around the world have been increasing very rapidly. Scientists warn that the Earth's resources are limited and non-renewable. By 2050, the world's population will reach 9.6 billion people. if humans reach this level, three planets will require resources equal to current lifestyles (UN, 2023). Therefore, there is an urgent need to change consumer behavior and shift to conscious consumption taking into account the current situation (Kostadinova, 2016).

Sustainable consumer behavior is the conscious decisions and actions of consumers aimed at minimizing their negative impact on the environment and promoting social and economic sustainability. That is, it refers to a type of behavior that attempts to balance the social, economic, and environmental needs of the Earth and future generations (Luchs et al., 2011). As the negative impacts of human activities on the environment become more evident, there is a growing awareness of the need for sustainable practices in all areas of life, including consumption.

Sustainable consumer behavior is important for several reasons. First, it can contribute to the preservation of the environment. Many products and services that consumers use in their daily lives have negative impacts on the environment, such as household waste emissions, deforestation and water pollution. By choosing environmentally friendly products and services, consumers can help reduce these impacts and conserve natural resources for future generations.

Second, sustainable consumer behavior can contribute to social and economic stability. Many products that consumers use are produced using exploitative labor practices or contribute to income inequality. By choosing fair labor products, consumers can contribute to social justice and economic sustainability.

Third, sustainable consumer behavior helps create a more sustainable economy. Increased production of sustainable products and services can create new economic opportunities and jobs, as well as spur innovation and entrepreneurship.

Generational Theory

Generations change every 20-25 years as people of the same period experience social, political, and economic events together, their attitudes and behaviors become similar (Strauss & Howe, 1991). There are five generations in total: the silent generation, baby boomers, generation X, generation Y, and generation Z. This paper discusses generation Y and generation Z. However, there is no consensus on their birth years (Reisenwitz, 2021). Therefore, generation Y (1979-1995) and generation Z (1996-2010) were considered to have been born as shown in Fromm and Reed's work.

According to the McKinzey&Company study, by 2025, Generation Z will account for 25% of the population in the Asia-Pacific region(Francis&Hoefel, 2018). According to a 2022 report by the Ministry of Labor, 60% of the labor force in Kazakhstan is currently made up of Millennials and Generation Z. By 2030, this figure will reach 80% (El.kz, 2022). From an economic point of view, this is a very large category of consumers. Therefore, the relevance and significance of research on this topic will increase in the coming years.

The new generation entering the scene is different from previous generations as they are familiar with the Internet and social media from a young age. The rapid growth of the Internet and digital communication technologies has also led to significant changes in people's consumer behavior.

Generation Y

Since members of this generation were born at the end of the millennium, they have names such as Millennials, and the Internet Generation (Wiedmer, 2015). They are the first generation that came exactly to the advent of the Internet and social media (Ordun, 2015). That is why they are competent in new technologies and issues related to the Internet. Larson et al. (2016) noted that millennials are more educated than their predecessors.

Generation Z

Therefore, the existing literature on Generation Z refers to them as "iGeneration" (Philip&Garcia, 2013), "digital natives", "true generation", "iGens", "centennials" or "post-Millennials". Another important aspect is that much of the current literature on iGen focuses on how they behave. Researchers have noted their distinctive characteristics - they are fluent in tech and technology, have no problem using various apps, adapt to society through social media, pay more attention to online shopping experiences, and seek constant entertainment.

Methodology

The purpose of the study is to answer the following two research questions.

1. To what extent do members of generations Z and Y understand the importance of sustainable consumption?
2. Do the sustainable consumption attitudes of generations Z and Y differ significantly?

This research paper utilizes quantitative, systematic and comparative research methods. Quantitative methods are widely reflected in academic research in marketing. Participated in an online survey to answer the research question. The survey was designed and distributed online using Google Form platform. A total of 88 respondents were surveyed (Table 1.), including 50 respondents of generation Y, 38 people of generation Z. Their behavioral differences and similarities in sustainable consumption were studied by comparative method. System method is widely used in interdisciplinary research. This method helps to identify the cause and effect relationship and determine its origin.

Consumers and their consumer behavior issues play a very important role in the study of sustainable development. On this occasion, an online survey of two generations economically active in the consumer market was conducted on the topic of conscious consumption. The demographic composition of the survey is as follows:

Table 1. Demographics of respondents from generations Z and Y

	Z	Y
Age		
16-22	34	
23-28	4	
29-35		15
36-45		35
Gender		
Male	18	13
Female	20	37
Occupation		
Student	34	1
Empoyed	3	47
Unemployed	1	2
Education		
High school	11	5
Undergraduate	23	20
Graduate	4	25

In order to determine the negative impact and influence of people on the environment, representatives of two generations were asked the question "How much do you agree with the statement that people cause huge damage to the environment and the problem of garbage is getting worse every year" (Fig.1). 79% and 80% of Z and Y respondents respectively stated that they strongly agree with this statement. 2% of Y representatives completely disagree with the negative impact of humans on the environment.

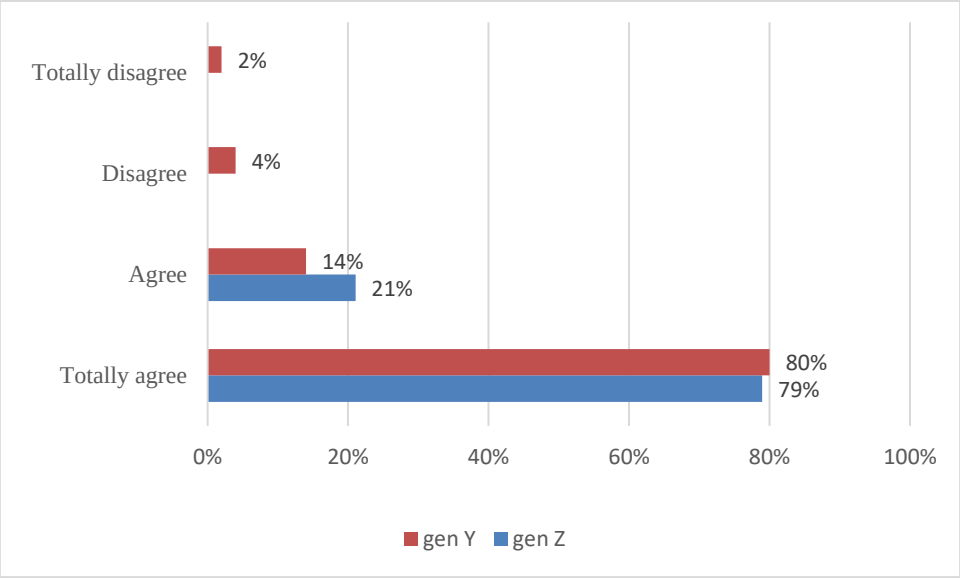

Fig. 1. Negative human impact on the environment

When asked about the importance of people's sustainable consumer behavior (Fig.2), 50% of respondents Z answered "important" and 50% "very important", while representatives of generation Y answered 30% "important" and 70% "very important". That is, respondents Y assess the importance of conscious consumption higher than respondents Z.

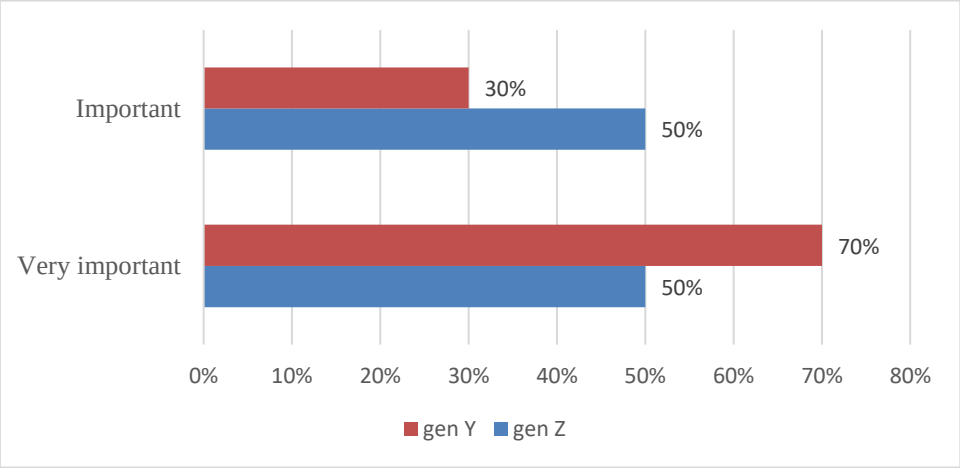

Fig. 2. Importance of sustainable consumer behavior

A vivid manifestation of sustainable consumer behavior can be seen in the sorting of household waste (plastic, metal, glass and paper) by consumers. In this regard, it was found out that 32% of respondents Y and 24% of representatives Z do not sort household waste.

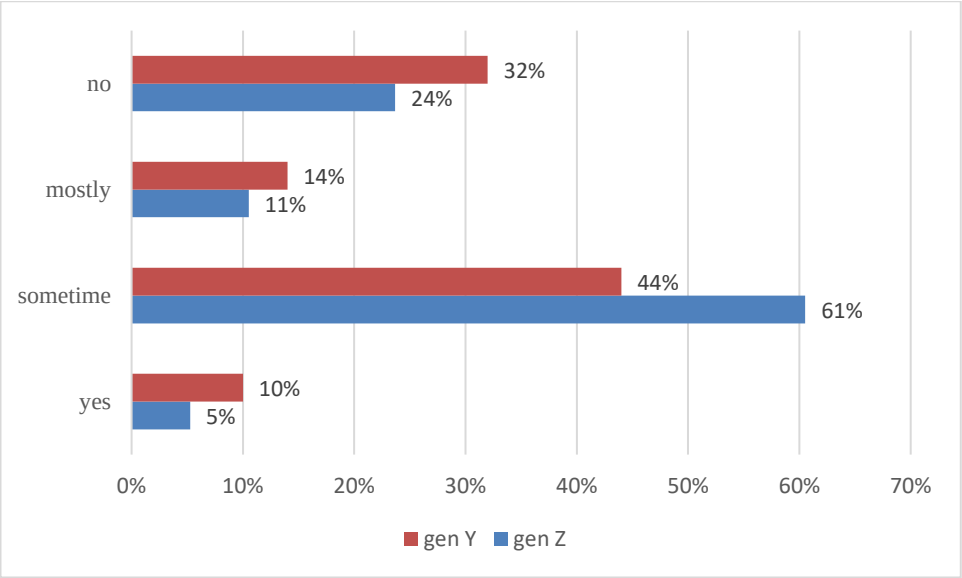

Fig. 3. Sorting of waste

Economical use of water and electricity by consumers also means sustainable consumer behavior. In this respect, the values of the indicators of both generations are very close, which means that the vast majority of consumers try to save water and electricity regularly and frequently.

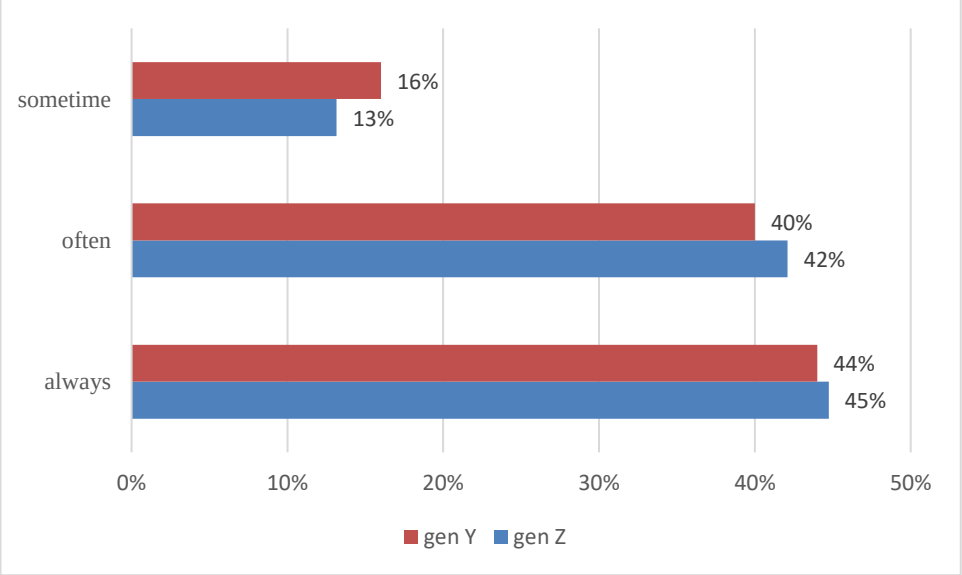

Fig. 4. Efforts to save water and energy

Three parties have a special place in the transition to sustainable consumption - the conscious consumer, responsible production and processing companies, and the last one - the state, i.e. government and regulators. When asked which party's role is more important when acting on the principles of sustainable consumption: the conscious consumer, 63% of Y respondents and 51% of Z respondents answered. In addition, generation Z also values the work of production and processing companies higher than generation Y.

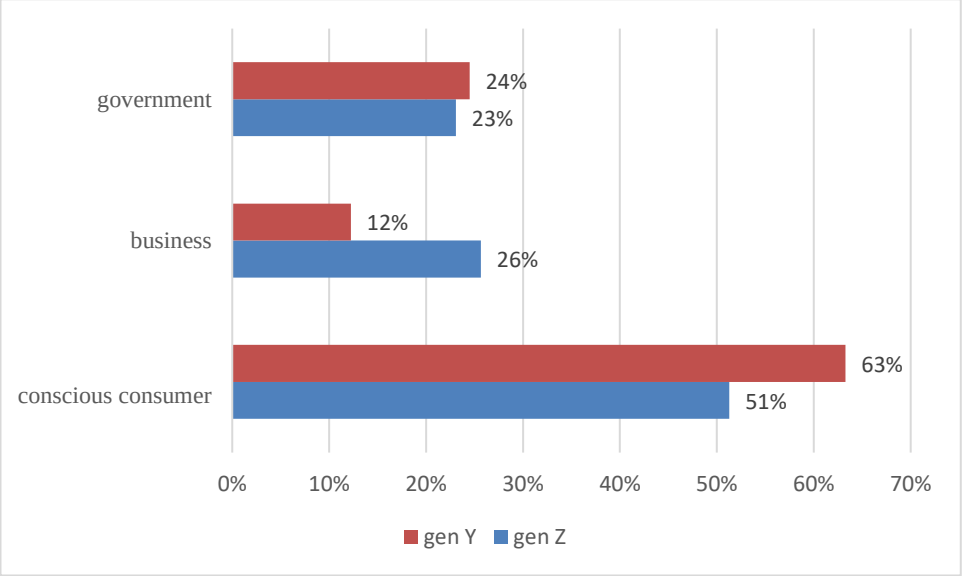

Fig. 5. Role of parts in transition to sustainable consumption

Analyzing the results of the study, the answers to the above two questions were determined. Representatives of both generations are highly aware of the importance of sustainable consumer behavior and the need to shift to conscious consumption in order to protect the environment. It deeply understands the negative impact that people have on the environment. In addition, the vast majority of respondents do not care about such issues as sorting household waste, saving water and electricity, and the problem of sustainable consumption. In general, there is no significant difference in the consumer behavior of generations Z and Y.

Conclusion

In conclusion, this study provides insight into the sustainable consumer behavior of Generations Y and Z in Kazakhstan. By exploring their attitudes and practices towards sustainable consumption, we highlighted the importance of addressing environmental issues and promoting a more sustainable future.

The results obtained indicate that representatives of both generations are aware of the negative consequences of human activity on the environment. Moreover, the emphasis on sustainable consumption and the prioritization of saving resources such as water and electricity indicate a growing commitment to caring for the environment.

Although Generation Y demonstrates a slightly greater inclination towards sustainable practices, it is noteworthy that Generation Z recognizes the role of manufacturing and processing companies in promoting sustainability. This indicates a keen understanding by younger generations of the systemic nature of sustainable development problems.

The study highlights the importance of understanding generational differences in consumer behavior to develop targeted strategies to promote sustainable consumption. Policymakers, business leaders, and educators can use this knowledge to develop initiatives that meet the values and preferences of each generation.

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Fulfillment as a means of transformation of logistics centres of Kazakhstan

Golubtsov Daniil Ilyich*, Sartova Rysty Bozmanaevna
Al-Farabi Kazakh National University, Almaty, Kazakhstan
E-mail: daniil.golubtsov95@gmail.com

Abstract

Given the continuous improvement of the logistics sector, it is imperative for companies to adopt more and more new technologies. The Republic of Kazakhstan is no exception. Fulfillment processes incorporate best practices as an enhancement to traditional logistics supply chains. This study is mainly aimed at identifying the 68ptimizatio of Fulfillment Processes by logistics companies in the Republic of Kazakhstan. The study of the use of Fulfillment processes by logistics companies was conducted as part of the dissertation work on "Digital transformation of functioning of the logistics centres in the Republic of Kazakhstan on the basis of Fulfillment concept".Methodology is based on aprimary data through a survey of respondent companies and experts within the framework of the survey for the dissertation, sothe survey and field questionnaires are also the research method of this article. Moreover, descriptive statistical methods to analyse the collected data and highlight key trends and features of logistics fulfillment development in Kazakhstan were implemented.PEST analysis was also applied as a recommendation for improvement and transformation of traditional logistics centres of the Republic of Kazakhstan based on the use of Fulfillment-processes.

The results of this study in the context of the Likert scale showed that logistics companies in the Republic of Kazakhstan use the processes of Fulfillment in a rather average value. Such processes as Delivery of goods/products, Inventory management and Receiving of goods/products show the highest values. This may be due to the automation of these processes by the surveyed companies. In conclusion, it should be noted that the prospects for the development of Logistics Fulfillment in the Republic of Kazakhstan are sufficiently positive considering the various factors identified in this study.

Keywords: Fulfillment, logistics centres, Republic of Kazakhstan,PEST-analysis, Amazon
JEL codes: R4, R40, R49

Introduction

Every year, traditional logistics supply chains undergo significant changes due to various economic and geopolitical factors. Competition in the market is quite high, therefore, companies providing services in the logistics business need to reach a qualitatively new level and improve the mechanisms of services provided. One of such decisions is the fulfilment service linked to processes performed in warehouses by external operators (Kawa, 2017). Often, logistics companies cooperate with Fulfillment organisations due to the fact that it is Fulfillment companies that perform quality Last-mile delivery. The process of getting the product to the end consumer (the last mile) is not a direct problem for most, as it is usually outsourced. The rest of the e-retailer's logistics processes such as warehousing, picking, packaging and returns handling are more complex.Logistics processes such as warehousing, picking, packaging and returns handling are more complex. For this reason, some online retailers prefer to use logistics services provided by fulfillment operators (Kawa, 2021). Last-mile delivery in e-commerce logistics is an extremely important and complex task that affects customer happiness and operational efficiency. Younus et al. also state that tofacilitate this task, Fulfillment centres are also needed to use marking delivery areas/zones (Younus et al., 2023).

Fulfillment services, provided mainly by external operators, are a relatively new sector of the economy, and in the context of the Republic of Kazakhstan, the concept of fulfillment is in its infancy. As a key element of modern global trade, logistics fulfillment is expected to play an

important role in the economic development of Kazakhstan, which is rapidly becoming a regional trade and logistics centre due to its strategic geographical location and growing attractiveness to investors. The prospects for the development of logistics fulfillment in Kazakhstan promise to be vast and perspective.

The country is actively and consistently investing in the modernisation of its infrastructure, including transport highways, port facilities and warehouses, which creates a favourable environment for the development of logistics operations.The introduction of advanced technologies and automation systems into the logistics industry is becoming increasingly essential and strategically important to improve operational efficiency and strengthen Kazakhstan's competitiveness in the global arena.

Improving the quality of fulfillment services, including aspects such as warehousing, inventory management, order processing and delivery, has a significant impact on the attractiveness of a country for local and foreign investors. In light of the rapid growth of e-commerce, the demand for high-quality logistics services that require innovative solutions and flexible strategies is also increasing.

Overall, the development of logistics fulfillment in the Republic of Kazakhstan promises to become a powerful stimulus for the country's economic growth and development, improve access to global markets for local businesses and enhance overall prosperity. However, in order to achieve these goals, it is essential that the government and the business community actively cooperate to create a favourable investment environment and promote the sustainable development of the logistics industry, which in turn will strengthen local and international trade and ensure the long-term success and prosperity of Kazakhstan.

Since the Fulfillment concept in the Republic of Kazakhstan is a rather new concept and its impact on logistics activities at this stage is not so high, we propose to define the following RQs of this survey:

RQ 1: What are the average values of the respondent companies' answers and their role in the context of using Fulfillment processes in traditional logistics enterprises?

RQ 2: How does PEST-analysis influence the perspective of Fulfillment development in Kazakhstan?

Literature review

Axwell and Hudson (2011, p. 2) state, "One of the most important common findings is that consumers are leading the way in multichannel shopping and many retailers are lagging behind in meeting their needs. There is a huge opportunity for global retailers today to improve the mechanisms needed to keep pace with shoppers who demand greater 69ptimization69 in terms of delivery and returns, product choice and the number of channels from which to choose." In turn, those companies that implement new logistics solutions that meet the needs of the market win (Ramanathan et.al., 2014). New logistics complexes that fully support e-commerce through functional 69ptimization69n are rapidly emerging in parallel with the growth of the B2C online retail segment. These facilities differ from traditional logistics complexes and range from large fulfillment centres and small freight stations to locker systems supporting last-mile delivery (Jean-Paul Rodrigue, 2017). Despite the dynamic development of fulfillment service in e-commerce practices, this issue is still relatively understudied in management theory (Kawa, 2017).

One of the important issues is that economists have concluded that the opening of fulfillment centres increases the number of jobs in the warehousing industry (Tarannum, 2023; Jones & Zipperer, 2018). One of the best business examples of Fulfillment is Amazon, which is a successful company and has established itself as a responsible third-party seller. Amazon is different in that it includes certain factors that keep business processes running.Amazon's solution to the lack of automation was to connect human labour with technology (Fuchset al, 2021). Vakhariya (2020) identified important factors that influence the online shopping experience (namely, customer service, customer satisfaction, reliability, self-congruence, attractiveness, product variety, and affordability) and then compared the brand experience of Amazon to another online retailer.

Methodology

The study, based on a theoretical review of early definitions proposed by various authors in the Literature review section, is the basis for analysing the prospects for the development of logistics fulfillment in the Republic of Kazakhstan.Order fulfillment is necessary for effective supply chain management in the e-commerce sector(Camilleri, 2022; Croxton, 2003).Moreover, 70ptimization70n forces companies to adapt to changes in strategic technology priorities and ways of doing business (Kurniasariet al., 2022).Bystudying the existing concepts and practices in this area we can better understand the current state and potential for further development of this industry in the70ptimizatiooceeding from the fact that Fulfillment in the context of the logistics segment of the Republic of Kazakhstan is a rather unexplored field, we have collected primary data through a survey of respondent companies and experts within the framework of the survey for the dissertation research on the topic "Digital transformation of functioning of the logistics centres in the Republic of Kazakhstan on the basis of Fulfillment concept" for further analysis and processing of the obtained data. Accordingly, the survey and field questionnaires are also the research method of this article.

The Results and Discussion section uses descriptive methods to analyse the collected data and highlight key trends and features of logistics fulfillment development in Kazakhstan. Such analyses help to identify the strengths and weaknesses of the current system, as well as identify areas for future development.

In the context of the prospects for further development of the fulfillment concept in the Republic of Kazakhstan, it is proposed to use PEST-analysis. This method allows to consider external factors, such as political, economic, social and technological, and assess their impact on the logistics industry. The results of the analysis will identify the opportunities and threats facing the development of the fulfillment logistics industry in Kazakhstan and develop strategies to maximise its potential.

Thus, the combination of theoretical analysis, descriptivemethods and PEST analysis helps to assess the current state and prospects of logistics fulfillment development in the Republic of Kazakhstan. This is an important step to create effective strategies and policies to stimulate the growth and development of this industry, which in turn contributes to the overall economic prosperity of the country.

Results and Discussion

The study of the use of fulfillment processes by logistics companies was conducted as part of the dissertation work on "Digital transformation of functioning of the logistics centres in the Republic of Kazakhstan on the basis of Fulfillment concept". This project aims to better understand the methods and principles of applying fulfillment in logistics centres in Kazakhstan and to adapt them to modern challenges and requirements in the digital era.

The survey was conducted among respondents from various logistics companies in Kazakhstan between September and December 2023, using the Google Forms platform. As a result, 112 responses were received out of a total of 173 queries sent. Of these responses, 106 were selected for further research as they were considered valid for calculations and analysis.

The respondents were executives and employees of procurement and logistics departments of various companies, including managers, executives and supervisors. They were invited to participate in the survey and rate the intensity of 70ptimizatio of fulfillment processes in their companies on a Likert scale from 1 to 5. This analysis provided valuable insights into the current level of fufillment 70ptimizatio in Kazakhstan's logistics operations and identified potential areas for improvement and development.

The results of the survey of respondent compa'Ies on the use of Fulfillment Processes at their companies based on their averages are plotted in Figure 1 below.

Figure 1. The use of Fulfillment processes by respondent companies.
Note: compiled by the authors based on the results of the survey.

Each of the fulfillment processes plays a key role in a company's efficient logistics, and analysing the average values of the respondent companies' answers provides important information on the current level of their use in practice.

Deferral services: this process also has an average value of 1.56, which may indicate a low 71ptimizatio of such services by companies.

Liaising with transport companies/external organisations: the mean value of this process is 1.92, which may indicate that companies may face some challenges in co-operating with external partners.

Dealing with returned goods: this process has an average of 1.56, which may indicate that there is a need to improve the handling of returned goods and refunds.

Processing customer orders: this process has an average of 2.12, indicating that companies have certain systems in place to process their customers' orders.

Preparing sales documents (e.g. cheques, invoices): this process has an average value of 2.02, indicating that companies take care to ensure that documents are properly prepared as part of the sales process.

Inventory management: this process has an average value of 2.16, indicating that companies pay attention to managing their inventories effectively.

Delivery of goods/products: this process has the highest mean value of 2.60, indicating that companies are focusing on 71ptimizati and 71ptimizati the delivery of goods to their customers.

Packing of goods/products: the mean value of this process is relatively lower at 1.74. This may indicate the need to improve the process of packing of goods/products to improve efficiency and customer service.

Storage of goods/products: the average of this process is 2.08, which indicates that companies are paying some attention to 71ptimizati and managing their inventories.

Receiving of goods/products: the mean score for this process is 2.14, which may indicate that companies already have certain procedures and systems in place to effectively receive supplies.

By analysing this data, it is possible to identify areas that require additional attention and improvement, as well as to identify strengths that can be used in developing a more effective logistics strategy.

Based on the obtained data of average values from the descriptions above, we put forward our own PEST-analysis as a recommendation for improvement and transformation of traditional logistics centres of the Republic of Kazakhstan based on the use of Fulfillment-processes:

P (Political)	**E** (Economic)	**S** (Social)	**T** (Technological)
***Trade and logistics* regulation:** Changes in legislation, import and export tariffs, customs procedures and trade agreements can significantly affect the operations of logistics companies. For example, changes in customs regulations may affect the speed of border crossing and increase the time it takes to deliver goods. ***International relations*:** Geopolitical conflicts or peace agreements can change trade routes and affect access to key markets. Logistics companies must be prepared for possible changes in the geographical situation and respond to political risks that may arise.	- ***Currency fluctuations*:** A rise or fall in the value of a country's currency can significantly affect the cost of importing and exporting goods, which can affect logistics costs and service prices. Companies should have hedging strategies in place to mitigate risks from currency fluctuations. ***Economic growth and investment:*** Economic growth and investment in infrastructure can create new opportunities for the logistics industry. For example, the construction of new roads and railways can improve the availability and efficiency of transport routes	***Changing consumer preferences:*** The growth of online shopping and e-commerce requires logistics companies to be prepared for increased order volumes and fast delivery. Companies must adapt their processes and infrastructure to meet the needs of today's consumers. ***Demographic changes:*** Changes in population, income levels and lifestyles can also affect the demand for logistics services. For example, the increasing number of people who prefer online shopping requires more efficient delivery and order processing systems	***Innovation in logistics:*** The introduction of new technologies, such as warehouse automation, the use of drones for delivery and inventory management systems using artificial intelligence, can significantly improve the efficiency and competitiveness of logistics companies. ***Digitalisation and e-commerce:*** The growth of digital technology and online commerce requires logistics companies to be prepared for changes in consumer demand and behaviour. Companies must invest in digital platforms and solutions to improve their operational efficiency and customer service.

Table 1. PEST-analysis on the use of Fulfillment processes by traditional logistics companies in the Republic of Kazakhstan.
Note: compiled be the authors.

PEST-analysis is given as a recommendation on the prospects of development of traditional logistical centres of the Republic of Kazakhstan on the basis of the survey in the context of the results of the average values of the respondent companies' answers on the use of Fulfillment processes on the basis of their companies within the framework of the dissertation research on the topic: "Digital transformation of functioning of the logistical centres of the Republic of Kazakhstan on the basis of Fulfillment concept". Taking into account the above factors, logistics companies in the Rep"blic of Kazakhstan should develop flexible strategies that will allow them to adapt to the changing environment and 72ptimiz the capabilities of Fulfillment processes for sustainable development of their business.

Conclusions

Based on the identified RQs presented in the Introduction, it is appropriate to answer them as follows, based on the data of the Results and Discussion section:

RQ 1: The analysis of the data on the use of Fulfillment processes in traditional logistics centres in the Republic of Kazakhstan provides important information on the current status of this concept. An overview of the average values indicates a variety of aspects that require attention and improvement, as well as strengths that can be 72ptimiza in the further development of the logistics strategy.

It is noted that many companies already have certain systems and processes in place that facilitate customer order management, sales document preparation and inventory management. However, there are areas where processes can be improved such as handling returned goods, co-operation with external partners and packaging of goods.

The high score for the goods delivery process indicates that companies are actively focusing on 73ptimizati and 73ptimizati delivery to customers, which is critical to meeting customer needs and remaining competitive.

The overall analysis highlights the need for continuous improvement in logistics processes to ensure a more efficient and competitive business. Using the findings, companies can prioritise areas for further improvement and develop strategies using the best practical Fulfillment concepts to improve customer service, reduce costs and strengthen their position in the logistics market in Kazakhstan.

RQ 2: PEST analysis provides valuable information on external factors that may influence the development of logistics fulfillment in Kazakhstan. Taking into account political, economic, social and technological aspects, it can be concluded that the prospects for the development of this industry in the country depend on the complex interaction of various factors.

A stable political environment and favourable government regulation contribute to the creation of conditions for the growth of the logistics sector. Economic growth, investment in infrastructure and trade development create new opportunities for logistics companies. At the same time, changing consumer preferences and technological advances require companies to continuously adapt and improve their processes.

The prospects for the development of logistics fulfillment in Kazakhstan look promising, especially if innovative technologies are effectively 73ptimiza and adapted to changing market conditions. The development of this industry will help to improve infrastructure, increase the efficiency of trade operations and stimulate economic growth in the country. However, it is important to 73ptimizat the risks and challenges associated with a volatile political environment, economic fluctuations and changing consumer demands in order to successfully adapt to change and 73ptimizati on emerging opportunities.

In conclusion, the transformation of the logistics centres of the Republic of Kazakhstan on the basis of the Fulfillment Concept represents an important stage in the development of the logistics industry of the country. The application of the Fulfillment approach in logistics implies an integrated approach to the fulfilment of all stages of goods supply, from receipt and storage to delivery and returns handling, which allows companies to ensure more efficient and integrated management of their logistics operations.

The transformation of logistics centres based on the Fulfillment Concept includes the introduction of modern technologies, process automation, 73ptimization of warehouse operations and improved inventory management systems. This helps to improve the speed and quality of order processing, reduce delivery times and increase customer satisfaction.

The key benefits of transforming logistics centres based on the Fulfillment Concept are referred to improving operational efficiency, reducing costs, increasing speed of order processing and improving customer service. This strengthens companies' competitiveness in the market and fuels their growth and development.

However, to successfully transform logistics centres based on the Fulfillment Concept, a number of factors need to be taken into account, such as staff training, investment in infrastructure and technology, and adaptation to changing customer needs and requirements.

In general, the application of the Fulfillment Concept in the logistics centres of the Republic of Kazakhstan will allow companies to improve their competitiveness, increase the efficiency of their logistics operations and provide a higher level of customer service. This in turn contributes to the growth of the country's economy and strengthens its position in the global market.

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ALGORITHM FOR ACCOUNTING LOGISTICS COSTS AT DAIRY INDUSTRY ENTERPRISES

Issaeva A.A*.,Beysenova M.U., Sultanova B.B.
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: aiman.isaeva83@mail.ru

Annotation . The dairy industry plays a key role in meeting the population's needs for high-quality dairy products. However, with increasing competition in the market and rising costs of logistics operations, it is becoming increasingly important for enterprises in this industry to effectively manage logistics costs. In this context, the development of an algorithm for accounting logistics costs in dairy industry enterprises is a pressing research problem.

The purpose of this article is to develop an algorithm for accounting for logistics costs at dairy industry enterprises in order to optimize logistics processes and reduce overall costs. Specific research objectives include:

Analysis of the features of logistics processes at dairy industry enterprises.
Development of accounting methods and algorithm for optimizing logistics costs.
Assessing the effectiveness and potential of using the algorithm in a competitive environment.

It is expected that the developed algorithm will allow dairy industry enterprises to improve the management of logistics costs, reduce time and financial costs, and also increase the efficiency of production and customer service. The results of the study can be useful both for practical specialists in the field of logistics and for the scientific community dealing with the problems of optimizing production processes in the dairy industry.

The article reflects the results of a theoretical study to identify the essence of the categories “logistics costs” and discusses the results of a theoretical study of the features of the formation of logistics costs and the accounting algorithm at dairy industry enterprises. The efficiency of organizing and keeping records of the costs of production and sales of products (works and services), the reliability of the assessment of work in progress and finished products, the determination of indicators of the cost of production of works, services and financial results from the usual activities of the organization largely depends on the classification of costs. Therefore, it is necessary to know the economic content of production costs and, based on this, classify them in accordance with their group affiliation.

Keywords. Logistics costs, classification of logistics costs, dairy industry costs, cost accounting.

Introduction. In the context of sustainable development of the country, modern companies are in a state that requires continuous, continuous development, improvement, and increased efficiency.

The task of the current stage is to form the prerequisites for sustainable development, which will require additional costs, including logistical ones. On the other hand, logistics activities can have a negative impact on the socio-economic sphere and the ecosystem, which causes additional costs for economic entities. The formation and development of a logistics cost optimization system is determined by the degree of dependence of an economic entity on procurement, in-house, sales, transport, warehouse and information logistics, inventory and order management systems.

The formation and improvement of the logistics cost management system is a prerequisite for ensuring sustainable and balanced development of economic entities in the agricultural sector.

One of the main ways to achieve this goal and maintain competitiveness, as well as one of the main factors for successful strategic planning and sustainable development of the agro-industrial complex is a competent analysis, accounting for logistical costs and full optimization of material flow costs while maintaining the quality of products. Logistics costs have a complex structure based on the total cost of production and circulation of products, while in agricultural production this quality is enhanced due to the close connection of the technological process. The accounting and management accounting tools currently used do not allow us to fully determine the level of

logistical costs, and their primary identification requires significant time and material resources. Since the logistics system is present in every business process, the importance of the logistics cost accounting algorithm is quite obvious.

Literature review. Currently, profitable relationships are formed in conditions of high competition, uncertainty and instability of the market environment. In order to achieve their goals, entrepreneurs, in addition to marketing approaches, need to apply modern effective methods and methods of business process management. In this regard, logistics and logistics costs are becoming relevant in modern conditions.

The logistics infrastructure is a complex system that must combine business structures providing transport, forwarding services, purchase and sale services, storage, etc. The purpose of modern logistics systems is the effective management of material and related flows based on effective cooperation with stakeholders and the introduction of modern technological solutions, which causes the occurrence of appropriate costs [1].

The problems of formation and development of a management system, an integral part of which is the element of accounting for logistical costs to ensure sustainable development, have been studied by scientists from different countries. Thus, V.I. Sergeev [2], P.R. Murphy, D.F. Wood [3], D.J. Bowersox, D.J. Kloss [4] paid attention to the issues of determining the role of logistics activities in modern economic activity, classification of logistics costs and their optimization.

The relationship between logistics activities and the results of sustainable development was studied by L.B. Mirotin, V.I. Sergeev [5], V. Albino [6], J.-P. Rodrigue, B. Slack, C. Comtois [7].

Theoretical and practical aspects of the peculiarities of the formation of logistics costs and their classification are reflected in the works of scientists: patronymic – K.T.Taygashinova, Zh.S. Raiymbekov, B.U.Syzdykbaeva and foreign – S.A.Pelikh, I.A.Yelova, I.I.Poleshchuk, N.K.Moiseeva, O.M.Sumets, L.B.Mirotin, E.Tashibaeva, A.M.Gadzhinsky, M.Kufel.

Currently, the scientific and practical direction of logistics is increasingly of interest to the scientific community in the field of the formation of logistics costs in the agro-industrial complex.

The authors' approaches to the definition of the concept of "logistics costs" are discussed below in figure 1.

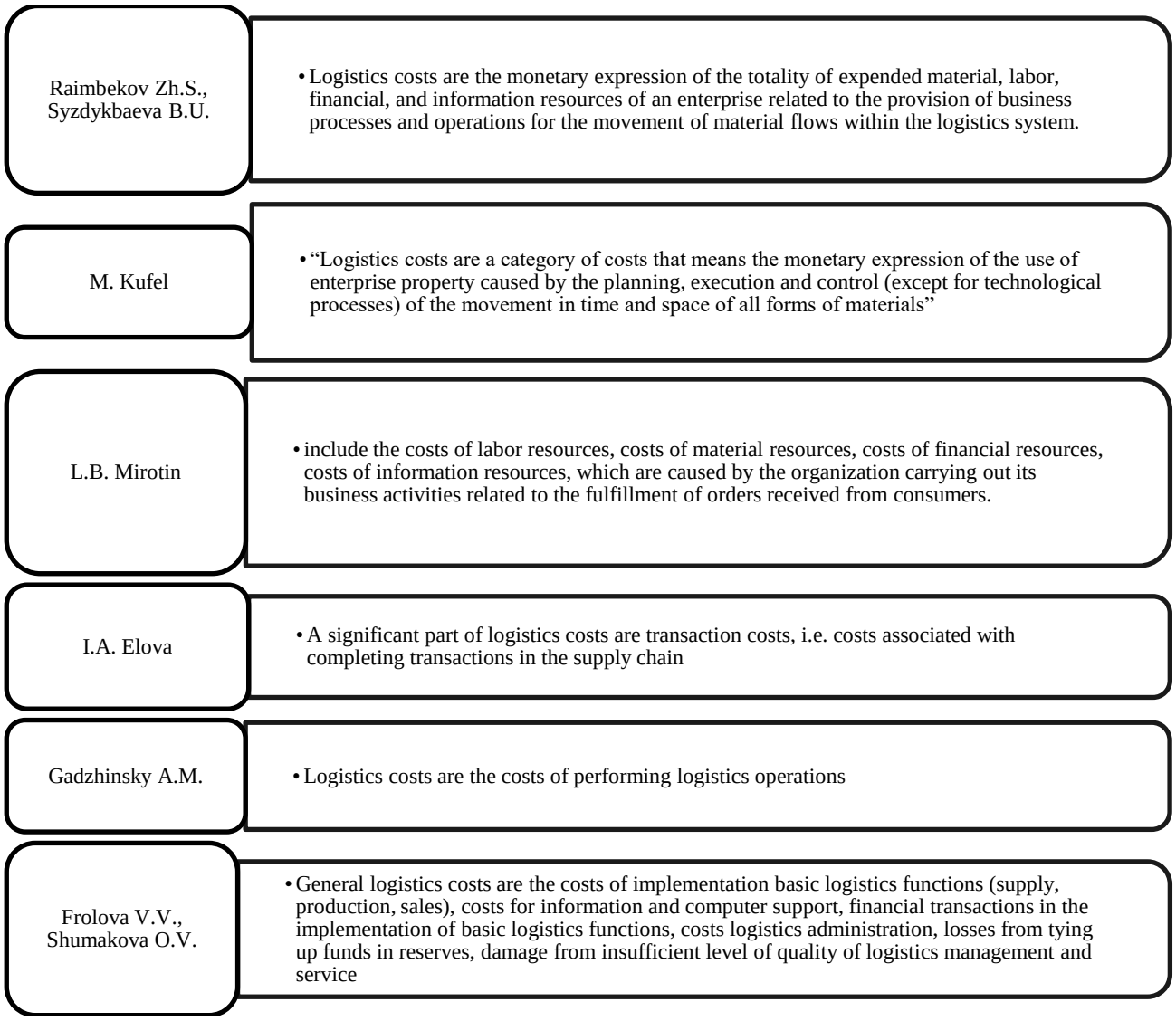

Figure 1. The authors' approaches to defining the concept of "logistics costs"
Note: compiled by the authors based on sources [8, 9, 10, 11, 12, 13]

If, according to J. Stock and D. Lambert, marketing determines the required level of service, then logistics can provide it with optimal costs and economic attractiveness of capital. [14]

A.M. Gadzhinsky notes: "Organizing the accounting of logistics costs, the main task that logistics faces is to minimize the costs associated with the delivery of material flow from the manufacturer to final consumption." [12]

According to N.K. Moiseeva: "Logistics costs are the sum of all costs, in particular the costs of storing incoming products, internal transportation, intermediate storage, storage of finished products, shipment, external transportation, as well as costs of personnel, equipment, premises, warehousing of stocks, transfer of data on orders, stocks, deliveries." [15]

K.T. Taigashinova expresses her opinion: "Isolating logistics service costs in non-traditional management accounting is logistics costs. However, in modern conditions, cost accounting of logistics services is not carried out..." In his research, K.T. Taigashinova writes: "Reducing production costs is the main indicator in increasing an entrepreneur's income. The development of a strict market strategy requires the perfection of the production process of production technology" [16, p. 90].

Investigating the costs associated with ensuring the logistics activities of an enterprise, L.B. Mirotin, Y.E. Tashbaev, O.G. Poroshina revealed the classification of logistics costs: "Logistics costs are the costs of labor, material, financial and information resources caused by enterprises fulfilling their functions for fulfilling consumer orders. The costs of enterprises included

in logistics costs are very diverse and are divided according to cost elements, functional areas and responsibility centers."

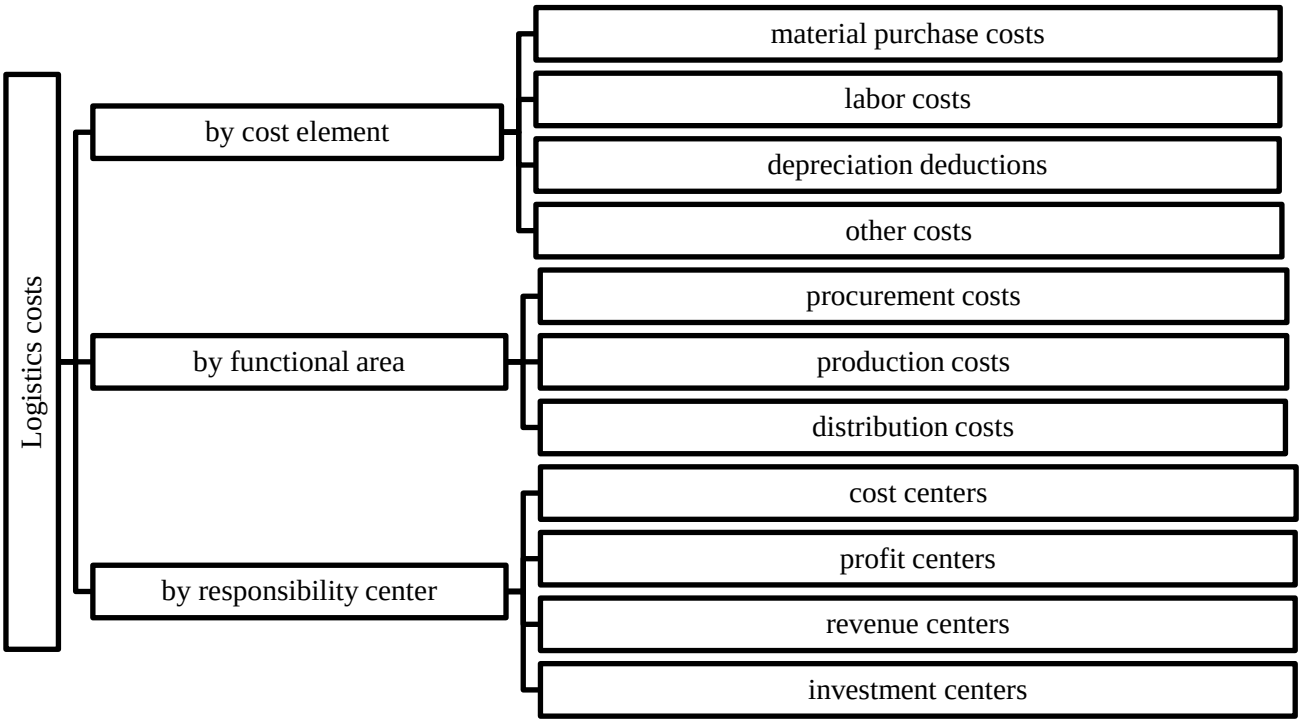

Figure 2 . Classification of logistics costs
Note: compiled by the authors based on source [10]

In Figure 2, the classification of logistics costs by functional areas, the authors write “sales costs”, in our country there will be sales costs, or sales costs, and in the Republic of Kazakhstan in the standard chart of accounts these costs are taken into account in account 7110 - “Sales costs”, regardless of sales, sales of products or sales of logistics services.

In general, in modern conditions in the economic literature, the problems of “accounting for logistics costs” in the entire field of activity, including in the dairy industry, have been little studied. In this regard, the relevance of demarcating integrated cost accounting with logistics areas is timely and beyond doubt.

Therefore, there is a need to identify a system for accounting for logistics costs, and link their classification with the classification of costs in management accounting.

Methodology. The research analyzed existing methods for accounting for logistics costs at dairy industry enterprises. This included a literature review, analysis of reports and publications, and interviews with logistics practitioners. The main parameters and variables affecting logistics costs in dairy industry enterprises were identified. This included the cost of transportation, warehousing, packaging, as well as factors such as distance, supply volumes and product characteristics. Based on the analysis, a cost accounting algorithm was developed that describes the relationship between parameters and logistics costs. And the algorithm for accounting for logistics costs will allow the enterprise to more effectively manage its logistics activities, reduce costs and increase competitiveness in the dairy industry market. Based on the resulting algorithm, it can be approved and tested on real data from dairy industry enterprises. As a result, its accuracy, reliability and efficiency are tested under various operating conditions.

Results and discussion. The classification of costs in traditional management accounting is very diverse and depends on what management problem needs to be solved. The main objectives of management accounting include:

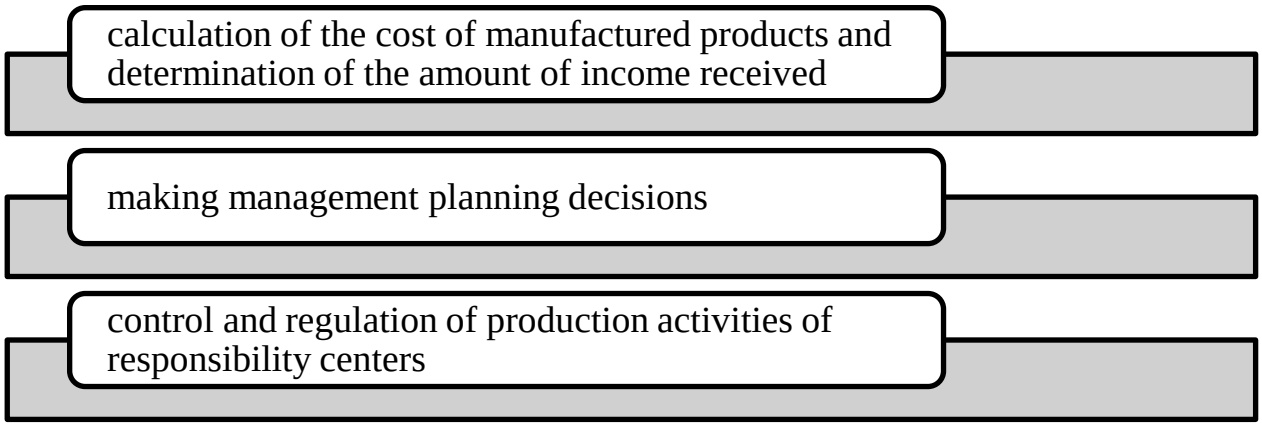

Figure 3 . Main tasks of management accounting
Note: compiled by the authors

The solution to each of the assigned tasks corresponds to its own classification: we can consider the classification of the 2nd and 3rd directions - this is the adoption of management planning decisions, control and regulation of the production activities of responsibility centers, which may well fit into the classification of logistics costs.

The cost of purchasing raw materials and supplies is an important cost center.

The basis for the distribution of logistics costs is the supply chain, which includes logistics functions from procurement to consumption. There are two options for assigning costs:

- to order;
- on the process (supply, procurement). [16, 121 p.]

The system for assigning costs to an order determines the costs for each selected order as it goes through the logistics process. These are transportation and procurement costs. An order is an information unit of logistics operations that goes through all stages of logistics transactions. The technological process of order fulfillment is a set of sequentially performed operations.

Based on a generalization of various literature sources, it is possible to propose a classification of costs in the dairy industry.

Table 1. Classification of logistics costs

Classification sign	Types of costs	Characteristic
To determine cost and profit		
By economic content	Cost elements	Includes means of labor, objects of labor and labor resources
	Cost items (costing)	Grouping of production costs by economic homogeneity, by target value (material costs, social contributions, labor costs, depreciation, and others)
By the method of attribution to the cost of production	straight	They can be directly included in the cost of specific types of products (works and services). Direct costs primarily include expenses for raw materials, basic materials, purchased semi-finished products, fuel and energy for technological purposes, for wages of production workers with corresponding charges
	indirect	Related to the maintenance and management of product production, product sales, and management of the organization as a whole
In relation to the production (technologica	Basic	Directly related to the technological process of manufacturing products, performing work, providing services (raw materials, supplies, depreciation, etc.)
		Formed in the course of servicing the production process,

l) process	Invoices	managing the activities of the organization's production divisions
By composition and degree of homogeneity	Single element (simple)	Homogeneous types of costs, such as, for example, wages, depreciation and others
	Complex	They include several types of costs: general business expenses include the cost of materials for general business purposes, salaries of management personnel, depreciation of buildings, etc. The grouping of costs by composition is identical to their division into elements and items
According to the expediency of spending	Production	Necessary to ensure the activities of an economic entity in accordance with the envisaged technologies, plans, estimates, norms and regulations
	Non-production	Indicate deviations from normal conditions of production and economic activity (losses from downtime, payment of overtime work, manufacturing defects)
For planning, forecasting and management decision making		
In relation to the volume of labor products	Permanent	They depend not on the volume of products (work, services), but on the operating conditions of the business entity, are associated with the very fact of the organization's existence and occur even in the absence of labor products (wages of management and service personnel, advertising costs, consulting, auditing and information services , for training and advanced training of personnel, other general business expenses).
	Variables	Costs, the value of which varies in proportion to the volume of products (works, services). Variables, as a rule, include the costs of raw materials and basic materials, wages of production workers, and other similar expenses
	Conditional variables (conditionally constant)	Contains both variable and fixed costs (fees for communications)
By frequency of occurrence (time of determination of facts)	current	Refers to the costs of production and sales of products in the reporting (planned, analyzed) period
	Deferred expenses (one-time)	Associated with the preparation of new production facilities, development of new products, reserving costs for purposes (payment of vacations, repair of fixed assets)
	periodic	Not directly related to the production process. They consist of commercial (expenses associated with sales and supply of products) and administrative expenses (expenses of enterprise management)
If possible and necessary planning	Planned	Comply with the requirements of the technological (production) process and the conditions of sale (sales) of products, works, services
	Unplanned	Indicate a violation of the normal conditions of the production process (losses from defects)
For the purposes of making management decisions	Relevant	Dependent on the decision being made
	Irrelevant	Inevitable under any solution
In relation to	Limit (margin)	Arise from the manufacture or sale of an additional unit of

the profitability of production		product
	Limit (margin)	Arise from the manufacture or sale of an additional unit of product
Based on reality	Real	Occurred and reflected in accounting
	Imputed	Lost profit of the organization
for the purposes of control and regulation of cost levels		
By responsibility center	Adjustable	Depends on the degree of control of the head of the organization's department
	Unregulated	Organizational divisions independent of the influence of the head of the organization
By degree of controllability	Controlled	Which can be controlled by the head of this responsibility center and which can be significantly influenced
	Uncontrollable	Which do not depend on the activities of the head of this responsibility center.
According to the expediency of spending	Limited (standardized)	This includes travel and hospitality expenses, advertising expenses, etc., the legislation establishes limits, norms and standards
	Unlimited	Accepted when calculating cost in actual amounts
to determine the effectiveness of costs incurred		
expenses that form income	Effective (profitable)	Generating income from product sales
	Ineffective (unprofitable)	Non-income generating (losses in production, defects)
	Current (required)	Necessary for normal operations
Note: compiled by the authors		

Each group of costs has its own independent economic significance and practical application. It should be taken into account that this classification for organizing accounting and cost control, calculating the cost of products according to some characteristics is of great practical importance, and according to others - less.

Logistics contributes to the success of an enterprise by providing consumers with products in a timely manner and in accordance with requirements. The logistics chain of the dairy industry consists of parts - supply management and demand management. The task is to process perishable raw materials in the shortest possible time and fulfill received orders daily.

Cost information obtained in management accounting is the basis for external and tax reporting. Logistics involves recording accounting for the entire flow, which makes it possible to show changes in the amount of costs as a criterion for the effectiveness of decisions made in the field of material flow management.

In management accounting, the phases of accounting for logistics costs should be distinguished.

The first phase is the emergence of costs from material, intangible resources, fixed assets, working capital, labor, and output. Material costs at a dairy industry enterprise come from:

- from the workshop, from the livestock division, through the warehouse, the main accounting document is the "Demand-invoice";

- alternative receipts - when the costs are the results of product output, the accounting documents are "shift production report", "Product output", "Item assemblage".

The second phase is storage, cost adjustment. In this phase, changes in analytical cost accounting may occur. Transfer of costs: raw materials, materials from one production order to another. Documents can be:

- “Adjustment of work in progress” (remains of products that have not gone through the full technological cycle, for example, raw milk);

- “Adjustment of other costs.”

During the storage phase, processes such as write-off and return of materials, raw materials and purchased goods can occur.

The third phase considers which asset or expense is generated by cost accounting.

Dairy production enterprises in their accounting policies determine a list of expense items, such as material costs, labor costs, deductions, depreciation charges, and other costs. Expenses are recognized as justified and documented expenses - expenses confirmed by documents drawn up in accordance with the law, or documents drawn up in accordance with the requirements of business turnover applicable in the territory of which the corresponding expenses were incurred, or documents indirectly confirming the expenses incurred (including customs declaration, business trip order, travel documents, report on work performed in accordance with the contract). As already noted, any expenses are recognized as expenses if they are incurred to carry out activities aimed at generating income.

All costs should be divided into interaction costs and conversion costs. Cost accounting is formed from a variety of costs that appear at the following stages:

Receiving an order;
Order Processing;
Preparation of documents for registration;
Order completion;
Storage and delivery;
Forwarding services;
Invoicing.

One important point is that expenses form the cost price, and expenses contribute to determining the total annual income.

Accounting for cost transactions, including accounting for logistics costs, is carried out in accordance with Law of the Republic of Kazakhstan No. 234 dated February 28, 20027. “On accounting and financial reporting” (as amended on 07/07/2021), [18] The accounting rules approved by order of the Minister of Finance of the Republic of Kazakhstan No. 221 dated 06/22/2007, [19] The standard chart of accounts for accounting, approved by the Order Minister of Finance of the Republic of Kazakhstan No. 185 dated May 23, 2007. [20] (section 7, accounts 7000-7710 are allocated for accounting for “expenses”, and section 8 of accounts 8000-8400 for expenses).

Accounting in agriculture is governed by International Financial Reporting Standard (IAS) 41 Agriculture (IFRS/IAS 41). This standard is applied to accounting for agricultural products (that is, products obtained from biological assets) only at the time of their receipt (collection). Subsequent accounting of finished products and their processing is carried out in accordance with the requirements of IAS 2 “Inventories” [21]

For management purposes, accounting organizes the accounting of expenses by cost items.

Planning, accounting and calculation of the cost of dairy products is recommended to be carried out using the following costs:

main and additional material resources;
transport and logistics costs for main and additional raw materials;
expenses and services of auxiliary production;
fuel and energy for technological purposes;
expenses for maintaining fixed assets;
wages of production workers;
contributions for social needs;
taxes, fees, other payments;
other costs;
general production expenses;
general running costs.

An algorithm for accounting for logistics costs at dairy industry enterprises is a necessary process when managing the agricultural process. The accuracy and timeliness of calculating the organization's performance indicators depends on how effectively analytical and synthetic cost accounting is organized. In this regard, the construction of an effective cost accounting system, which provides for grouping costs by elements and costing items, deserves special attention.

For the most effective integration of management accounting into specialized software systems, you can use a digital coding system, where the first two characters indicate the center of responsibility in accordance with the functional areas of business processes: 01-management, 02-sales, 03-supply, 04-main production, 05 -auxiliary production. The next two characters represent the codes of responsibility centers, allocated on the basis of the business processes carried out in the organization. The following symbols are the serial numbers of cost centers within the specified responsibility centers. If more detailed cost accounting is necessary, this classifier can be supplemented.

Table 2 – Classification of cost centers within the selected business processes of the dairy industry

Name of business processes	**Name of the responsibility center and cost center**	**Accounting account**	**Responsibility Center**
Primary activity			
Control	Administration	7210	01.01
	Accounting	7210	01.02
	Planning and Economic Department	7210	01.03
	Human Resources Department	7210	01.04
Sales	Marketing department		02.01
	Sales department		02.02
	Finished products storage warehouse		02.03
Supply	Purchase department	7110	03.01
	Warehouse for storing raw materials and supplies	7110	03.02
Primary production	**Crop production**	8111	04.01
	- Brigade No. 1		04.01.1
	- wheat production		04.01.1.1
	- production of industrial crops		04.01.1.2
	- brigade No. 2		04.01.2
	Livestock	8112	04.02
	- livestock farm		04.02.1
	Industrial production	8113	04.03
	- dairy plant		04.03.1
	-meat processing production		04.03.2
Support activities			
Auxiliary production	Mechanical repair workshops	8411	05.01
	Machine and tractor park	8412	05.02
	Car park	8413	05.03
	Electricity supply	8414	05.04
Note: compiled by the authors			

Cost accounting and calculation are necessary processes in the management of the dairy industry. The accuracy and timeliness of calculating the organization's performance indicators depends on how effectively analytical and synthetic cost accounting is organized. In this regard, the

construction of an effective cost accounting system, which provides for grouping costs by elements and costing items, deserves special attention.

When forming a nomenclature of cost items, one should take into account their specific weight, role in the formation of product costs, as well as their connection with production technology. To introduce progressive methods and management accounting systems, the nomenclature of items and cost elements in the dairy industry can be used in the following composition.

Table 3 shows the recommended nomenclature of costing items for organizing management cost accounting in the dairy industry, which will lead to the formation of the cost of dairy products.

Table 3. Cost accounting algorithm for calculating dairy products

Cost elements and costing items	Cost accounting and calculation of product costs	
	Overall for the organization	By responsibility center
Direct material costs		
Material costs: **a) feed:** **- purchased, incl. concentrated;** **- own production of previous years;** **- own production of the current year;** **- costs of maintaining a feed mill.**	 * * * *	 * * * *
b) means of protecting animals from diseases (veterinary medicines);	*	*
d) fuel and energy for technological purposes;	*	*
D) auxiliary materials;	*	*
E) other services	*	*
Direct variable labor costs		
Labor costs: A) remuneration of key workers; B) remuneration of workers engaged under civil contracts; D) additional wages D) Social insurance contributions	 * * * *	 * * * *
Indirect costs		
Maintenance of fixed assets, including herds: **A) depreciation of fixed assets, including herds;** **B) costs of repair and maintenance of fixed assets, including herds.**	 * *	 * *
Other costs: **A) works and services of auxiliary production;** **- fuels and lubricants;** **- repair of mechanical workshops, vehicle fleet;** **- energy supply;** **- water supply;** **- other productions.** **B) AUP salary;** **C) insurance premiums of the AUP;** **D) works and services of third parties;**	 * * * * * * * * *	 * * * * * * * * *

D) Expenses for using loans and interest; **E) Rental (leasing) payments;** **D) costs of standardization and certification of milk;** **D) other costs.**	* * * * *	* * * *
Business expenses		
Logistics costs: **A) costs of bottling and transporting milk;** **B) costs of warehousing and packaging;** **B) Cleaning and transportation costs;** **C) expenses for selling milk, including advertising;** **D) Salaries of employees in the logistics and transportation department;** **E) Social insurance contributions for employees in the logistics and transportation department;** **D) other costs**	* * * * *	* * * *
Basic expenses	*	* A. Cost generated by the responsibility center
Overheads	* B. Production cost	
Selling expenses	* B. Full cost	
Note: compiled by the authors		

This standard for the list of cost elements and costing items was reviewed from a modern perspective, structured, the components of cost elements and cost items were described in more detail, which made cost information more transparent.

The structure of the cost of dairy products is multidimensional and covers a large number of production and economic relations.

In the agricultural industry, they mainly use the traditional classification of costs by economic elements and costing items. This meets the requirements for planning and controlling costs and calculating the full cost of production, but does not provide the opportunity to obtain information about costs for making management decisions.

Conclusions.

One of the main problems in the development of the agro-industrial complex of the Republic of Kazakhstan is:

• lack of developed transport and logistics infrastructure (worn-out infrastructure, low railway capacity, shortage of wagons in season);

• high transport costs and logistical difficulties [23].

To solve these problems, it is necessary to improve the processes of planning and regulating the supply chains of agriculture, the development of logistics infrastructure, optimization of flow processes based on the management of total logistics costs at different levels of the economic system, including logistics service standards based on the greening of agriculture, production and processing of dairy products, the formation of an open information system for logistics processes.

In conclusion, the developed logistics cost accounting algorithm represents an important tool for optimizing the operation of logistics processes. Experiments have shown its high efficiency and potential for use in various industries. The advantages of this algorithm include accuracy of cost accounting, flexibility of customization to meet the specific needs of the enterprise, and the ability to automate logistics management processes. It is recommended to actively implement the algorithm in practice in order to improve the management of logistics operations and reduce overall costs. Further research in this area will expand the functionality of the algorithm and increase its efficiency in a rapidly changing logistics environment.

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THE ROLE OF BUDGETING IN THE PROCESS OF MANAGING PRODUCTION RESOURCES

Arystambayeva Almira *, Kogut Oxsana , Zhunisova Gulnara
Al- Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: almyra73@mail.ru

Abstract

In modern conditions of a market economy, in all industries, competition is intensifying, one of the main tools of which is the optimization of production costs. For all companies, costs are a determining factor in maintaining and increasing competitiveness. Modern business practices are based on day-to-day control over costs, which ensures stability of market positions and is the most effective way to achieve profitable company operations. Cost management is a necessary part of economic work in a company , since within its framework, when planning and actually implementing activities, the target result is formed and the prerequisites for making management decisions are identified. Budgeting plays a crucial role in managing production resources to ensure that funds are allocated wisely to achieve company goals.This article examines the theoretical aspects of budgeting in the context of manufacturing resource management, with an emphasis on optimizing the efficiency and effectiveness of the production process. The article provides a comparative description of the main types and methods of budgeting and has developed a general model for rationalizing budgeting, taking into account the industry characteristics of the company's activities. The results of the study can be used to deeply understand the benefits of budgeting as the main method of managing and optimizing costs.

Keywords: budgeting, management, optimization, efficiency.
JEL codes: M41 , M 11

1 Introduction

Currently, the issue of budgeting the company's activities as a management technology, an indicator of the quality of management in the company, compliance of the level of its management and the management decisions made with modern requirements is becoming acute. It is the introduction of a budgeting system in a company that allows you to get a holistic view of the company’s total needs for production resources , make management decisions on their more rational use , and conduct planning, accounting and analysis of financial results. A well-functioning budgeting system increases the value of a business and allows for a significant increase in its profitability.Budgeting a company’s activities increases the efficiency of its financial management, contributes to the growth of competitiveness and investment attractiveness of the enterprise, which is especially interesting for foreign investors who want to see the business profitable and transparent.

Planning, as one of the most important management functions, includes two types of activities that are an integral part of the entire process of management control.

Firstly, program preparation includes the development of medium- and long-term plans to implement the company's strategy. The preparation of such a program brings success in decision-making in the main areas of the company’s activities. In profit-oriented companies, each major product or individual production line is a program.

Secondly, budget development is the process of planning the activities of individual divisions or functions of the entire company as a whole for the subsequent period. Budgeting can be considered as a system for selecting tactical planning goals at the company level within the framework of the adopted strategy, developing plans for the company's future operations and monitoring the implementation of these plans, that is, as a system of internal financial management.

A budget can have an infinite number of types and forms. Unlike financial reporting forms, a budget does not have a standardized form; it can be as simple as projected sales and expenses or as complex as large financial projects.

The development of budgets gives quantitative certainty to the selected prospects for the organization's activities; all costs and results acquire monetary expression. Budgeting contributes to correct and clear goal setting and development of a business strategy.

Factors that impede effective intra-company management in production are different and depend not only on the phase of development of the company , but also on the readiness of management for organizational changes, as well as the stability of the economic development of the enterprise. Therefore, they must be taken into account when choosing a budget management model to prevent unwanted deviations. An important point is to assess the effectiveness of the implementation of budgeting at the enterprise, taking into account qualitative changes in management, which makes it possible to identify reserves in a timely manner and propose reasonable corrective measures. All of the above necessitates the introduction of budgeting to improve the efficiency of their management. At the same time, special attention must be paid to the development of comprehensive methods for selecting a budgeting model and assessing performanceits implementation.

2 Literature review

Budgeting problems have been studied by many scientists. Information for planning, management and control was presented in the works of K. Drury, who argues that with the help of planning and management processes it is possible to monitor the implementation of decisions made [1]. The author points out that planning is the development of a course of action for the future, which over time will bring the organization the desired results. And, management is defined as the process of changing and adjusting actual indicators in order to achieve intended results. According to the author, if various activities of an organization must be coordinated through the development of a general program of action for future periods, then more detailed programs are called estimates.

P. Atrill and Eddie McLaney also highlight budgeting as the most important tool for management planning and control. A budget is a financial plan for a short period, expressed primarily in financial terms, and its role is to transform long-term plans into feasible projects in the near future. We identified five main benefits of a budget for an organization [2]:

- promote long-term thinking and identification of short-term problems;
- help coordinate the activities of various parts of the organization;
- allows managers to improve performance indicators;
- provide a system of powers;
- provide the basis for the control system.

The authors examined the possibilities of preparing a budget with limiting factors.

Nikolaeva O.E., Shishkova T.V. describe budgets as a key tool in the management control system. The authors give more refined budget functions for organization, where they indicate: planning, coordination, stimulation, control, evaluation, training tool [3].

Among domestic authors Nurgazina Zh.K. defines a budget as a quantified plan aimed at achieving a goal. The author considers the budget as a planning tool, a means of motivation, ensuring coordination, the budget also determines performance criteria and a financial control mechanism, forms a communication environment, and creates financial awareness [4].

Taigashinova K.T. explains the budget as a statement of what can be achieved based on reasonable calculations. According to the author, the budget is drawn up based on the achieved level of costs, in several options, in accordance with established standards for the consumption of materials per unit of production and labor costs. She highlighted the impact of inflation, which leads to the widespread use of rolling budgets. She also noted the importance of flexible budgets, which are developed with a distinction between fixed and variable costs in order to change in response to changes in production, for example in the volume of output [5].

Tsakhaeva D.A. argues that it is impossible to limit the budget to a plan of income and expenses, and budgeting only to planning. It is part of the overall system of economic work in an organization . Planning without control over the implementation of plans loses its meaning, accounting that is not used to evaluate and evaluate activities is pointless, and control without plan and accounting data is impossible. That is why budgeting is an integrated system that summarizes

planning, accounting and control data not only for income and expenses, but also for the processes and quantities that form them. The author also pays attention to the accounting and analysis of deviations [6].

Zlomanova E. A., Petrushina E. P. defined budgeting as a tool for planning, implementing and monitoring the activities of an organization to ensure optimal use of scarce resources. According to the authors, results-based budgeting involves the development of financial plans for the organization, which are determined by a list of desired results formulated at the beginning of the budgeting process. This process involves calculating resource requirements based on predetermined outcomes rather than simply planned events or activities. Performance budgeting requires managers to define goals and outcomes that involve changes or benefits to end users, and then measure the extent to which those changes and benefits are actually realized in the course of business operations [7].

Nikitina E.B.shows the new purpose of budgeting in the formation and objective information for enterprise management during the production cycle (usually a year).To develop budgets, an appropriate information base is required. Based on this approach, a distinction is made between incremental budgeting and "budgeting from scratch." Incremental budgets are formed based on the results of past periods, taking into account events that should occur in the future. The use of incremental budgeting does not allow us to identify the inefficient use of resources in the enterprise, low labor productivity, and low work efficiency [8].

Sokolov A.Yu. says that it was necessary to optimize the algorithm for creating budgets, improve interaction between departments and business units, enhance all the benefits of budgeting, and level out the disadvantages. Thus, the concept of BB (Beyond budgeting).Advanced or progressive budgeting budgeting) arose at the present stage of development of the budget model, its application is becoming a trend in the world theory and practice of management accounting and controlling business performance. In essence, this is an attempt to combine and combine all the advantages of the "improved budgeting" and "beyond budgeting" systems [9].

Thus, today research is being conducted that continues to search for the most effective and progressive budgeting methods.

Ashish Kumar Srivastav examines the performance budget, arguing that it is not just a performance indicator; it is much more than measuring performance or reporting results in a budget. The main characteristics of this budget are the introduction of performance measurement into the budgeting procedure and the inclusion of a budget management system with overall responsibility for compensating for excellent performance and punishing poor performance [10].

Research into performance budgeting has identified the strengths of performance budgeting, as well as a number of opportunities for improvement, and has provided recommendations for possible improvements to EU budgetary practices, taking into account expected impact and complexity [12].

3 Methodology

During the study, methods of scientific knowledge were used, including consideration of theoretical justifications, identification of the main problem and the search for ways to solve it with a review of sources and publications of domestic and foreign authors. The search for advanced budgeting techniques requires, first of all, an understanding of the theoretical foundations of budget problems and budget management. Because they form basic ideas about what a budget is, what its main functions are, what principles it is based on, what types exist, what are the differences, what are the advantages and disadvantages.

4 Results and Discussion

The modern market is characterized by such trends as speed, globality, and efficiency. They determine the ever-increasing role of financial planning and budgeting. With the help of a well-designed budgeting system, you can predict changes in market conditions and plan the financial

results of the organization. Budgeting is an important step in developing a system of regular economic management that helps optimize the financial flows of an enterprise, which allows it to increase competitiveness.

The budget must be considered from an economic, legal, organizational and material point of view (Figure 1).

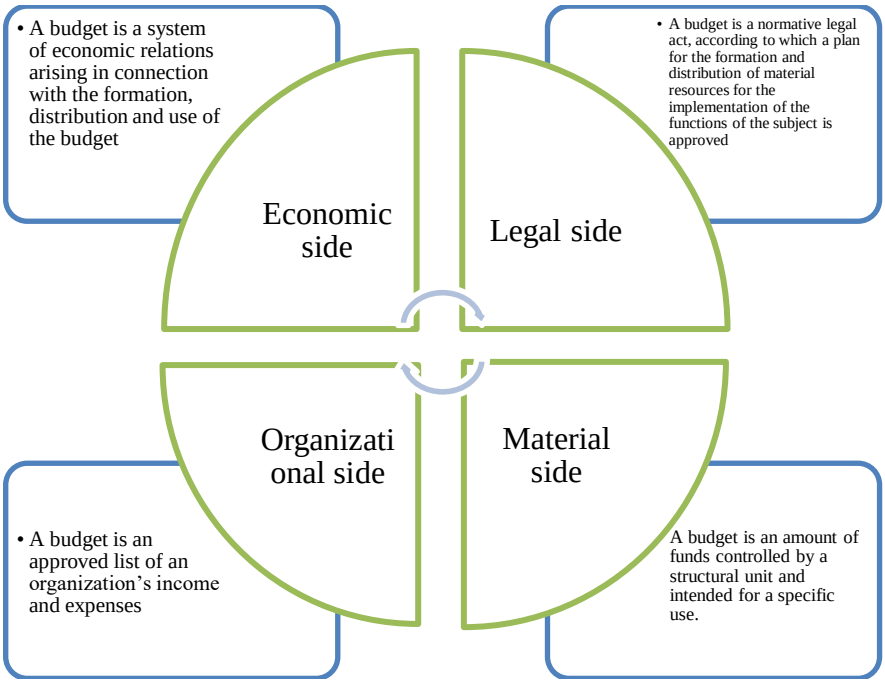

Figure 1. Categorical content of the concept of "budget"

Budgeting is a method of projecting future values of financial statements. The quality of budgeting is determined by the structure of budgets and the composition of budget items, the consistency of budgets with each other, as well as the activities of managers participating in the budgeting system.

The operational system for managing the activities of an organization with the help of generated budgets allows you to achieve your goals through the most efficient use of resources. An important point in budget management is the motivation and delineation of responsibility for these deviations.

The extent to which the budgeting process functions depends on the amount of effort and expense put into it.

The essence of budgeting is the development of interrelated plans for the production and financial activities of an organization and its divisions based on current and strategic operational goals, monitoring the implementation of these plans, and corrective actions on deviations from the parameters of their implementation.

When considering budgeting for an organization's activities as a process, it is necessary to highlight its three main elements:

Organizational support – concerns issues of intra-company organization of departments and services responsible for ensuring and maintaining the budgeting process itself; and also provides for the selection of someone responsible for the correct and timely implementation of the process;

The budgeting process, which is divided into separate procedures: planning, execution of budgets, collection and analysis of factual data, etc. In this case, regulations are needed to control the implementation of all procedures;

Budgeting technology – includes the formation and consolidation of organization budgets. For this purpose, a financial structure is being developed, consisting of responsibility centers with separate budgets.

The development of the budget of any organization is always carried out for a certain time interval, which is called the budget period. At the same time, an organization can develop several budgets, varying in duration of the budget period. For each specific company, the budget will be individual depending on the type, organizational structure and characteristics of the organization's activities.

Budgeting will perform three main functions:

Planning function . Budgeting is the basis for intra-company planning. Based on the strategic goals of the organization, budgets solve the problem of allocating available financial resources.

Forecast function . The peculiarity of the function is the calculation of forecast indicators for the implementation of planned tasks based on the corresponding accounting records.

Analysis function . This function involves comparing actual data with planned indicators at any stage, identifying deviations in activities compared to the budget and subsequent adjustment of actions.

The methods used in budgeting are divided into planning, accounting, controlling, and analytical. When budgeting, prognostic and statistical methods are used, which are generalized as the budget method; and in budget control, accounting and analysis, methods of financial and managerial cost accounting, the standard-cost method and the normative method, and mathematical methods of economic analysis are used. Based on the above, it should be determined that the budget expresses the organization's planned indicators for the current period in the following groups:

Use of capital, inventory, labor and financial resources;
Attracting sources of financing for operational and investment activities;
income and expenses;
movementmonetaryfunds;
investments(capitalAndfinancialattachments).

There are operating, financial and investment budgets. Atthe development of certain types of budgets should take into account the existingtheir interrelationships that determine the order of their formation. TotalityeveryonebudgetsAndordertheirdrawing upcalledbudgetarymodel of the organization .

Building a budgeting system is impossible without a thorough study of the organizational structure, reflecting the divisions that make up production: main, auxiliary and service.

Research into the current state of organizations confirms the enormous impact of innovative technologies. These include big data and analytics technologies, block chain, machine learning, robotization, which results in: routine and standard operations for processing financial and economic information are increasingly carried out within the framework of software and corporate information systems; reduction of personnel involved in these operations .

Much depends on the leadership style, corporate culture, size of the enterprise and industry, and the level of training of specialists , which together reflects the close relationship between the budgeting system and the personnel motivation system.

Budgeting can be thought of as integratedtools,directlyinterconnectedWithotherobjectsfinancialmanagement,accountingAndreporting (Figure 2) .

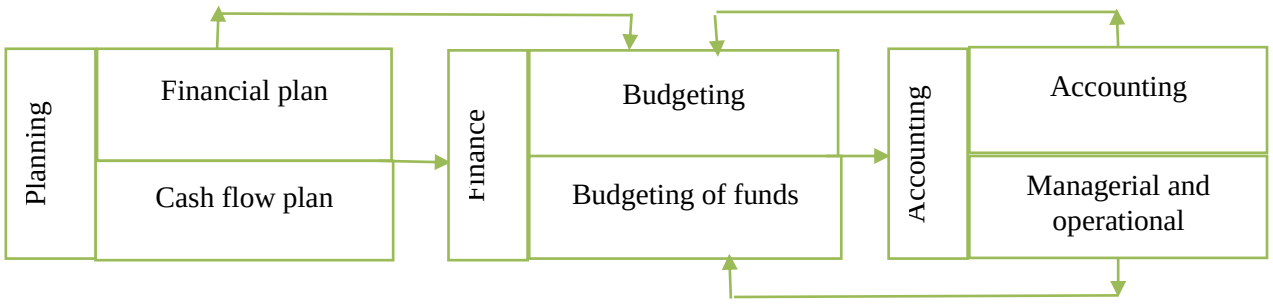

Figure 2. Budgetorganization model

INcorrespondenceWithpresentedbudgetarymodel–budgetingwillintroduceyourselfresultfinancialplanning.

Since the divisionsin its activitieshave limitedin dependence, Thatrespectively questionsinvestment Andfinal formation arrived TheyNot decide.That's whycenterinvestmentAndthe center of profit in the enterprise under study will be the Divisionfinance Andeconomics, which, Firstly, carries outfinancialplanning,Secondly,isresponsiblebehindformationfinancialresult–arrived.AND,Thirdly, acceptsparticipationVformationAndfullyjustifiesorfullyrejectsproposed investment solutions. Thus, the budget modelsubjectenterpriseswillbe basedonusedorganizationalstructuremanagement

For effectivemanagement of a company, it is necessary to have information about the company in threecuts:

- financialresult(BDR);
- financialflow(BDDS);
- financialposition(BBL).

Candefinefollowingbasicgoalsdevelopmentbudgets:

operating rooms(current)budgets–willreflectcurrent(production)activitysubjectenterprises.Targetformation of the operating (current) budget of the Central Federal District: revenue forecast forcore activities, forecast of financial results and costscommodityproducts;
financialbudgetswillshowfinancialwealthsubjectenterprises,hispossibilitiesVfinancingactivities behindcheckownfinancialresources(ownfunds).Targetformationfinancialbudget:controlimplementationfinancialstrategiesAndwayoptimizationbusinessorganizations

KindsAndstructurebudgets allow you to control activitiesorganization as a whole and determine at each current momenttimehisfinancialstateAndfurtherpossibilitiesdevelopment.

The next step, which is necessary to ensure effectivethe budgeting process is the creation of specialized regulationsBythisprocessVresearchedenterprise.Regulationbudgetaryprocessbeginscreationblock diagramsformationthe main financial and operational (current) budget of the studyenterprises.

FinalstageformationbudgetIng,HowtoolsfinancialplanIng,isVorganizationspreparationAndresearchmanagementAndservicesmanagemententerpriseinformation,receivedVprogressbudgeting,OincomeAndexpenses (Figure 3) .

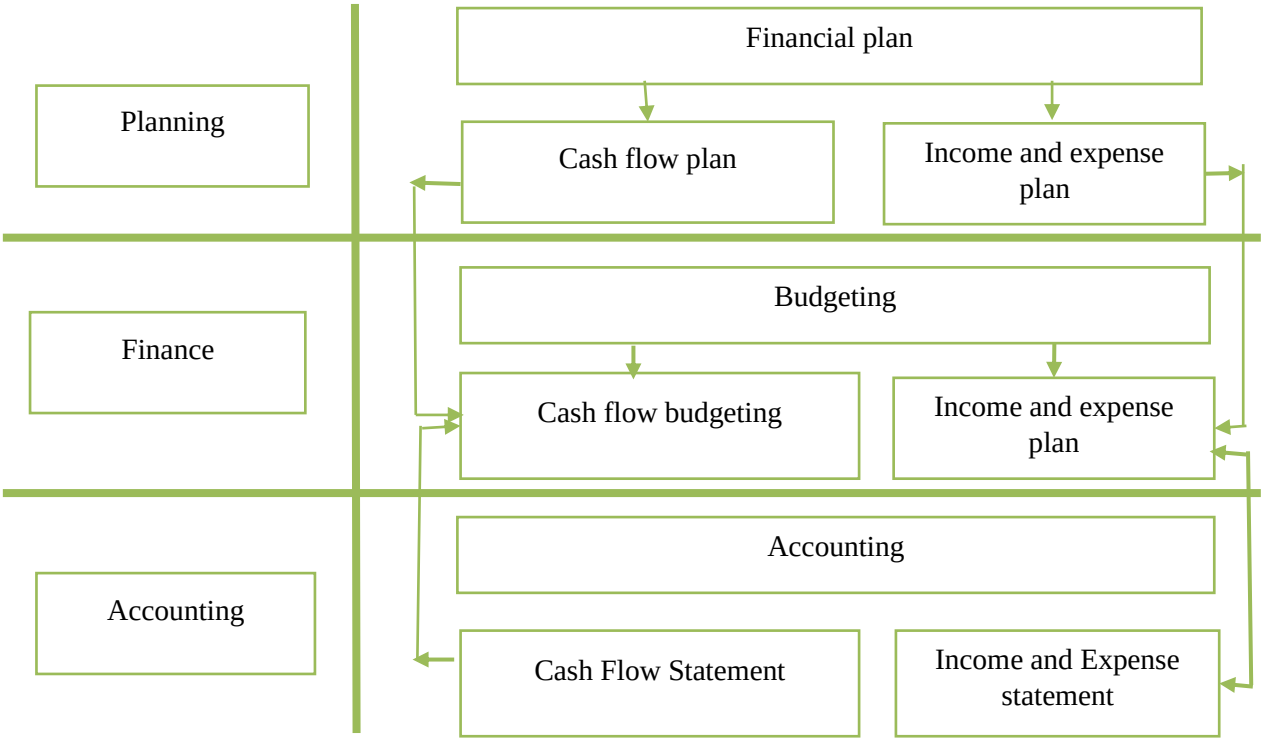

Figure 3. Organization of financial management and planning atbasisbudgeting

ConfigurationreceivedVresultprocessbudgetingschemefinancialmanagementAndplanning,presentedbelowondrawing3containsVto myselfrelationshipthreeblocks:accounting,financialandblockplanning.

About the organizationfinancialmanagementAndplanningonbasisbudgetingVinformationalplanmoreeffective,That's whyWhat:

A)moduleplanningprovidesinformationOplannedindicatorsmovementmonetaryfunds,planincomeAndexpensesby enterpriseand centersfinancialresponsibility;

b)accountingmoduleprovidesinformationVblockbudgetingactualindicatorsmovementmonetaryfundsAndreportOincomeAndexpensesByenterpriseAndcentersfinancialresponsibility;

V)actualdeviationsfromplannedindicatorsare calculatedVmodulefinance,WhatallowspromptlyacceptsolutionsVregionmanagementfinancialstreams.

To the finalthe result of all the main solutions presented above is the developmentcontrolproceduresVpartsprocessbudgeting,Howfinancial planning tools. Because, as has been shownhigher,closingplanningbudgetsis happeningfrom belowup,ThatAccordingly, control procedures should include the following basiclevels (Figure 4).

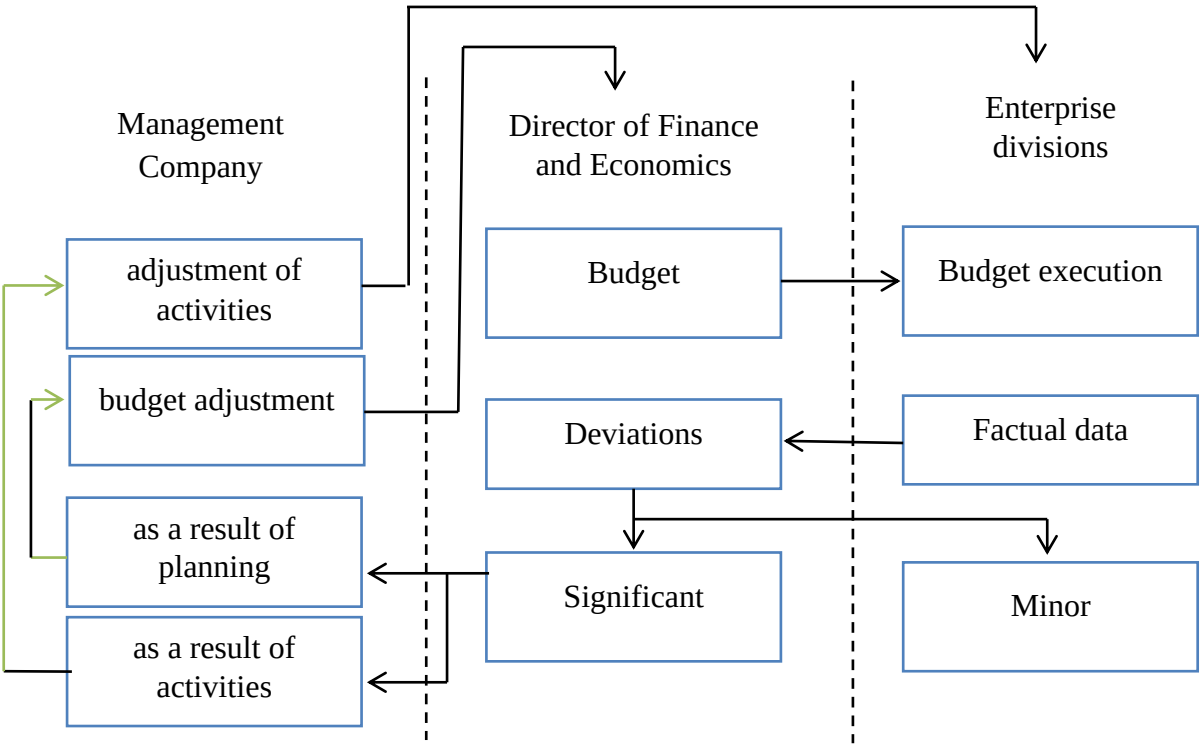

Figure 4. Levels of control

ComparisonplannedAndactualvaluesisthe main element of the budget control system. This processmostin detailgivesinformationVpercentageexpression.ThenshouldconductanalysisresultscontrolForidentifyingerrorsByCentral Federal District.INconclusionmanagerfunctionsystemscontrolrequiresputdeadlineseliminationnegativeresults,discoveredVprocesscontrol,And,finally,installwhichmeasuresacceptForcorrectionssituations.

To form a mechanism for assessing the performance of an organization and its divisions, it is necessary to use the most effective management technologies. Similar methods that can improve existing standards in the field of budgeting are: rolling budgeting, balanced scorecard, zero-based budgeting, business process-based budgeting, driver-based budgeting.

The rolling budgeting method is a process of emergency response to market changes to make the necessary decisions and achieve set goals. When using this method, the budgeting time period is usually taken as a year and divided into quarters. The organization has a twelve-month work plan, which allows it to keep the budget up to date and quickly change it based on available data.

The balanced scorecard is directly related to the concept of the strategic gap. It occurs when an organization loses its goal orientation, which causes inefficient use of company resources and reduces the pace of development.The balanced scorecard allows you to implement a management strategy simultaneously in four areas: finance, customers, business processes and company employees. This approach provides the most interested and qualified employees with the opportunity to ensure high-quality execution of core business processes that fully satisfy customer needs.

A zero-based budgeting system is an alternative to traditional budgeting methods. This type of system is common in project and program management. Zero-based budgeting allows for a re-evaluation of ongoing activities and programs relative to new projects, based on financial and economic indicators comparing future costs and expected results.

Business process-based budgeting helps solve the overhead budgeting problem. The idea of this method is that the company is not represented by separate divisions, but by a single mechanism with built-in business processes, within which all structural divisions are affected. As part of working with this method, the organization carries out resource planning. Having identified the consumer and his needs, the organization uses information about them in developing its own strategy and forms goals at various levels of the organization.

Driver-based budgeting is a cost planning technique that allows, when implemented, not to change the logic of the work of internal departments and employees in them. In addition, it allows you to get rid of a large amount of work within the previous approach and the need to invest money. The driver in this concept is a component of information, the change of which will affect key business indicators. Drivers are represented by demand indicators, product price, time, and productivity. The concept of driver-based budgeting allows for significant savings in the forecasting process relative to other concepts .

5 Conclusions

Budgeting serves as a planning and control tool that helps organizations effectively manage their production resources. By setting financial goals, determining resource needs, and aligning expenses with operational goals, budgeting allows companies to optimize the use of resources and improve operational performance.

Advantages of budgeting in production resource management:

Resource Optimization: Budgeting helps in efficient allocation of production resources, avoiding overutilization or underutilization of assets.

Performance Evaluation: Budgets serve as benchmarks for evaluating the performance of production units and identifying areas for improvement.

Decision Making: Budgets help in decision making by providing information about resource availability, constraints and financial implications of production plans.

Issues and considerations:

Despite its benefits, budgeting in manufacturing resource management poses challenges such as inaccurate forecasts, budget variability, and resistance to change. Organizations need to address these challenges by creating flexibility in budgeting processes, leveraging technology solutions to accurately analyze data, and creating a culture of budget accountability.

Future Directions:

As technologies such as artificial intelligence and data analytics continue to advance, the future of budgeting in manufacturing resource management is poised for transformation. Advanced tools and algorithms can improve the accuracy of budget forecasts, optimize production resource allocation in real time, and provide forecasting capabilities to support long-term planning and decision making.

Conclusion:

In conclusion, understanding the theoretical foundations of budgeting is necessary for organizations to effectively manage production resources, optimize performance and increase productivity. By implementing theoretical principles such as zero-based budgeting, activity-based budgeting, and flexible budgeting, companies can achieve operational excellence and sustainable growth in an increasingly competitive environment. Budgeting is not just about numbers; it is a strategic tool that enables organizations to make informed decisions and thrive in the dynamic resource management landscape.

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DEVELOPMENT IN THE FIELD OF LIGHT INDUSTRY: THE EXPERIENCE OF FOREIGN COUNTRIES

Nurmagambetova A.M*., Rysbayeva B.B.
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*e-mail: asilzat91@mail.ru

DOI

Abstract
The purpose of the article is to analyze foreign experience in light industry, which plays a strategic role in the context of globalization and increased competition. Developed foreign countries have unique technological and organizational approaches, so the main task is to adapt them to increase the efficiency and competitiveness of national production. In addition, learning from the experience of other countries helps to avoid mistakes and successfully adapt strategies to local conditions.
It is also important to actively involve young people in the study of light industry, create training programs for specialists, conduct master classes and internships for leading industry specialists. This will help to preserve and transfer the accumulated experience, ensure the availability of qualified personnel and support the innovative development of the industry in the future.
Thus, the study of international experience in light industry is a key step towards the development of national production, increasing its competitiveness and sustainability in the global economy. The implementation of successful strategies and innovative approaches adapted to local conditions contributes to the long-term growth and prosperity of the industry.

Keywords:regions, light industry, economic policy, share, investments, resources, leasing, raw
JEL codes: 025, 038, 047, P23

Introduction

One of the important factors in the development of the Kazakhstan light industry was the availability of a raw material base – cotton and leather, and as a result of an extensive increase in the production of cotton and other crops in the south of the country in the 1960s and 1980s, an environmental disaster occurred in the Aral Sea, which became shallow due to too active water use.
The transition to the market in the early 1990s led to a sharp degradation of the industry, which turned out to be less competitive compared to importers, whose products were more diverse and attractive in price. Low prices were also achieved due to the fact that for a long time a significant part of the light industry's products were imported into the country using gray schemes. In the most difficult period for the industry – 1991-1999 – production volumes decreased by tens of percent per year: in textile production by an average of 18%, in clothing production by 37%, and in leather goods production by 43%. Kazakhstan's light industry, unlike other industries (petrochemical, mining and metallurgical, food, pharmaceutical and others), has not played back this decline so far. In physical terms, over 30 years, the output of cotton has decreased by one and a half times, fabrics – by four times, leather – by six times, shoes – by 34 times [1].
The current state of the textile industry shows that problems remain in the development of the industry that negatively affect economic growth and require early solutions, the main of which are: 1. The technical and technological backwardness of the textile industry from foreign countries, expressed in high material consumption, energy intensity and labor intensity of production. 2. The absence of a civilized consumer goods market, expressed in the intensification of competition in the domestic market between domestic and foreign producers. 3. The high share of imports, which caused the strengthening of the strategic and commodity dependence of the state on foreign countries. 4. The low level of innovation and investment activity of the industry, expressed in the weak competitiveness of domestic goods, in the low share of know-how and innovative products in sales in domestic and foreign markets. 5. The social and personnel problem, manifested in the shortage of highly qualified specialists, managerial personnel, main and auxiliary workers in all

types of technological redevelopment. The relatively stable and successful development of the garment industry in Kazakhstan became possible due to the fact that fairly cheap fabrics from China, Turkey and other countries began to enter the domestic market when their local fabric production was in decline and could not compete significantly with imported fabrics. This availability of raw materials was facilitated by the customs clearance scheme by weight [2].

Considerable attention is paid to the development of light industry in many countries of the world, since this industry has considerable socio-economic significance, providing high employment for the working-age population, in particular for women. The importance of the industry lies in the fact that it occupies the second position in terms of consumption, second only to the consumption of food products. The main global producers of light industry products are countries such as China and India. China accounts for 65% of the world's cotton production, 35% of the world's yarn production, 41% of the world's fabric production and 50% of the world's clothing production. In general, the impact of the industry on the economy of our country is insignificant relative to other sectors of the economy. Light industry has a small share in the manufacturing industry – no more than 1.2%. The industry carries out both the primary processing of raw materials and the production of finished products. It is a complex industry that includes more than 20 sub-sectors, which can be grouped into three main groups: textile; clothing; leather, fur, shoe. The largest share in the structure of light industry is occupied by the products of the garment and textile sub-sectors [3].

In 2023, China's textile and clothing exports amounted to $293.6 billion, an increase of 8.1 percent. lower than in the previous year.

According to the data, the growth of industrial exports resumed in December 2023 and increased by 2.6 percent. year-on-year, up to $ 25.3 billion [4].

Literature review

A literary review of the international experience of foreign countries in the field of light industry is an analysis of academic research, reports from organizations and other sources related to key aspects of the development of this industry in various countries.

Many studies focus on the role of innovation and advanced technologies in the development of light industry, They analyze the application of automation, digitalization, robotics and other modern technologies in production processes and management. A striking example is Timothy Brown, an American economist who studies the impact of technological innovations on economic growth and productivity in various industries, including light industry [5].

David Audretsch is also a Professor of Economics and Entrepreneurship, known for his research in the field of innovation, entrepreneurship and economic development in small businesses, including the light industry sector [6].

Richard Lipsey is a Canadian economist who has contributed to understanding the relationship between innovation, technological progress and economic growth, including analysis of light industry [7].

Rebecca Henderson is a professor at Harvard Business School who studies innovation, strategy and competitiveness of companies, including companies in the light industry sector.

Joseph F. Francoisis an economist specializing in trade, innovation, and the macroeconomic aspects of industry, including light industry [8].

Benjamin F. Jones is a professor of economics who studies the relationship between innovation, growth and economic development in various industries, including light industry [9].

These are just a few well-known scientists who have researched innovations in the economy, including the light industry sector. In fact, many researchers around the world continue to study this topic, making important contributions to understanding innovation processes and their impact on the economy.

Their work includes the introduction of environmentally friendly technologies, waste management, reduction of resource use and other measures to reduce the negative impact on the environment.

These researchers have made significant contributions to understanding the trends and challenges facing the light industry at the international level.

A literary review of international experience is an important tool for understanding trends and challenges facing the light industry, as well as for identifying promising strategies and approaches to its development.

Methodology

Both theoretical and empirical methods were used in the course of scientific research. The method of scientific abstraction allowed us to delve into the problem and identify trends in the development of LP in Kazakhstan. The use of inductive and deductive methods has played a key role in confirming the hypotheses put forward based on the multifaceted experience of different countries. Statistical analysis revealed the dynamics of the development of the LP industry, and comparative analysis after in-depth study of foreign experience allowed us to formulate effective recommendations for the development of LP. Special attention was paid to the innovative development of light industry, which is recognized as an important factor in sustainable economic growth.

The basis for our analysis and synthesis was not only official sources, but also accurate statistical data provided by government agencies. This approach provided our research with reliable and up-to-date information necessary to draw fundamental conclusions.

In January-March 2023, light industry products worth 55.5 billion tenge were produced in Kazakhstan, which is 37.8% more than in the same period last year, the press service of the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan reports.

According to the ministry, there is an increase in the number of active enterprises in the industry by 9% or 122 new enterprises compared to last year.

By the way, the growth of light industry production is observed in all sub-sectors: the production of textiles - by 57.6%, clothing - by 11.7%, leather and related products - by 7.4%.

The leaders among Kazakhstan's regions in the production of light industry products have changed slightly compared to last year: Turkestan region (28.5%), Shymkent (16%), Almaty (8%), Akmola region (5.6%).

There are 1,445 enterprises operating in the country's light industry sector, employing 22,000 people [10].

Results and discussion

Light industry plays an important role in the economy in several key aspects [11].

1. Promoting job creation and social stability: light industry is often one of the largest sources of employment in many countries. Employment in light industry is provided by a wide range of people, including low-skilled workers, and contributes to reducing unemployment and social tension.

2. Contribution to exports and trade balance: Many light industry goods such as textiles, clothing, shoes and household appliances are important export items for many countries. Exports of light industry products contribute to an increase in foreign exchange earnings and an improvement in the trade balance.

3. Promoting innovation and technological development: Light industry, like other manufacturing industries, is constantly striving to improve product quality, reduce costs and introduce new technologies, contributing to innovation and technological development of the entire economy.

4. Providing consumers with goods: light industry produces a wide range of goods for everyday life, including clothing, shoes, household chemicals and electronics. The scale and efficiency of production achieved in this sector make consumer goods accessible to a wide range of the population.

5. Promoting regional development: light industry factories and plants are often located in remote and sparsely populated areas

6. Economic diversification: Light industry helps diversify the national economy by expanding production opportunities and reducing dependence on specific sectors and markets.

Thus, light industry plays an important role in economic development by providing employment, stimulating exports, supporting innovation and ensuring the supply of consumer goods.
In general, light industry plays an important role in the economy, contributing to its growth, stability and diversity.
Current trends in light industry abroad reflect a wide range of changes in the industry, including innovations in technology, changes in consumer behavior, trends in sustainable development and global economic and political shifts. Below are some of the main current trends in light industry that Kazakhstan needs to implement for the development of light industry:
1. Digitalization and automation of production: The use of digital technologies such as the Internet of Things (IoT), artificial intelligence (AI) and automation of production processes is becoming increasingly common in light industry. This allows you to increase production efficiency, reduce costs and improve product quality.
2. Flexible production and personalization: Modern consumers are increasingly appreciating the individuality and personalization of goods. Light industry responds to this demand by offering flexible production processes and the ability to adapt products to specific customer needs and preferences.
3. Sustainable production and environmental responsibility: With increasing awareness of the challenges of climate change and sustainable development, companies in the light industry set themselves the goal of reducing the negative impact on the environment. This includes reducing emissions, energy consumption, and the use of more environmentally friendly materials and manufacturing processes.
4. Digital transformation in marketing and sales: The use of digital platforms for marketing and selling goods is becoming more common. Online commerce, social media, influencers and other digital channels play an important role in the promotion and distribution of light industry products.
5. Localization of production: In response to global challenges such as the COVID-19 pandemic and trade conflicts, some companies in the light industry are beginning to prefer localization of production. This reduces dependence on international supplies, provides more flexible supply chain management and improves response to changes in the market environment.
6. Development of new materials and technologies: Modern light industry is actively researching and implementing new materials and technologies such as biodegradable materials, 3D printing, nanomaterials and smart textiles, which opens up new opportunities for innovation and product improvement.
These trends reflect the dynamism and variability of modern light industry, and companies that successfully adapt to them can secure a competitive advantage in the market. However, it is important to keep up with scientific and technological progress, that is, to introduce innovations in the development of this industry.

Table 2 - Innovative approaches to the production of modern light industry

№	Innovative approaches	Recommendations for use in light industry
1	Industry 4.0 and digitalization:	The introduction of digital technologies and Industry 4.0 concepts allows you to create flexible and smart production systems. This includes using the Internet of Things (IoT), artificial intelligence (AI), data analytics, cloud computing and other technologies to automate processes, optimize production and predict failures.
2	Flexible Manufacturing system (Lean Manufacturing):	Many companies in the field of light industry are implementing the principles of flexible production aimed at minimizing losses, optimizing processes and improving product quality. This includes techniques such as Just-in-Time (JIT) systems, quality management at all stages of production, and continuous improvement.
3	Environmentally sustainable production:	Modern companies in the light industry are increasingly paying attention to the environmental aspects of production. This includes the use of environmentally friendly materials, energy-saving technologies, waste disposal and reduction of the ecological footprint of production.products.

4	Production using 3D printing:	3D printing will allow companies to quickly and efficiently create prototypes, customize production and produce customized parts and products. This is especially useful for the production of small batches of goods or customized products.
5	Using robotic systems and automation:	Robotic systems and automated processes will increase productivity, reduce costs and improve product quality. The company needs to automate various stages of production, from assembly to packaging and warehousing.
6	Using Data analytics and machine learning:	Data analysis and machine learning will allow companies to conduct deeper market analysis, understand customer needs and preferences, predict demand and optimize production processes. That is, to make more informed decisions and successfully adapt to changing market conditions.
Compiled by the author		

Adaptation or implementation of foreign experience in the Republic of Kazakhstan can be useful for the development of light industry in the country.

The development of light industry in most countries is associated with the active intervention of the state in this process. Programs developed in many states, as a rule, involve:

• direct government support for the industry;
• support for enterprises working for export;
• preferential tax policy;
• Customs regulation;
• creation and improvement of production infrastructure;
• Stimulating technological modernization;
• creation of an integrated industry chain with a closed production cycle from the receipt of raw materials to the production and sale of finished products [12].

Based on international experience and taking into account the peculiarities of the light industry in the Republic of Kazakhstan, the following strategies for the modernization and development of the industry can be proposed:

Introduction of modern technologies and automation of production: Investments in modern technologies such as digitalization, robotization and automation will help to increase the efficiency and competitiveness of Kazakhstani enterprises. This will also improve product quality and reduce production costs.

Development of sustainable production practices: Special attention should be paid to sustainable production and environmental responsibility. The use of environmentally friendly technologies, waste recycling and reduction of energy consumption will help make the industry more sustainable and environmentally friendly.

Stimulating innovation and research: Supporting research and innovation in the field of light industry will help stimulate the development of new technologies and products, which contributes to the competitiveness and growth of the industry.

Human resources and education development: Investments in education and professional training will help ensure access to a skilled workforce capable of working effectively with modern technologies and production processes.

Export promotion and development of international markets: The development of export potential and expansion of presence in international markets will allow Kazakhstani companies to increase sales and diversify their income.

Support for small and medium-sized enterprises: Creating a favorable business environment and providing financial support to small and medium-sized enterprises contributes to the development of entrepreneurship and innovation in light industry.

Implementation of quality management systems and standards: The implementation of quality management systems and compliance with international standards will help improve product quality and improve its competitiveness in the global market.

Promoting the development of local markets and brands: Supporting the development of local markets and brands contributes to the creation of unique products and competitive advantages at the national and global level.
These strategies, based on international experience, can help modernize and develop the light industry in the Republic of Kazakhstan, contributing to its sustainable growth and competitiveness.

Conclusion

In the coming years, the development of Kazakhstan's light industry will be influenced by the same factors as in the previous 10-15 years: the tenge exchange rate against foreign currencies, access to financing, as well as the ability of companies to form strong brands, automate production and integrate into international value chains. If the first two factors are beyond the control of manufacturers, then brand creation, automation and the search for large customers are the exclusive responsibility of the business.
The focus in state support on export-oriented manufacturers may stimulate the emergence of 5-10 leading companies in the next decade, which will be able to build a cluster around themselves, including the production of certain types of raw materials and accessories, as well as modernize the personnel training system.
E-commerce is another promising area for Kazakhstani manufacturers. However, in order to conclude contracts with regional online stores like Wildberries, Yandex.Market, Ozon, it is necessary not only to be branded (register a trademark), but also to ensure sufficiently large volumes of shipments to warehouses (and this is additional logistics costs), the goods must be labeled, and supplier firms should take into account large commissions marketplaces. Given these features of the changing landscape of the industry, further state support for domestic light industry enterprises may include compensation to local manufacturers for online store commissions
The international experience of foreign countries in the field of light industry is a valuable source of knowledge and practices that can be successfully applied in the development of an industry on a national scale. Effective use of this experience will improve the competitiveness of Kazakhstan's light industry and contribute to its sustainable development.

Based on international experience and taking into account the peculiarities of the light industry in the Republic of Kazakhstan, we have proposed the following strategies for the modernization and development of the industry:

• Introduction of modern technologies and automation of production: Investments in modern technologies such as digitalization, robotization and automation will help to increase the efficiency and competitiveness of Kazakhstani enterprises. This will also improve product quality and reduce production costs.
• Development of sustainable production practices: Special attention should be paid to sustainable production and environmental responsibility. The use of environmentally friendly technologies, waste recycling and reduction of energy consumption will help make the industry more sustainable and environmentally friendly.
• Stimulating innovation and research: Supporting research and innovation in the field of light industry will help stimulate the development of new technologies and products, which contributes to the competitiveness and growth of the industry.
• Development of human resources and education: Investments in education and professional training will help ensure access to a skilled workforce capable of working effectively with modern technologies and production processes.
• Export promotion and development of international markets: The development of export potential and expansion of presence in international markets will allow Kazakhstani companies to increase sales and diversify their income.
• Support for small and medium-sized enterprises: Creating a favorable business environment and providing financial support to small and medium-sized enterprises contributes to the development of entrepreneurship and innovation in light industry.

• Implementation of quality management systems and standards: The implementation of quality management systems and compliance with international standards will help improve product quality and improve its competitiveness in the global market.
• Promoting the development of local markets and brands: Supporting the development of local markets and brands contributes to the creation of unique products and competitive advantages at the national and global level.
These strategies, based on international experience, can help modernize and develop the light industry in the Republic of Kazakhstan, contributing to its sustainable growth and competitiveness.

Further research in the field of light industry development in the Republic of Kazakhstan may focus on a number of key aspects that will help identify strategies and directions for achieving sustainable growth and competitiveness of the industry. These research areas will help develop an understanding of the key factors determining the development of light industry in the Republic of Kazakhstan, and will help identify strategies and measures to achieve sustainable growth and competitiveness of the industry.

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OMNICHANNEL MARKETING: FOREIGN PRACTICES AND THE POTENTIAL OF ITS DEVELOPMENT AMONG ENTERPRISES IN THE REPUBLIC OF KAZAKHSTAN

N.T. Tulebayeva*, Zh.T.Kozhamkulova
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: tulebaeva_nazym@mail.ru

Abstract

In conditions of heightened competition enterprises face the task of retaining and improving their positions by providing positive customer experience. However, customer behavior tends to change under the influence of various factors. Thus, digitalization appears to be one of such factors that facilitates the development of new approaches in marketing, such as omnichannel marketing. Foreign practices show that many leading companies have begun implementing omnichannel marketing in their businesses.

The purpose of this article is to research the experience of foreign companies having implemented omnichannel marketing and to offer recommendations for fast and flexible adaptation of the approach among enterprises of the Republic of Kazakhstan in modern economic conditions. To achieve this goal, the authors used benchmarking tools to analyze successful cases of foreign companies that have implemented omnichannel marketing. A survey has been done, on the ground of which there were conclusions made that there is a potential of development among Kazakhstan enterprises, and thereafter recommendations for domestic companies were offered based on the analysis of the foreign companies practices. The practical significance of the study is in the fact that the results demonstrate to the companies how the implementation of omnichannel strategy can benefit.

Keywords: omnichannel marketing, marketing, consumer behavior, omnichannel strategy.

Introduction

At present, consumer behavior in Kazakhstan is changing under the influence of modern life realities, enterprises have to offer the customers a higher consumption value as compared with their peers. One of the factors that influenced the transformation of the customer behavior is the development of the country in the sphere of information technologies. The number of smartphones, the Internet and various technologies users is growing constantly, thus promoting the development of omnichannel marketing. The channels of interfacing with customers should be flexible to the clients' preferences: if today's consumers often use their smartphones, then it is necessary to consider this fact when building communications with them.

The research rationale is confirmed by the President of the country Kassym-Jomart Tokayev, who in his message to the people of the Republic of Kazakhstan set a mission to turn Kazakhstan into IT country by increasing the level of digitalization and implementing innovations (Akorda.kz, 2023). After all, the implementation of omnichannel marketing involves the usage of various innovative technologies. Along with that, CEO of ALSI Dauren Khamzin, in his visions of the main trends in the IT industry in Kazakhstan, said that by 2025 many business structures will have switched to Applications (bluescreen.kz, 2022).

The purpose of this article is to research the experience of foreign companies having implemented omnichannel marketing and to offer recommendations for fast and flexible adaptation of the approach among enterprises of the Republic of Kazakhstan in modern economic conditions. The implementation of omnichannel marketing by domestic enterprises will be able to increase the efficiency of the company's activities due to satisfaction of the customers needs.

Literature review

The study of modern literature shows an increasing interest to the research of omnichannel marketing in the process of meeting the needs of customers and increasing their loyalty to the company. Every year the interest to this topic is growing and the number of researchers as well. The transition to omnichannel marketing is closely linked to an appropriate omnichannel strategy, which helps to increase awareness, involvement and loyalty, along with attracting potential customers and increasing sales (Pellicelli, A.C., Garrone, C.R. 2023, Wong, 2020). The confirmation for this were researches that showed that omnichannel clients are more loyal and generate higher profits than customers interacting with only one channel (Verhoef et al., 2015, Park, J., Kim, R. B., 2019). The implementation of omnichannel interaction will lead to an increase in the level of trust in the company among retail customers, therefore the number of purchases made will also increase. (Lestari, A. H. et al., 2023). For example, companies using omnichannel strategies to attract customers retain an average of 89% of their customers, while companies that use it partially or do not use an omnichannel strategy at all retain only 33% (Saleh, K., 2015). In addition, the introduction of omnichannel marketing greatly simplifies the management and monitoring of all business operations on each channel using a single platform, which in turn saves time of operations and increases overall efficiency (Bahri, R. S., 2020). In the study by Moreira et al, conducted on the ground of a systematic review, there is a confirmation of the advantages of implementing an omnichannel strategy, among which improved access to information, increase of communication efficiency, and personalization of services provided to customers are particularly noted (Moreira et al, 2023).

Due to its flexibility and adaptability to changes in the external environment, the omnichannel approach is one of the most effective sales techniques. This approach will be actively used and developed in different business lines (Komarov M. M., Abashidze M. D., 2022). For example, the Natalina K. study among Bank BRI customers, the Grace Phang study among fast food consumers, as well as the Alfina study among clinic patients also unanimously confirm the positive effect of omnichannel marketing on loyalty, customer satisfaction and their positive associations with the brand (Natalina, K., Wahyuni, D.S., 2022; Grace Phang et al., 2021; Alfina et al., 2021). This indicates the great advantages of omnichannel marketing regardless of the field of activity.

However, it is necessary to consider the problems that may arise when implementing omnichannel marketing (Romanchenko T. V., 2018). There are obstacles in the implementation of the omnichannel strategy (Abrudan, I.N. et al., 2020).

After the implementation of omnichannel marketing, a need to assess its effectiveness arises, which is discussed in the study of Mahardikaningtyas R. (Mahardikaningtyas, R., Akromudin, N., 2024).

Thus, the literature review demonstrated a high interest of foreign scientists in this topic, however, this area has not been sufficiently studied by domestic researchers.

Methodology

As research methods comparative analysis, systematization and generalization of the practices of foreign companies using omnichannel marketing were used, for which one of the benchmarking tools was utilized - the study of relevant cases from business practices. Benchmarking is a method of comparative analysis of results, practices and processes within and between organizations and industries to obtain information for improving their own activities (Duka N.A., 2012). In this context, benchmarking for this situation will be considered as a method of comparing, identifying, studying and adapting the best practices and experience of other companies, including foreign ones, to improve the performance of other domestic companies. As the competition is growing now, benchmarking has become one of the most widespread tools for managing companies. It saves time and resources, contributes to the continuous development of the company and increases its efficiency.

There was also a survey conducted in January 2024 with a representative sample among employees of 30 retail enterprises in Almaty. Most of them were representatives of medium and small businesses according to the organizational and legal form - individual entrepreneurs and LLP. They were mainly representatives of clothing and shoe stores, cosmetics, household appliances and food.

This method was used to test the hypothesis suggested by the authors of this article: H1 – there is a potential for the development of omnichannel sales among enterprises of the Republic of Kazakhstan.

Results and discussions

To determine the potential for the development of omnichannel sales among Kazakhstan enterprises, it is necessary for a start to study the foreign practices of the implementation and use of omnichannel marketing.

Alibaba Group is a company that was one of the first to introduce omnichannel marketing. The company's extensive ecosystem includes e-commerce platforms such as Taobao and Tmall, as well as various digital and offline services. It means the company is focused not only on its customers, but also on other participants in business processes. Alibaba uses its large database and technological capabilities to create a comfortable shopping experience for consumers allowing them to seamlessly switch between different channels of interaction (Popova, A., Svitlana Lysa, S., 2023).

The next case is BonLook, a company that sells prescription glasses and sunglasses in physical stores across Canada, as well as through its global internet platform.

BonLook has a function of virtual fitting for online shoppers so they can feel like they are in a store. This allows customers to get a complete picture of how the glasses will fit them. In addition, BonLook offers a personalized iOS app that allows colleagues to help customers choose frames and make a subsequent purchase. If desired, customers can make purchases through the integration of the app with the web store. Besides that, store employees can track inventory and orders in real time.

A complex omnichannel strategy is implemented by BonLook on the Shopify Plus platform. Since the transition from the previous system, the company has experienced a noticeable increase in the average order cost by 18%. Up to 15% of customers make repeat purchases within six months (Glossy Team, 2021).

Pinduoduo's omnichannel marketing strategy is based on a social commerce model. Users can access the platform through a mobile app where they can browse, make purchases and participate in group purchase transactions. The main difference of Pinduoduo from others is social interaction. Consumers can create shopping groups with friends and family using their collective purchasing power to get discounts. This approach not only encourages user engagement, but also uses the power of social media to stimulate sales. Pinduoduo organically combined e-commerce and social media allowing users to share their shopping experiences and recommendations with their network, thereby expanding the reach of the platform (Popova, A., Svitlana Lysa, S., 2023).

Amazon is also one of the successful examples of using an omnichannel strategy. It should be noted that this company is remarkable for its client-oriented approach. The company creates a personalized and relevant user experience at all stages of interaction by means of collected customer data. Amazon's omnichannel marketing strategy is evident in everything from one-button purchases to voice control of Alexa devices. Each channel and each point of contact creates a single path for the client providing a consistent and continuous experience (Passteam, 2020).

Another example of successful use of an omnichannel marketing strategy is Walmart, which is actively developing its physical and online strategies. The company invests in online strategies increasing the number of pick-up points for products and improving online services for customers. To improve the customer experience, Walmart is investing in store modernization, expand of customer pickup, and the introduction of mobile technology. The company is also actively using social media, SEO and digital advertising, as well as experimenting with virtual reality to improve

the buyer experience. Overall, Walmart continues to steadily develop its omnichannel marketing strategy focusing on improving the shopping experience through various channels (Passteam, 2020).

The chain of clothing and household goods stores Stockmann is also a successful example. It was important for the company to create an online product window display so that the customer could view and select a product online, and try it on and pick it up in an offline store. This demonstrates the synergy between online and offline channels. To encourage purchases the company offered offline-only promotions and notifications about them on the website. To increase the customer convenience, a "Favorites" tab was created and the opportunity to make quick purchases without registration on the website. There is an application that has been developed to scan the barcode of the product, add it to the shopping list and get additional information about the product. This example demonstrates the use of omnichannel marketing, where a company integrates various sales channels to create a single customer experience (Passteam, 2020).

IKEA has integrated its in-store experience and online experience with the help of a mobile app. In-store shoppers can use the app to get detailed product information, check stock availability, and even visualize furniture in their home using augmented reality. IKEA teaches us how important it is to use technology to expand the store's capabilities and integrate them with digital technologies (sok.marketing, 2023).

ASOS, a fashion retailer, has implemented omnichannel marketing to create a seamless shopping experience. The ASOS website and mobile app are synchronized in real time, that is, if a customer adds an item to the cart on one platform, it appears in the cart on all platforms. In addition, the company uses customer data to provide personalized product recommendations and conduct targeted promotions. The lesson from ASOS is the proper use of technology for real-time synchronization and personalization (sok.marketing, 2023).

Having studied the experience of foreign companies in implementing an omnichannel strategy based on the above literature sources, the authors compiled a comparative table of channels of interaction with customers among the companies considered, as well as the distinctive features of each of them based on (Table 1).

Table 1. Comparative analysis of omnichannel marketing of foreign companies

Company Name	Channels of interaction with clients									Features
	Online Store	Offline store	Application	Email	Chatbots	Phone calls	SMS/Text messages	Social network	Messengers	
Alibaba Group	+	+	+	+	+	+	+	+	+	The presence of a self-service portal; the presence of an ecosystem that includes not only communication with customers, but also with other participants of business processes
BonLook	+	+	+	+	-	-	+	+	+	Using innovative technologies such as a virtual fitting
Pinduoduo	+	+	+	+	+	-	-	+	+	Social interaction: the ability to make collective purchases; the use of artificial intelligence to analyze chat with customers
Amazon	+	+	+	+	+	+	+	+	+	Personalized approach, using elements of artificial intelligence

Walmart	+	+	+	+	+	-	+	+	+	Using Virtual Reality,
Stockmann	+	+	+	+	-	+	-	+	+	An application that allows you to scan the barcode of a product, add it to your list and place an order later
IKEA	+	+	+	+	+	+	-	+	+	The use of augmented reality technologies, digital technologies
ASOS	+	+	+	+	+	-	-	+	+	Proper use of technologies for real-time synchronization and personalization
Note: Compiled by the authors										

From table 1, we can see that such channels of interaction with customers as online and offline stores, applications, e-mail, messengers and social networks are used by absolutely all companies. And channels such as chatbots, phone calls, SMS/text messages are partially used. The authors assume that this is connected with the fact that the introduction of chatbots requires certain costs and conditions to create and in the future Stockmann and BonLook will launch this channel of interaction. Phone calls and text messages are less popular to use today, as the number of Internet users is growing and they prefer to contact via messengers rather than make or receive calls.

The above examples demonstrate how latest technological advances in mobile computing and augmented reality erase the boundaries between traditional retail and online commerce, allowing retailers to interact with consumers through multiple points of contact. (Brynjolfsson, E. et al., 2013)

Analyzing the foreign experience of successful companies we can conclude that all these companies:

used advanced technologies;
each of them has a mobile application, a website;
they adhere to a personalized client-oriented approach;
they constantly monitor consumer behavior and their preferences;
create a positive shopping experience by ensuring smooth and uninterrupted switching through sales channels.

These recommendations will be useful to study and consider when implementing omnichannel marketing in their buusinesses by domestic companies.

Having studied the foreign experience of companies using omnichannel marketing, the research was further conducted to determine the potential for the development of omnichannel sales among enterprises of the Republic of Kazakhstan.

The study conducted by the authors showed that many domestic enterprises have not yet implemented omnichannel marketing into their activities, however almost all use several sales channels (Figure 1)

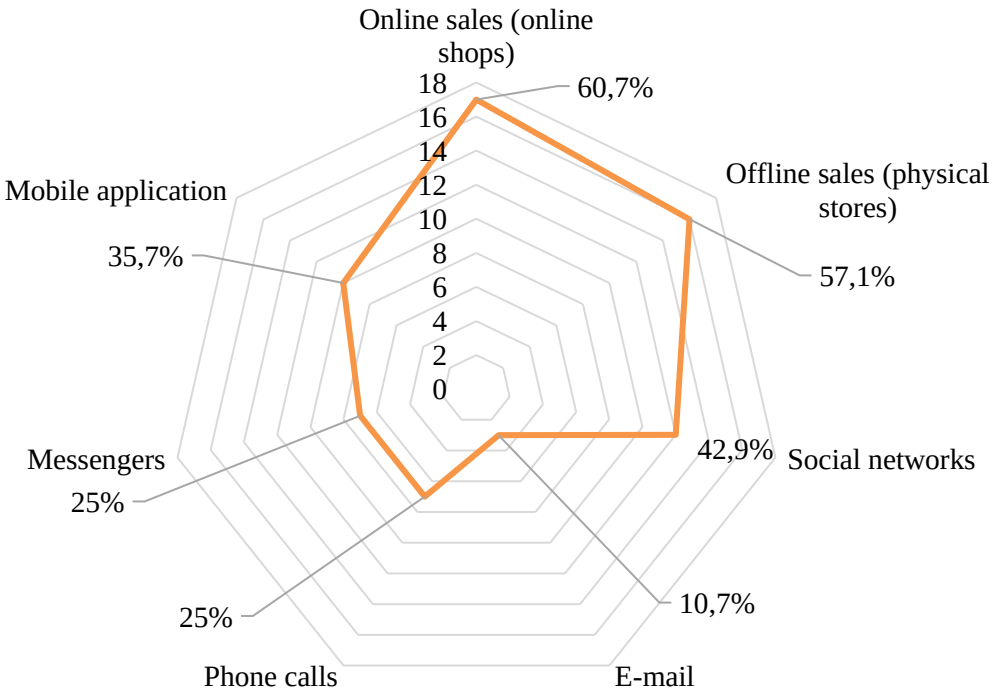

Figure 1. Types of sales channels used by enterprises of the Republic of Kazakhstan

Note: Compiled by the authors based on the results of the survey "Research of business sector on the presence of elements of omnichannel marketing"

From Figure 1 we can see that the most popular sales channels are online and offline sales, social networks and mobile applications. One of the reasons for the predominance of online sales is the Covid-19 pandemic, during which many companies had to switch to online mode. Offline sales are a traditional form of sales, which still do not give up their positions. This is due to the need to see the product and test it. Sales through social networks are now gaining more popularity as consumers spend a lot of time on social networks. If earlier social networks were mostly used for leisure and entertainment, now it is a large platform for making various kinds of purchases.

The survey data shows that 25% of respondents use only one sales channel, 21% use two channels, 18% use three sales channels, 3% use four channels and the remaining 33% use five or more sales channels. This is due to the increasing use of the Internet, various technologies and changing consumer behavior. Therefore, many domestic enterprises have begun implementing additional sales channels. However, the interaction between sales channels is still problematic. The confirmation to it is in the following Figure 2.

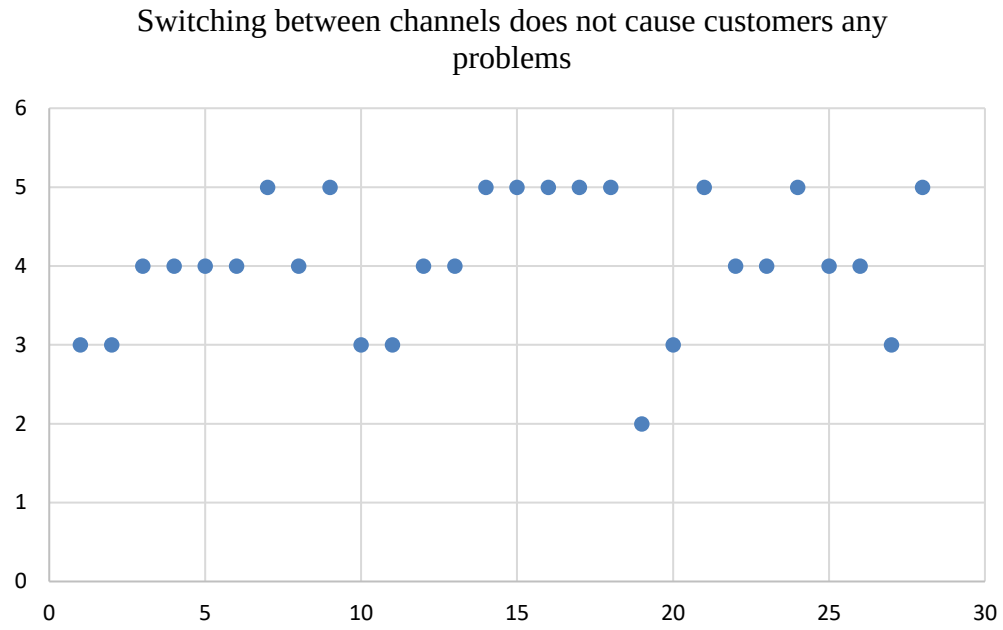

Figure 2. Interaction of channels in enterprises of the Republic of Kazakhstan

Note: Compiled by the authors based on the results of the survey "Research of business sector on the presence of elements of omnichannel marketing"

Figure 2 shows that only 1/3 of the respondents believe that switching between channels does not cause any problems for customers, while the rest of the respondents had doubts and could not fully agree with this statement. This indicates that many domestic enterprises are in multichannel mode, that is, they use different sales channels separately.

However, there are also successful cases of the introduction of omnichannel marketing in some enterprises of the Republic of Kazakhstan. For example, a well-known online store Flip.kz , which has several channels of interaction with customers. When ordering goods online it is possible to pick them up at a physical store. Or when buying any goods in a physical store, the purchase information is automatically displayed in the client's personal account. Besides that, they use mailing campaign and sending messages to the phone, which are also one of the most effective sales channels. Based on the collected data about purchases and customer preferences, the store provides personalized shopping recommendations. The store also has its own application, and in offline stores they use technologies with which you can check the price, availability of goods in other stores or warehouses.

Another example of using omnichannel marketing tools is the Zara clothing store. Zara customers can make purchases both online (via the website or app) and in physical stores. Both channels interact with each other, for example, by ordering clothes online, it is possible to deliver them to an offline store, where the customer can try it on, then keep the item or claim a refund on the spot. There is also a possibility to book a fitting room in the offline store through the app. In offline stores they use technologies with which you can check the price, the availability of goods in other stores or warehouses, and even search within a store.

The Golden Apple cosmetics store has similar characteristics, also using several sales channels, such as online and offline stores, an application, a website, and a mailing list. When buying an item in a physical store, the purchase is displayed in the client's personal account, which allows to collect data about the client's preferences. There is also a personalized mailing with offers of products similar to what the customer has bought before.

Thus, the study of foreign experience in the implementation and use of omnichannel marketing has shown that this practice has a positive dynamics, which leads to an increase in sales volume and customer loyalty. In addition, the study conducted by the authors showed that there is a potential for the development of omnichannel sales among enterprises of the Republic of

Kazakhstan. Therefore it is possible to identify general recommendations for the implementation of omnichannel marketing for domestic enterprises, which in many ways have not yet begun to introduce omnichannel into their activities. As the research showed, the number of enterprises using the omnichannel strategy is very low, in many cases they are branches of foreign companies. For implementing omnichannel marketing in an enterprise, to process a large amount of customer data through various programs financial resources are necessary. Besides, there is a need to integrate communication channels with the client, and for this we need a platform that could combine channels such as Shopify, Mindbox, Emarsys, Altkraft, eSputnik, Exponea, Synerise, SAP Hybris, SendPulse and others. The use of innovative technologies, artificial intelligence, augmented reality technologies, gamification, etc. is also welcome. This will give companies a great competitive advantage, as well as increase interest in making purchases.

One of the important conditions for the implementation of omnichannel marketing is constant monitoring of customer needs, it is necessary to constantly conduct researches on consumer behavior and which channels of interaction are preferable for it. It must be kept in mind that in the conditions of omnichannel, the system is built around the consumer. It is also an indispensable condition to introduce technologies and programs for monitoring and analytics that will track the effectiveness of customer interaction on all sales channels.

Conclusion

In the conditions of modern reality, where changes in consumer behavior are constantly taking place under the influence of various factors, enterprises need to be flexible and adaptive. There is a process of digitalization everywhere, within which the approaches to attracting and retaining consumers are changing. One of these approaches is omnichannel marketing, whose task is to integrate channels and create a united seamless communication. During the study of foreign practices in the use of omnichannel marketing, it was revealed that the implementation of an omnichannel strategy, namely, the presence of various channels of interaction with the consumer, as well as the integration of these channels and their operation as a whole, lead to the creation of a positive customer experience. Along with that the level of satisfaction and loyalty to the company increases.

The research also revealed that most domestic companies do not use omnichannel marketing. Some of them work in multichannel mode. In this regard recommendations on the implementation of omnichannel marketing were given. The practical significance of the study is in the fact that the results demonstrate to the companies how the implementation of omnichannel strategy can benefit. Enterprises need to implement several different points of interaction with the client, and ensure that the channels work in an integrated manner, as this is the basis for obtaining a good customer experience.

Due to omnichannel strategies domestic enterprises will be able to effectively attract new customers and retain existing ones through various sales channels, including websites, mobile applications, social networks, online and physical stores. As a consequence this will lead to sales increase due to a personalized and customer-oriented approach. However, these enterprises need to be ready to invest financial resources to create conditions for the implementation of omnichannel marketing.

It is worth noting that in addition to the advantages, when implementing omnichannel marketing, enterprises may face a number of constraining problems. This topic has opened up new directions for future researches.

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NAVIGATING THE GREEN HORIZON: EXPLORING SUSTAINABLE FINANCE IN TODAY'S WORLD

Rimma Sagiyeva*, Chingiz Zhumagulov, Aigerim Niyazbek
Al-Farabi Kazakh National University, Almaty, Kazakhstan.
*Email: rimmasagiyeva@gmail.com

Abstract. Sustainable finance, integrating environmental, social, and governance (ESG) principles into business decisions and investment strategies, plays a pivotal role in fostering long-term economic growth and resilience. This paper leads to the literature by taking a broader view of EM sustainable finance market and analyzing its evolution across multiple dimensions. This article examines the evolution and implications of sustainable finance, particularly in the context of emerging markets like Kazakhstan. Drawing on a comprehensive review of literature and recent developments, the article highlights the multifaceted impact of sustainability considerations on financial stability, environmental protection, and social equity. It discusses the structural deficits and funding challenges facing emerging markets, juxtaposed with the growing momentum towards sustainable finance initiatives. Furthermore, it explores Kazakhstan's progress in implementing ESG principles, including regulatory frameworks, green financing mechanisms, and institutional support. The article underscores the importance of robust strategies and international collaboration in advancing sustainable finance agendas, promoting inclusive growth, and achieving carbon neutrality objectives.

Keywords: Sustainable finance, ESG principles, Emerging markets, Financial stability.
JEL codes: G23, G28, Q54, Q56, O16

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Introduction

Originating from research in the 1970s, the notion of sustainable and ethical investing has played a large role in the finance sector for decades (Friede et al., 2015; Naidoo, 2020). The development of mutual funds dedicated to ethical or environmental investments traces back to the early 1990s (O'Rourke, 2003; Weber, 2005). It has also long been argued that the intermediary role that banks play in society makes them fundamental in achieving sustainability (Jeucken, 2001). Corporate social responsibility (CSR), sustainable and responsible investing (SRI) and the integration of so-called 'environmental, social, and governance' (ESG) factors into portfolio management are established and a well-studied phenomena (Friede et al., 2015; O'Rourke, 2003; Waddock and Graves, 1997), and many approaches share a common core of positive and negative screening, using social and/or environmental criteria (O'Rourke, 2003).

Recently, it has been increasingly argued that the finance sector is centrally placed and can be a driver in transforming our economies to become more sustainable per se (Naidoo, 2020). Prominent private and political initiatives, such as the United Nations' Principles for Responsible Investment,1 the Financial Stability Board's Task Force on Climate-related Financial Disclosures,2 and a range of initiatives in the European Union are all grounded in the potential of finance as a driver of sustainability. The European Commission frames it such that the finance sector can (1) "re-orient investments towards more sustainable technologies and businesses," (2) "finance growth in a sustainable manner over the long term," and "contribute to the creation of a low-carbon, climate resilient and circular economy." In concrete terms, a call for a stronger taxonomy defining what economic activity should be considered sustainable was a key recommendation from the EU High-Level Expert Group on Sustainable Finance (HLEG, 2018), and forms the centrepiece of the EU's legislative package coming out of its Action Plan on sustainable finance. Given the enormous levels of investment required to meet the global climate and sustainability targets of the Paris Agreement

and Agenda 2030, a better understanding of what role the financial sector can play in accelerating the pace of transition towards sustainable economies is clearly needed.

While most current global greenhouse-gas emissions originate from wealthier countries – the top 10% of the population emits almost half of the global total – the most acute needs for finance are in lower-income contexts (Chancel, 2022). Similarly, the value at risk from climate impacts is high among wealthy countries, but they also have less vulnerability and greater ability to finance adaptation domestically.

Enormous infusions of capital are needed if the world is to meet the UN's seventeen ambitious Sustainable Development Goals (SDGs) by the aspirational deadline of 2030. The current finance gap is estimated at $2.5 trillion per year (OECD, 2020). An analogous "adaptation gap" exists in fulfilling promises of North-to-South aid and investment for reducing vulnerability to climate change impacts (Musah-Surugu 2017). UNEP (2021) estimates a need of $155 billion to $330 billion per year for climate adaptation by 2030, yet today's "climate finance" to developing nations (adaptation plus mitigation) is just under $80 billion per year. Prospects for formal assistance have worsened as a result of the COVID pandemic, with an interagency task force, coordinated by the UN, warning of the potential for a lost decade (UN, 2021)

Literature review

Sustainable finance consists in the incorporation of environmental, social, and governance (ESG) principles into business decisions, economic development, and investment strategies. Research has documented how sustainable finance can generate public good externalities (Principles for Responsible Investment 2017; Schoenmaker 2017; United Nations 2016) where actions on an extensive set of issues generate positive impacts on society.

Sustainability consideration impact financial stability through multiple channels (IMF 2019, 2020, and 2021):

(1) Environmental risk exposures can lead to large losses for firms and climate change can entail losses for financial institutions, asset owners, and firms (IMF, 2020). Garanin et al. have shown that, while climate risks may seem abstract, losses in the event of a natural disaster can lead to a firm bankruptcy; (2) Governance failures at banks and corporations have contributed significantly to past financial crises, as evident during the Global Financial Crisis in 2008. López, Garcia, and Rodriguez (2007) have shown how corporate social responsibility influences the performance of stocks; and (3) Social risks in the form of inequality can contribute to financial instability by triggering a political response of easier credit standards to support consumption while the incomes for middle and lower-income groups remain stagnant (Rajan, 2010).

Sustainable finance markets can help spur positive changes to address environmental, social and governance issues. For instance, issuers of green bonds, green loans, and sustainability-linked loans tend to reduce their emission intensity over time at a faster rate than other firms (Schmittmann and Han Teng, 2021). Investor appetite for ESG finance is key to affordable environmental and societal transition, which has not yet reached the optimal level. They explained it through the perspective of institutional investors and suggested the need to work beyond the existing governance frameworks, which are incongruence with the sustainability problems facing institutional investors. Elmalt, Igan and Kirti (2021) find weak link between the ESG scores and emissions of large emitter, primarily on account of lack of consistency in reporting, and hence indicating widespread greenwashing of ESG investments.

Within sustainable finance, climate finance is of a particular importance (IMF, 2021). The Bank for International Settlements (BIS) conducted a survey of Basel committee members in 2020 on climate- related financial risk initiatives. The responses indicated that, while the membership acknowledges climate change as a systemic risk to financial stability and sees the measures to mitigate climate changeas a desirable part of their regulatory or supervisory framework, however these measures remained a guidance as the members shied away from incorporating it into the prudential capital framework. The Network for Greening the Financial System (NGFS), a group of central banks and financial supervisors, has expressed concern that financial risks related to climate

change are not fully reflected in asset valuations and has called for integrating these risks into financial stability monitoring (NGFS, 2019).

Trends in energy transition investment and commitments to ambitious reductions in emissions across governments and the private sector indicate that there is an unprecedented momentum behind the transition to a low-carbon economy. These issues are particularly relevant for emerging markets (EMs), which have until the past few years played a minor role in global sustainable financial markets (as discussed in depth in the next section). A number of EMs are already seizing this opportunity, but the risks of seeing lower-income economies fall further behind are also increasing. Most emerging economies do not have the budgetary space to deploy the kind of fiscal support that advanced economies can provide—as evidenced during the COVID episode. This suggests that the private sector needs to play a crucial role in driving sustainability, highlighting the importance of creating liquid and deep sustainable finance markets in EMs.

Existing literature has identified a number of issues related to climate transition in the developed world, spanning from insufficient climate finance, cost of transition (Bachner et al., 2019), and policies. In a technical note dated Oct 2021, OECD estimates the climate finance needed to be mobilized in developed economies to EM under different scenarios by 2025. While most researchers and market participants agree that the developed world has fallen short on its promise to mobilize funds to support low-carbon transmission, in emerging markets, there is little analysis on sustainable finance markets in EMs. In his paper on Green Bonds markets of developing countries, Josue Banga examines the role of green bonds, noting rising investor appetite for green bonds on the back of increasing climate awareness. Further, Jakob et al. estimate the transfers needed by developed countries to developing countries under the United Nations Framework Convention on Climate Change. EM sustainable finance markets have grown impressively over past few years and are getting increasingly complex.

Metodology

This article employs a qualitative research methodology to analyze the evolution and implications of sustainable finance, particularly within the context of emerging markets like Kazakhstan. The methodology involves a comprehensive review and synthesis of existing literature, academic research, industry reports, policy documents, and regulatory frameworks related to sustainable finance, ESG integration, and emerging market dynamics.

The research process begins with a systematic literature review to identify key themes, trends, and insights pertaining to sustainable finance and its impact on financial stability, economic development, and environmental sustainability. This review encompasses peer-reviewed articles, books, policy papers, and reports from reputable institutions, providing a robust foundation for understanding the theoretical underpinnings and empirical evidence surrounding sustainable finance.

Furthermore, the methodology involves gathering empirical data and case studies to illustrate the implementation of sustainable finance practices in emerging markets, with a specific focus on Kazakhstan. This includes analyzing regulatory reforms, market developments, and institutional initiatives aimed at promoting ESG integration, green financing, and sustainable investment strategies within the country.

Additionally, the methodology incorporates interviews or consultations with key stakeholders, including government officials, financial regulators, industry experts, and representatives from financial institutions and civil society organizations. These interactions provide valuable insights into the current state of sustainable finance in Kazakhstan, as well as the opportunities and challenges faced by various stakeholders in advancing sustainability agendas.

Through a rigorous analysis of literature, empirical data, and stakeholder perspectives, this article aims to provide a comprehensive understanding of sustainable finance dynamics in emerging markets, highlighting the role of Kazakhstan as a case study. By employing a multidimensional approach, the methodology seeks to offer valuable insights and recommendations for policymakers, practitioners, and researchers seeking to promote sustainable finance initiatives and drive positive environmental and social impact in emerging market economies.

Results and Discussion

Drivers of Sustainable Finance in EMs?

Structural deficit of funding and progress on sustainability

The tension between adapting to a carbon-neutral global economy, while simultaneously containing energy prices, maintaining economic growth and creating jobs, constitutes today's principal challenge for countries around the world. In emerging markets, the issues are even more acute and immediate as developing countries generally lag on education levels, shallower capital markets, and less flexible workforce. By contrast, with a few notable exceptions (such as fast-growing technology sectors in Asia), a large share of emerging market activity still involves fossil fuel production or rests upon carbon- and water-intensive industries, such as mining, agriculture and heavy industry. Developing nations are also more reliant upon cheap, often subsidized, energy for both their producers and consumers. The starting point for many developing economies—with much lower incomes per capita, young and rapidly growing populations, archaic and dilapidated infrastructure—often implies trade-offs between short-term growth and stability versus long-term environmental protection. It is a difficult balance to strike, and the devastation on emerging economies from COVID has in many ways exacerbated these strains.

This economic model of reliance on cheap fossil fuels now carries enormous risk in a world undergoing a fundamental energy transition, which is estimated by the International Energy Agency (IEA) to cost nearly

$4tr annually through 2050. A recent analysis by Carbon Tracker estimates that under the IEA's low carbon assumption (oil prices average $40/bl), the 40 countries that are most economically reliant on hydrocarbon exports would lose $9tr in revenue by 2040, with 95 percent of these countries being an emerging market. This shows the importance of investing in the new-economy initiatives and safeguarding against transition risks for emerging markets. This also shows that EMs' growth model is also significantly exposed to the 'brown' technologies to begin with – thus highlighting the potential scope of improvement. The IEA also identifies the heavy reliance that EMs have had on public finance for large-scale projects and calls for greater policy initiative to attract larger private investment, which would be instrumental to bring about the said energy transition.

Commentators have also recognized the need to reorient financial markets to meet global sustainable development needs and deliver long-term and resilient growth. By 2050, the United Nations predicts that an additional 2.5 billion people will migrate from rural to urban areas, with nearly 90 percent of this increase concentrated in growth and emerging markets.

Along with lagging on the sustainability progress, emerging markets also suffer from a structural deficit on funding. Development of local currency funding market is a long-standing development goal. Indeed, the current state of development funding shows a stark contrast between the estimated cost of financing the Sustainable Development Goals (SDGs) through 2030 and the available financial resources. The United Nations Conference on Trade and Development (UNCTAD) says achieving the SDGs will cost between US$5 and $7 trillion annually, with an investment gap in developing countries of about U.S. $2.5 trillion.

Outperformance of ESG Indices may be adding to the recent momentum

The broader investor optimism about the segment is also reflected in a steady outperformance of ESG assets over the broader indices across asset classes. This might reflect the fact that ESG issuances were earlier dominated by higher-credit quality issuers, or the sectoral composition of these ESG indices which are dominated by the tech sector. Bonds: Since 2019, the period over which more than half of EM ESG bonds have been issued, the average annualized return of the ESG segment is 2.1ppts higher than the corresponding broad indices. Since the COVID-19 pandemic this return differential has receded to a still notable 1.5ppts (Figure 1). Equities: For major EMs18, the average annualized return for ESG sub-indices since Jan 2020 is 17 percent, almost 7ppts higher

than the broad indices. While this is exaggerated by broader equity indices yielding negative returns in Chile. the average return differential since Jan 2020 still stands at meaningful 5.2 ppts for other major EMs, i.e., China, India, Mexico, and South Africa (Figure 2).

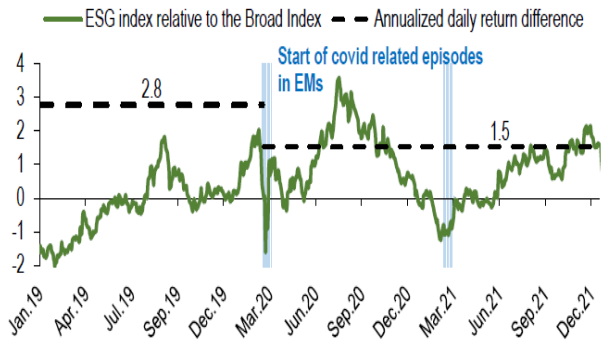


Figure 1. Bond returns: EM ESG vs the Broad Index (Indices = 100 on Jan 1, 2020 percent)

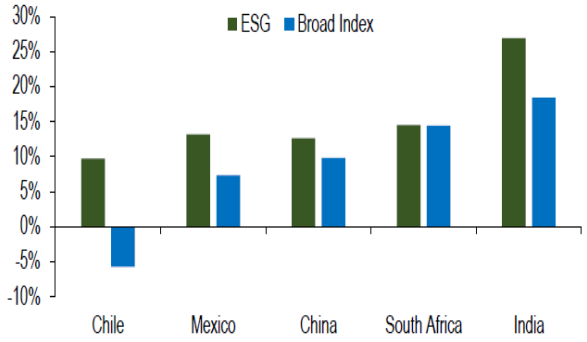


Figure 2. Equity Performance: ESG vs the Broad Index (Annualized Returns since Jan 2020)

Sources: Bloomberg; and authors' calculations

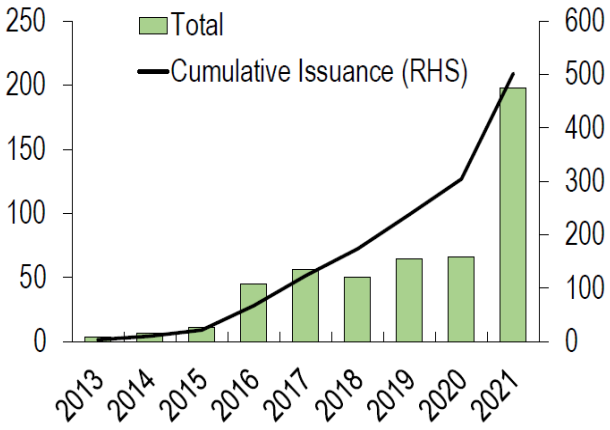
Note: For South Africa equity returns are calculated since June 2020. In panel 1, JP Morgan's ESG EMBI Global Diversified index is used to measure ESG bond performance and JP Morgan's EM Equal Weight index is used for broader EM bond performance. TheJ.P. Morgan ESG EMBI Global Diversified Index (JESG EMBIG) tracks liquid, US Dollar emerging market fixed and floating-rate debt instruments issued by sovereign and quasi-sovereign entities.

Growth of the EM ESG Financial Markets

Deepening market: Aggregate flows as well as an expansion across regions

2021 turned out to be a breakout year for sustainable financial markets in EMs. EMs saw a strong rebound in ESG flows, on the back of exceptional bond issuance volumes and sustained strong flows into equities. Gross flows into ESG related bonds were almost $200bn in 2021 against $66bn for 2020 (Figure 3). This accounts for ~40 percent of the total cumulative issuance of ~$500bn since 2015. The sharp acceleration in 2021 comes after sustainable finance strategies became more mainstream in EMs, driven in part by pandemic induced demand, as also reflected in the use of green borrowing strategies in LATAM. The share of EM in global ESG issuance had fallen from 31.6 percent in 2016 to 8.7 percent in 2020 reflecting an early lead by the advanced economies when it comes to ESG strategies. However, with EM bond issuance growing at 200 percent in 2021, EM's share in global bond issuance has risen to 12.8percent for 2021 with this being the first year where EMs have gained market share at the expense of AEs since 2016. ESG equity flows, at $25bn, were slightly ahead of the record flows of 2020. This led to total assets under management rising to almost $150bn (Figure 4). The cumulative ~$50bn flows in last 2 years compare with $20bn in the last 6 years. The rising penetration is also reflected in a sharp rise in the proportion of EM ESG AUM and the number of funds, which rose by 1.2 ppts and 1.9 ppts to 6.4 percent and 7.8 percent, respectively.

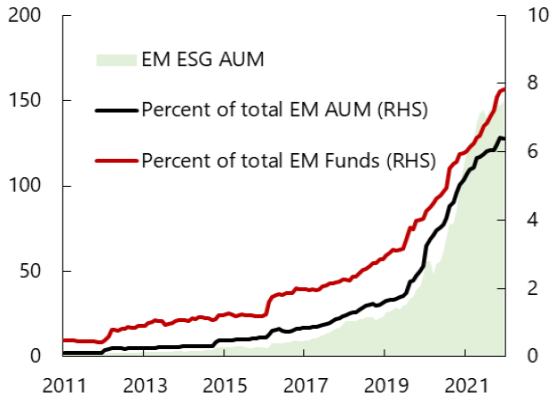
Figure 3. EM ESG Bond Issuance
(USD bn.)



Source: EPFR, and authors' calculations

Figure 4. EM ESG Equity Funds

(USD bn, percent; Based on EPFR data)



The sharp rise in the relevance of ESG instruments is also reflected through the changing financing composition for EMs. ESG instruments (for EMs ex China) account for almost 4 percent of the total issuance in 2021, which compares with around1 percent for the last five years (Figure 5). This shift is even more stark in the offshore markets with ESG instruments accounting for a meaningful 17 percent of the total issuance in 2021. This compares with just c4 percent over the last 5 years.

Figure 5. ESG Issuance as a prorportion of the total issuance
(Percent; for EMs ex China)

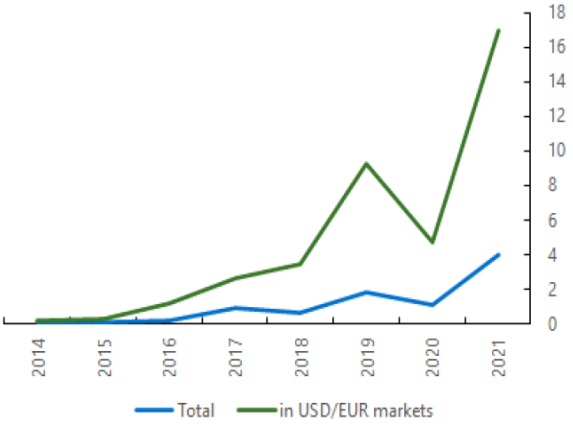
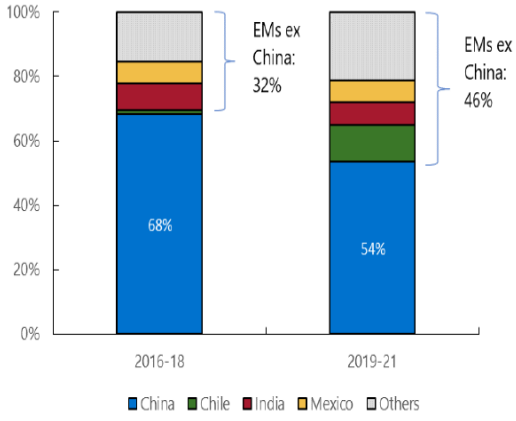


Figure 6. Yearly ESG debt issuance in EMs, by region
(USD Billion, percent)



Sources: BloombergNEF, and authors' calculations.

China remains a dominant player in the ESG universe, but other EMs are picking up sharply (Figure 6). With almost $110bn ESG issuance in 2021. China now stands in the league of leading AE issuers like U.S., France and Germany, becoming the third largest issuer of ESG debt in the world in 2021. Furthermore, as ESG debt issuance of China is primarily in green bonds, it is now also globally the second largest issuer in the segment—cumulative green bond issuance of almost ~2 percent of GDP. At the same time, ESG issuance for EMs ex China rose to $90bn in 2021 (vs average of $25bn over the last five years), increasing their proportion of total EM issuance to 45 percent in 2021 vs ~30 percent over 2016–18. Green bond issuance also grew sharply to ~$20 bn in 2021—vs average of $11bn in the last five years. While the rise in the ESG issuance is promising,

the breadth of participation is still not very high as the number of issuers remains low and concentrated amongst a handful of entities in most markets.

Chile and Peru are clear leaders within the EMs excluding China. Chile has issued sustainable debt equivalent to almost 12 percent of its GDP (Figure 7) which is a significantly higher than the peers and is followed by Peru and Mexico (at ~2 percent of GDP each). Analysis also shows that there is a significant recent acceleration for many EMs including Chile, Peru and Turkey with 2021 constituting more than 50 percent of their cumulative issuance. Looking from a complementary lens, Chile (and to a smaller extent Peru) has a significant amount of ESG instruments (as a proportion of its overall issuance) in both domestic and offshore issuances (Figure 8). This contrasts with India and Poland where ESG instruments dominate the offshore financing mix but relatively little in the total issuance. It might reflect the role played by a different set of investors in this segment.

Figure 7. Yearly ESG debt issuance in EMs, by region
(USD Billion, percent)

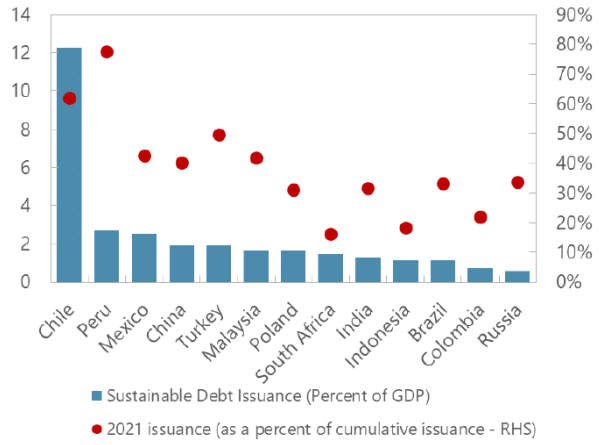
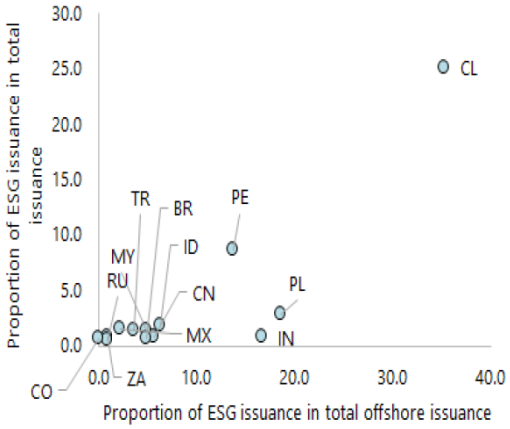


Figure 8. ESG Issuance as a prorportion of the total issuance— Country level
(Percent)



Sources: BloombergNEF, and authors' calculations.

Kazakhstan on the way of ESG principles implementation.

There is an increase in institutional support for the development of sustainable finance in Kazakhstan:

1. A new Environmental Code was adopted, providing for the dissemination of "green" investments based on the use of "green" bonds and "green" loans in January 2021.
2. The Decree of the Government of the Republic of Kazakhstan No. 996 approved a green taxonomy for the classification of green projects to be financed through green bonds and loans at the end of 2021.
3. The concepts of "green" projects and "green" taxonomy were introduced into the state program "Business Roadmap – 2025". The Government Decree No. 736 of 13.10.2021 subsidised the interest rate on loans for implementing "green" projects and the coupon rate on "green" bonds.
4. A Strategy for Achieving Carbon Neutrality until 2060 was adopted, providing comprehensive decarbonization measures in various industries and emphasising the need to update production processes at the beginning of 2023. By 2030, 10 billion US dollars will need to be invested, and by 2060 - the remaining 600 billion US dollars. It will be aimed at the development of low-carbon technologies in critical sectors such as energy, industry, transport, agriculture and building construction to achieve "clean zero".

Following the Environmental Code, Kazakhstan has introduced the Kazakhstan Unit Trading System based on the "Cap and Trade" principle. The main objective of this system is to systematically reduce greenhouse gas emissions using market methods to stimulate market

participants. The primary industries covered by the emissions trading system are electric power industry, oil and gas industry, mining industry, manufacturing industry, chemical industry, and metallurgy.

5. The Agency for Regulation and Development of the Financial Market of the Republic of Kazakhstan approved a Roadmap for implementing ESG principles for the Kazakh financial sector at the beginning of 2023. It contains step-by-step plans for the next three years. In particular, the objectives of financial market regulation for the implementation of ESG principles have been clarified:

- the ESG risks exposure information Disclosure by financial institutions;
- the ESG risk management and the carbon footprint of the loan portfolio assessment;
- Implementation of ESG principles in the risk management system and corporate governance;
- the ESG risks monitoring and integration into the supervision system.

6. Along with activating Kazakhstan's stock markets to attract sustainable investments, measures are being implemented to introduce ESG practices in the banking sector.

The first issue of "green" bonds was placed by

JSC "Development Bank of Kazakhstan" on the siteof the Kazakhstan Stock Exchange, with a volume of 10 billion tenge in March 2023. The European Bank for Reconstruction and Development provided financing of up to 150 million US dollars to financial institutions participating in the Kazakhstan Green Economy Financing Facility II (GEFF Kazakhstan

II) project for lending to small and medium-sized businesses and individuals for developing the local market of "green" technologies, reduce the risks of climate change, and spread circular businesses and promoting gender equality.

Banks can achieve significant decarbonization in relation to their activities related to energy con- sumption and transport use. However, the primary influence of a commercial bank on the decarbon- ization of the economy lies in indirect emissions: in connection with the provision of financial, insur- ance and other services to companies in the real sec- tor of the economy, which is directly responsible for direct GHG emissions. By responsibly using these tools, by strategically redistributing capital from carbon-intensive projects in favor of activities that contribute to accelerating decarbonization, banks are able to directly influence the speed at which the world economy achieves the goals of the Paris Agreement on Combating Climate Change.

Comply with the world's leading practices and expectations of the Regulator of the Republic of Kazakhstan:

Conducting ESG diagnostics, developing a roadmap and assessing the Bank's impact (Basic level):

- Development of a plan for quick wins – targeted ESG KPIs;
- Self-impact assessment and USP assessment;
- Building an ESG aspects management system;
- Implementation of ESG principles in the risk management system and corporate governance.

Development of approaches and tools for Responsible Financing Principles, ESG-scoring of Bank borrowers, which includes comprehensive ESG transformation of the Bank for full compliance with the requirements of the regulator in the long term and automation of processes and data in the field of ESG, for the collection, consolidation and management of ESG data for reporting according to international standards, carbon footprint assessment and climate stress testing.

Development of Climate strategy, scenariomodelling and climate stress testing.

Thus, in sustainable finance development and integration of ESG principles in the financial sector on the beginning stage financial institutions have started adding their plans to promote sustainable investments and ESG movement in the form of reports. However, it is too early to talk about actual results. For effective dissemination of the process and further implementation of national sustainable finance development goals, it is necessary to use the best international practices.

Establishing a comprehensive and well-defined roadmap is essential for implementing sustainable finance strategies, encompassing the integration of ESG principles within financial institutions. This program aims to enhance both funding opportunities and these establishments' long-term viability and competitiveness.

Table 1 - Kazakhstan's carbon neutrality strategy's directions by sector

Sector	The main directions of Kazakhstan's carbon neutrality strategy
Energy industry	Decarbonization of primary energysupplies Decarbonization of electric and thermal energyproduction Decarbonization and highly efficient use ofenergy
Industry	• Reducing the consumption of primary materials by improving product design and using alternative materials • Increasing the volume of waste processing to reduce the need for processing raw materials as the primary source ofemissions Introduction of new zero-emission production technologies
Transport	•Reducing the need for car trips Shift towards alternativefuels Improving urban planning and mobility
Agribusiness	Sustainable agriculture and livestockmanagement Improvement of irrigationsystem Sustainable forest management andreforestation
Building	Energyefficiency Transition to heating and energy supply based on renewable energysources

Conclusions

Sustainable finance is a key focus area for global investors and policy makers. This working paper is one of the first studies to focus specifically on sustainable finance markets in emerging markets. 2021 was a breakout year for EM ESG markets with record flows across asset classes, most notably the fixed income. Sustainable finance markets expanded not only in size but also across other dimensions—for example, with a meaningful pickup in issuance in EMs excluding China (China was the second largest issuer globally in 2021), and sustainable debt excluding green bonds. The greater share of ESG instruments in the EM financing mix, especially foreign currency, also raises issues related to financial stability in emerging markets. Sustainable finance markets in EMs differ from those in advanced economies as EM ESG ecosystem is still more concentrated, embeds a significant risk premia, and is dominated by the financial sector. EMs also face a number of challenges including data disclosure quality, data standards and declining ESG scores. The paper underlines key policy suggestions that can help address the challenges and help in the development of the sustainable finance ecosystem in EMs.

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TACKLING SUSTAINABILITY CHALLENGES IN CONSTRUCTION COMPANY INTERNATIONALIZATION THROUGH INNOVATION PATH

D. Jiang*
Al-Farabi Kazakh National University, 71 al-Farabi Ave., Almaty, Republic of Kazakhstan
*e-mail: jiangdekun0909@gmail.com

Abstract.

With the acceleration of globalization and the rapid development of technology, the internationalization of construction enterprises has become a trend. Not only the large-scale general contractors need to plan their own development strategies in both domestic and foreign markets, but also the small and medium-sized professional contractors are bound to find their own survival space in the international contracting chain. Currently, there are still some challenges and deficiencies in the sustainable development of construction companies, such as poor information transfer, inefficient decision-making, and irrational utilization of resources, etc. In order to cope with these challenges, the innovative path has become an urgent issue. The article will analyze the status condition of the current internationalization management mode of construction engineering companies and discuss some innovative development directions, aiming to promote the further optimization and enhancement of the internationalization development of construction companies in order to adapt to the increasingly complex and changeable international construction environment.

Keywords. Management model; enterprise internationalization; international construction company; innovation path; digital transformation

JEL codes: L74;M16;N60;O32

1 Introduction

In both developed and developing countries, the construction industry plays an important role in the economy. Hillebrandt (1990) has pointed out that the construction industry is vital to a country in terms of gross domestic product (GDP), investment in fixed assets, or in terms of solving the problem of employment. Levels of development of the construction industry vary from country to country, as does the degree of liberalization of the construction market. However, the liberalization of trade in construction services and international competitiveness in the construction industry have emerged as a general tendency. Due to the special characteristics of construction products, the international competition of construction enterprises has different characteristics. For instance, models such as build-operate-transfer (BOT), private financing of public works (PFI), etc. can be adopted.

The integration of the world economy is accelerating, and the cross-border engineering and construction services are becoming increasingly frequent. At the same time, the international contracting market is undergoing tremendous change and development. As a consequence of globalization, the international engineering contracting market provides opportunities and challenges for all countries. With the enhancement of global environmental protection awareness, the international community is constantly raising the requirements for the environmental impact and sustainable development of engineering projects. Therefore, in the contracting process, international construction companies need to pay attention to environmental protection, resource utilization and ecological balance to ensure the sustainable development of construction projects. At the same time, under the promotion of the "Belt and Road" initiative, international construction companies are facing more technological challenges. The application of advanced technology and digital tools has become the key to improve project quality, reduce costs and enhance efficiency.

The purpose of this paper is to analyze how innovative paths can help overcome the challenges of sustainable development in the internationalization of construction companies. The paper analyzes the current situation of international development of construction companies as well as proposes competitive optimization strategies for the development trend of the international contracting market. This approach is important for both theory and practice.

2 Literature review

The internationalization of construction companies has been a topic of interest in various regions around the world. Crosthwaite (1998) conducted a study on British construction firms from 1990-1996, highlighting that market demand is just one of many factors influencing overseas location decisions. Abdul-Aziz et al. (2010) emphasized the importance of top management's perception in the internationalization of Malaysian contractors, particularly in the realm of international entrepreneurship. Furthermore, Scherer (2012) discussed the internationalization of Brazilian companies in the heavy construction sector through foreign direct investment, emphasizing the need for broader studies in this area. Horta et al. (2016) delved into the impact of internationalization and diversification on the financial performance of construction industry companies, noting a nonlinear relationship with performance. Korzh et al. (2019) discussed the prospects and risks of creating an innovative environment to stimulate the internationalization of industrial companies in Ukraine. These studies collectively contribute to the understanding of the internationalization strategies and processes adopted by construction companies in different regions, shedding light on the various factors influencing their decisions and outcomes.

The concept of sustainable development for construction companies has been a growing area of interest in recent years. Lu et al. (2016) proposed a regenerative sustainability framework for Architecture Engineering and Construction (AEC) organizations, emphasizing the importance of driving sustainability initiatives beyond just green certified projects. This framework aims to encourage a revitalized approach to sustainability within the industry. Similarly, Yassin et al. (2018) focused on identifying factors influencing green building practices in Malaysia and found that awareness among construction industry practitioners towards sustainable green building concepts was moderate. Stępień (2019) delved into the management of costs incurred in implementing sustainable development practices within a manufacturing industry, highlighting the importance of efficient cost management in the context of sustainability. Drejeris et al. (2020) analyzed the environmental component of sustainable development in corporate activities, emphasizing the economic benefits of environmental protection measures. Zhao et al. (2021) focused on evaluating influencing factors for the sustainable development of smart construction enterprises in China, utilizing various analysis methods to construct a framework for identifying and evaluating these factors. Vynogradova et al. (2021) critically evaluated sustainable development principles within the fashion business model components for early-stage companies, emphasizing the need for modern companies to align their business activities with the goals of sustainable development outlined by the UN. These studies underscore the importance of sustainable development practices within the construction industry and highlight various strategies and factors that contribute to the sustainable growth of construction companies.

In the construction industry, the lack of innovation has been a significant challenge. Initiatives have been implemented to increase cooperation between companies to address this issue (Holmen et al., 2004). The introduction of relationships and networks as an organizational form in the construction industry has been a key focus in attempts to organize technological innovation across firm boundaries. Understanding the adoption path from closed to open innovation is crucial, as it involves the impetus for adopting the open innovation paradigm and the coordination of its implementation. Innovation persistence is a critical aspect of organizational success, with different indicators measuring the persistence of innovation activities (Antonelli et al., 2012). The market value of sustainability business innovations in the construction sector has been a topic of interest, with studies analyzing the association between sustainability innovation announcements and the market value of construction companies (Kajander et al., 2012). Positive and statistically significant associations have been found, highlighting the importance of sustainability innovations in enhancing the market value of construction companies. Organizational structure plays a crucial role in influencing logistics service innovation in construction companies (Tabatabaie et al., 2016). Overall, the literature emphasizes the importance of fostering innovation in the construction industry through collaboration, open innovation practices, persistence in innovation activities, sustainability-driven innovations, and the influence of organizational structure on innovation outcomes. Therefore, the aim of this paper is to analyze the innovative paths that can be

implemented by construction companies in order to achieve sustainable development in the international market.

3 Methodology

When discussing the internationalization of the construction field, there are often two different categories. One is the internationalization of the construction industry and the other is the internationalization of construction firms. Usually, the different categories of internationalization can be represented in Figure 1.

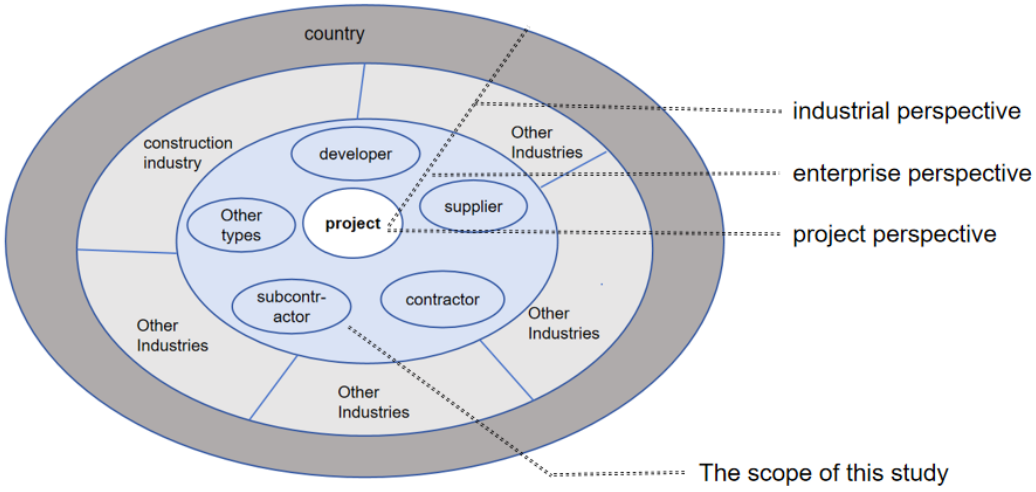

Fig1 - An illustration of different perspectives for researching international issues
Note-organized by the author

The focus of this study will be on the internationalization of construction firms. Focusing on the internationalization of construction firms does not mean separating construction firms from the industries to which they belong. There is a complex relationship between industries and various social factors, and the structure of industries influences the behavior of firms, but the behavior of firms in turn shapes the structure of industries. This paper mainly adopts the approach of literature reading and document analysis. I sorted out the current situation and development trend of the international engineering contracting market, and explored some innovative development directions.

4 Results and Discussion

4.1 Development trend of international engineering contracting market

4.1.1 Continuous expansion of the scale of international engineering contracting.

On the one hand, the development of the international engineering contracting market has benefited from the continuous improvement of global infrastructure. These projects often require large amounts of technical input and financial support, and therefore require the cooperation of international construction companies. At the same time, many Asian, African and other emerging market countries on the growing demand for infrastructure construction also for the international engineering contracting market provides a new growth point.

On the other hand, the development of technology is an important driving force for the expansion of the international engineering contracting market. With the continuous innovation of information technology and intelligent technology, international construction companies can provide more efficient and intelligent solutions to meet the needs of projects in different countries. The continuous investment of multinational enterprises in technology development and innovation also gives them a stronger advantage in competition.

4.1.2 Further broadening of international engineering contracting business field

Driven by global economic integration and international cooperation, the international engineering contracting market has shown a booming trend. With the advancement of science and technology and the facilitation of transportation, the number of cross-border engineering contracting projects has been increasing and the fields involved have been widening.

Above all, infrastructure construction is one of the important fields in the international engineering contracting market. With the growing demand for infrastructure in emerging markets and developing countries, large-scale infrastructure projects, such as bridges, roads, ports and power grids, have gradually become the focus of attention of international construction companies. Countries are promoting the development of the international contracting market while at the same time facilitating the exchange of technology and experience in the renewal and upgrading of infrastructure.

Secondly, renewable energy has become a hot spot for international engineering contracting. The global awareness of sustainable development and environmental protection has promoted the rapid development of renewable energy. The rise of clean energy projects such as solar energy, wind energy and water energy requires large-scale engineering contracting services, and enterprises from various countries have been participating in these projects to carry out technical cooperation and resource integration. By promoting the application of green energy, the international engineering contracting market has made a positive contribution to environmental protection.

Finally, digitization and intelligence have brought new opportunities to the international engineering contracting market. With the rapid development of artificial intelligence, big data and internet of things technologies, countries are beginning to apply these technologies to engineering construction to improve the efficiency and quality of engineering. Smart city construction, information system integration and other projects have become new growth points in the international engineering contracting market. Meanwhile, digital technology provides more convenience for international cooperation and project management, and more choices for international construction companies to expand the market.

4.2 Analysis of the current situation of International construction management mode

4.2.1 Poor information transmission. In the current international construction management mode, there is often a problem of poor information transfer. This is mainly reflected in the lag and inaccuracy of information transmission between various levels. Due to the complexity of the project and the multi-level organizational structure, information is prone to distortion, omission or delay in the transmission process. This leads to poor communication among project team members, which prevents them from obtaining key information in time, thus affecting the progress of the project and the accuracy of decision-making.

4.2.2 Ineffective decision making exists in the current international construction management model. This is mainly due to the problems of difficult access to information, too many decision makers, and cumbersome decision-making process in the decision-making process. First of all, due to poor information transmission, decision makers need to spend a lot of time and energy in obtaining project-related information, which leads to delayed decision-making time. Secondly, too many decision makers are involved in the decision-making process, and the decision-making results need to be approved and confirmed at multiple levels, which makes the decision-making process cumbersome and inefficient. This inefficient decision-making mode not only delays the project progress, but also increases the cost and risk.

4.2.3 The problem of irrational utilization of resources also occurs frequently. On the one hand, due to poor information transfer and inefficient decision-making, the project team is unable to accurately predict and plan resource requirements, resulting in wasted and idle resources. On the other hand, the existing resource allocation mechanism often lacks science and flexibility, and is unable to rationally allocate resources according to actual needs. This leads to unbalanced allocation and waste of resources, which in turn affects the efficiency and quality of the project.

4.3 Internationalization management mode innovation strategy of construction companies

4.3.1 Innovate management concept. In the process of innovating the internationalized management mode of construction projects, it is necessary to update the management concept.

Leaders and managers of construction firms should consider the future of the industry and align themselves with the needs of the international marketplace. They need to focus on improving their reputation in the marketplace and to have a good grasp of first-hand market information. At the same time, they also need to fully understand the actual situation of the construction site, and combined with scientific and effective technical means to make up for the shortcomings of the existing management mode. In addition to increasing the level of attention, it is also necessary to continuously increase the investment of funds. To this end, the establishment of a high degree of specialization of the management department is essential. The management system should be scientific and up-to-date. When formulating the management system, the person in charge of the enterprise and the management personnel should take into account the development needs, economic strength, development goals and market environment of the construction enterprise. By optimizing and perfecting the internal management system, the competitiveness of the international market can be improved.

4.3.2 Innovative management technology. In the process of innovating the international management mode of construction project, it is necessary to adopt scientific and reasonable management technology, not only limited to a certain level of management. From the perspective of theoretical analysis, the interrelationships between enterprises and within industries can be described by the concepts of "value chain" and "value system". The business activities of firms can be described in terms of a value chain, while an industry can be viewed as a value system (Porter, 1986). Therefore, the value creation process of construction enterprises can be decomposed into a series of different but interrelated value-added activities. The value chain of an individual firm is interconnected within the wider construction industry. For example, between upstream and downstream, between suppliers and vendors, and between complementary and collaborative enterprises, thus forming a complex aggregate of value-added activities such as integrated design, consulting, manufacturing, management, and sales, i.e., forming a value system. As shown in Figure 2

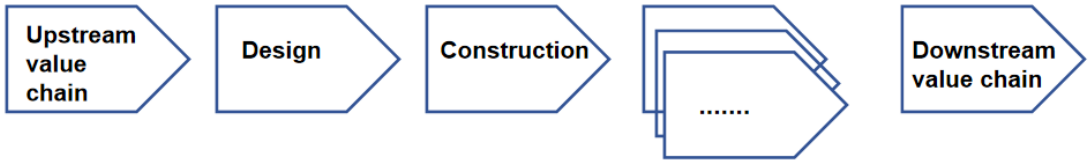

Fig 2 - The value system of the construction industry

Note - compiled by the author based on 12

The international management of the construction company involves project design, construction plan preparation, quality management and material procurement, etc. Therefore, it is necessary to have a certain degree of specialization and complexity in the management of construction projects. At the same time, a scientific and reasonable management system should be established from the identification of drawings and procurement of materials at the early stage of the project to the completion of the project.

In the process of innovative management mode, it is necessary to rationally integrate network technology and information technology into specific work and continuously improve the management content. The use of computers and other advanced technology to deal with the problems arising in the management process, to achieve the goal of resource sharing. At the same time, timely updating of corporate culture and ideological and political concepts can reduce the possibility of adverse events in the construction process, improve the quality of management and project quality. Therefore, in the process of updating the management mode of construction project, it is crucial to continuously innovate the management technology.

4.3.3 Through third-party cooperation, a pattern of synergistic competition and win-win cooperation has been formed.The first step is to strengthen cross-border cooperation. Enterprises

from different countries can set up joint contracting teams. This form of cooperation can integrate their respective advantageous resources, jointly meet the challenges of technology, capital and market, realize complementation of advantages, and form a synergy of competition.

Secondly, establish trust mechanism. In the international engineering contracting market, trust is a crucial factor. Enterprises from different countries can establish long-term and stable partnership, abide by the contract together, and improve the predictability and stability of cooperation. At the same time, establishing and improving the dispute resolution mechanism between partners can lay the foundation of trust and promote the formation of win-win cooperation.

Thirdly, promote professional division of labor. In the field of international construction company contracting, enterprises from different countries can cooperate with each other based on their professional advantages, so as to realize division of labor and complement each other's advantages. For example, some countries have outstanding advantages in design and planning, while others are more competitive in construction and equipment supply. Through the specialized division of labor, all parties will be encouraged to form a cooperative network, improve their overall strength, and jointly cope with market competition.

Fourth, strengthen government guidance and support. Governments can actively encourage international construction companies to cooperate, provide policy support, information sharing and other aspects of help, and promote the formation of a good environment for win-win cooperation. At the same time, governments can also break down barriers through intergovernmental cooperation agreements to promote the healthy development of the international construction contracting market and provide more convenient conditions and guarantees for construction company cooperation.

4.3.4 Strengthen the localized management of contracting companies and enhance the international resource allocation capacity of enterprises.

International construction companies should expand the pool of local talents. Enterprises should increase the training and introduction of local talents, formulate training programs for local employees, and improve their professionalism and cross-cultural communication skills. Through the construction of local talents, enterprises can better understand and integrate into the local market, and enhance their influence and competitive strength in the local market.

Enhancing the enterprise's international resource allocation ability is also key. The optimization of competition in the international construction market requires construction companies to have the ability to integrate resources on a global scale. Contracting enterprises should strengthen cooperation with local suppliers and service providers to realize resource sharing and complementation, reduce costs and improve project execution efficiency. At the same time, enterprises should also strengthen cooperation with internationally renowned design institutes and scientific research organizations to provide clients with more competitive solutions.

In the management of international construction companies, emphasizing environmental protection and resource conservation has become a trend that cannot be ignored.

4.3.5 Management models will focus more on green building design and construction to minimize the negative impact on the environment. The use of renewable energy is an important direction, the use of solar energy, wind energy and other renewable energy, reducing dependence on traditional energy sources, reducing carbon emissions, and realizing the sustainable use of energy. Reducing energy consumption is also the key to green building management. Adopting energy-saving technologies and equipment, such as high-efficiency lighting systems and heat-insulating materials, can reduce the energy consumption of buildings and improve the efficiency of energy utilization. Optimizing material selection is also an important aspect of green building management. Choosing environmentally friendly, renewable and low-carbon building materials, such as recyclable materials and paints with low volatile organic compounds (VOCs), can reduce the consumption of natural resources and environmental pollution. In addition, construction project management will pay more attention to building life cycle management, including sustainability considerations in all aspects of design, construction, use and demolition. In the design stage, emphasis will be placed on the sustainability of the building, taking into account the utilization of energy, water resources and indoor environmental quality of the building. In the construction phase, the focus is on reducing the generation of construction waste and rationalizing the use of resources.

In the operation phase, focus on the operation and maintenance of the building, improve the efficiency of energy utilization, and reduce operating costs. During the dismantling phase, emphasis will be placed on the recycling of building materials to minimize the negative impact on the environment.

5 Conclusions

In the current internationalized management field of construction companies, innovation and development has been an inevitable trend. The traditional management mode is characterized by asymmetric information, poor communication, inefficiency and other problems, and innovation is needed to solve these challenges.

International construction companies need to pay close attention to market dynamics, actively adjust their strategies, and do a good job of market research and positioning. At the same time, they should broaden the cooperation channels and strengthen the cooperation with the government and local enterprises. In addition, technological innovation and talent training are also important factors for success. International construction companies should continuously improve their technological innovation ability, expand service areas, strengthen talent training, and improve the overall quality and internationalization level of the team. Only by actively responding to market changes and continuously improving their own strength can international construction companies develop sustainably in international competition.

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OPTIMIZATION OF LOGISTICS COSTS: MODERN METHODS OF ANALYSIS AND PRACTICAL RECOMMENDATIONS

Koshkina Olga Valentinovna*, Bekmetova Aruna Kerneevna, Koshkina Natalya Valentinovna
Al-Farabi KazNU, Almaty, Kazakhstan
E-mail: ovkoshkina08@gmail.com

Abstract.

At the present stage, the relevance of the work is due to the lack of a high level of development of the logistics industry and the low degree of transformation in Kazakhstan and the associated awareness of logistics costs.

The article focuses on determining the essence and basic principles of the formation of logistics costs and logistics management of an enterprise. The conceptual foundations for optimizing the logistics management of an enterprise are considered, highlighting the constituent elements of the enterprise's logistics costs, studying the specifics of their accounting and modern methods of analysis.

The main subject of the study is the collection and analysis of data useful for substantiating the essence and basic principles of logistics costs in logistics. To achieve the goal, the following tasks were set: conducting an analysis of logistics costs in a Kazakh company. To accomplish the assigned tasks, survey methods and case analysis methods were used. These methods allow you to obtain reliable data on costs and methods for reducing them in logistics.

The study revealed that the digitalization of logistics infrastructure makes it possible to increase the efficiency of transport use and reduce the costs of its operation.

As a conclusion to this work, an architecture was proposed for the formation of an optimal model for the formation of logistics costs, which will allow a logistics company to optimize its costs for development in the future.

Keywords.logistics costs, logistics methods, management optimization, industrial enterprises, logistics systems

JELcodes: D57 Input-Output Tables and Analysis, D61 Allocative Efficiency, Comparative Input-Benefit Analysis, R41 Transport: Demand, Supply, Road Congestion, Travel Time, Safety and Accidents, Traffic Noise

Introduction

Logistics costs are the costs of performing logistics operations; include distribution costs and part of production costs. Logistics costs are the costs of labor, material, financial and information resources caused by enterprises performing their functions to fulfill consumer orders

In modern economic conditions, the external market environment of enterprises is characterized by enormous competition, constant uncertainty and instability. This unfavorable factor is intensified by the economic crisis that is engulfing the country. To achieve success in business, it is no longer enough to rely only on marketing tools, but it is necessary to use modern, highly effective methods and approaches to managing flow processes. A progressive and scientifically applied concept that is actively developing in this area is logistics management.

Literaturereview

Performing various technological operations in the production process takes about 90% of the total cost time. The use of logistics significantly reduces time frames at all stages of the production process. The main reduction in time occurs in the production process, starting with the acquisition of raw materials and materials and ending with delivery of the finished product to the consumer. The introduction of a logistics approach reduces the time to obtain information and increases the level of service of the production process [1, 2].

Calculating logistics costs for each individual business is often done by determining a percentage of total sales. Another method is to determine the cost per unit weight of raw materials, materials and finished products used, and as a percentage of the cost of net profit. If the performers of logistics operations and functions are not part of the enterprise, then the costs of these operations are covered by the services of specialized organizations that are engaged in warehousing, transportation, forwarding, cargo handling and other similar activities as their main activity.

Practical experience demonstrates that the most significant impact on logistics costs is exerted by costs associated with the transportation and procurement of goods, as well as costs associated with the formation and storage of inventories. Analyzing the structure of logistics costs in developed countries, it was revealed that the largest share is made up of costs associated with inventory management, transportation and administrative functions. Currently, there is a significant increase in the logistics costs of many companies in the field of order processing, information and computer support, as well as in the field of logistics administration [3, p. 120].

Lost profits from unsold goods cause costs associated with lost sales. Underestimating the demand for certain groups of goods can lead not only to missed opportunities for potential buyers, but also to rapid obsolescence of products, which in turn leads to a loss of risk [4].

Analysis of logistics costs in a strategic context is the process of comparing the costs of an enterprise for servicing consumers in comparison with the costs of its competitors. The strategy for managing logistics costs includes the redistribution of information flows, as well as a long-term orientation. The key elements of this strategy are the systematic analysis of internal and external logistics factors, as well as the use of non-financial information. Benchmarking, in turn, helps improve business performance by providing organizations with signals about possible lag, allows them to compare the organization with global best practices, makes it possible to quickly implement new approaches with minimal risk, and reduces the costs of the improvement process. Benchmarking logistics costs allows you to quickly and effectively identify problems in logistics systems, as well as in customer-facing areas such as order fulfillment and delivery. A well-founded analysis of the main stages of order fulfillment allows us to move to the use of more cost-effective technologies. In order to reduce the shortcomings of the traditional approach to accounting for logistics costs and linking financial results with operating activities, a functional cost analysis is carried out. This technique is based on dividing the production process into separate tasks, identifying cost centers and allocating the necessary resources for each of them. This approach provides a more accurate cost estimate of logistics costs, as well as a more accurate determination of the cost of servicing a specific client. Functional cost analysis is not a replacement for traditional financial accounting. It provides a unique opportunity to better understand supply chain performance. This becomes possible thanks to the correct calculation of the costs of labor, materials, and equipment for specific processes. The logistics development process has been transformed by an integrated approach that has changed the understanding of costs in this area. The allocation of logistics costs from the total costs of the enterprise and the organization of accounting for this type of costs are carried out with a focus on the final result. At the initial stage, the volume and nature of work in the logistics system is determined, and after that an analysis of the logistics costs associated with its implementation is carried out. The new mechanism for calculating costs is based on determining the main goal that must be achieved in the process of “product-market” interaction [5].Risk management involves the process of making decisions and taking actions, including analyzing risks and developing strategies to minimize them in order to achieve planned financial results and create conditions for the further development of the company [6]. The desire to ensure an adequate level of competitiveness of logistics systems in difficult conditions of the modern economy has served as the driving force for the development of various concepts for saving resources and minimizing losses, the implementation of which can be complicated by certain barriers, including the high sensitivity of individual logistics processes [7].

The author [8] insists on introducing a new functional area of logistics into the scientific base of logistics, namely “risk logistics as the theory and practice of managing risk flows based on a systems approach” [8]. At the same time, a risk flow is defined as “a group of random situations, the occurrence of which is associated with the movement of material or other flows and influencing the nature of flow processes” [8]. Risks in supply chains (and/or risks in logistics systems) are classified according to “risk centers”, which are functional subsystems (for example, “warehousing and storage” and “service”), infrastructure facilities, resources [8], as well as “ in accordance with the process approach” at levels: operations, infrastructure, supply chain links/nodes, logistics system, environment. The author proposed to use the definition of risks in supply chains [9] as “an activity factor characterized by certain conditions of occurrence, force of action and resource

potential, acting at the same time as an indicator, integrator and regulator of the state of the supply chain. Risk is a source of additional opportunities, a way to increase the competitiveness of the supply chain and its entities by eliminating bottlenecks and focusing on key success factors" [10].

Methodology

To conduct a comparative analysis of logistics costs, various methods and approaches were used. One of the basic analysis tools was the method of conducting surveys among users of transport services, which made it possible to collect data on satisfaction, preferences and experience of logistics costs in the transport sector.

A method was used to analyze the main performance indicators - downtime at the borders without taking into account digitalization, as well as a method of comparative analysis of the cost of operating expenses.

To develop proposals, the case method was used to analyze the results of pilot projects and real cases of the implementation of digital technologies in the transport sector. This method allowed us to evaluate the effectiveness and practical applicability of various solutions and identify best practices for further scaling.

As the analysis showed, imbalances in digital development complicate regional cooperation and the exchange of best practices in the digital sphere. Currently, Kazakhstan is striving to develop and become one of the leaders in the region in the field of digital technologies and the digital economy, to reduce costs in logistics. However, at the moment, the digitalization policy in the region is at its initial stage.

Results and Discussion

In the Republic of Kazakhstan, the State Program "Digital Kazakhstan" has been implemented in the field of digital logistics since 2017. The Republic of Kazakhstan became a leader in the region in providing e-government services in 2008. Large-scale State program for infrastructure development "Nurly Zhol" for 2020-2025. One of the main directions of implementation of the State Program is the introduction of intelligent traffic flow management systems in the field of transport and transport infrastructure. The Digital Transformation program is being implemented by NC Kazakhstan Temir Zholy JSC. Part of this strategy is the Koldau and Ruksat platform[11].

The main feature of the logistics management concept and the distinctive feature of this approach to material flow management is the allocation of a single integrated function, which is aimed at controlling end-to-end material flows. Therefore, logistics costs, as a criterion for optimal logistics management, should be considered in an integrated manner. Logistics costs arise as a consequence of the interaction and functioning of supply channels, production processes and distribution[12]. It is advisable to present them for each enterprise as the sum of three main components: supply costs (LCP), production and technological costs (LCV) and sales costs (LCR):

$$LC = LC\Pi + LCB + LCP \quad (1)$$

Logistics costs associated with supply and distribution are referred to as external logistics costs, while costs in production are referred to as internal logistics costs. The use of a logistics approach in enterprise management presupposes a systematic approach, consistency of processes and optimization of logistics costs. The traditional concept of enterprise management is based on the desire for optimal management and cost minimization in every link of the organization:

$$LC = \min LC\Pi + \min LCB + \min LCP. \quad (2)$$

As it departs from the traditional concept, the logistics approach emphasizes the refusal to consider costs in isolation, and instead relies on the criterion of the minimum amount of these costs, based on the optimal value of each component element.

$$LC = \min (\text{opt}LC\Pi + \text{opt}LCB + \text{opt}LCP) \quad (3)$$

To ensure effective logistics management, accounting for transaction costs as part of total logistics costs plays an important role.

Transaction costs refer to the costs that arise when implementing agreements. These costs include the costs of searching for information, the costs of conducting numerous negotiations and concluding contracts, and the costs of monitoring compliance with the terms of contracts.

Logistics costs should include the costs of financial transactions that are associated with the movement of material flows, the supply of material resources, work in progress and finished products. It is advisable to include losses arising from poor-quality supplies of finished products, production and sales as logistics costs. Logistics costs play a significant role in the cost structure of an enterprise and constitute a significant position, second only to the costs of supplying raw materials. When accounting for logistics costs, it is necessary to take into account that the costs of obsolete and lost sales are not included. At the same time, these costs are directly related to material flows and should be classified as logistics costs. Although in certain cases the cost of such expenses may be significant, then they are not considered as logistics costs and, therefore, do not participate in the management activities of the enterprise. These costs arise during the economic activity of an enterprise when raw materials and finished products cannot be fully used in the production or sales process and must be withdrawn. Some enterprises are faced with accelerated aging of production equipment, which leads to even greater logistics costs. This problem is especially relevant in the field of computer equipment production.

Accounting for logistics costs has its own characteristics. The costs associated with specific logistics activities and their grouping based on the work and operations performed are highlighted. The main requirements of the logistics cost accounting system include (Figure 1):

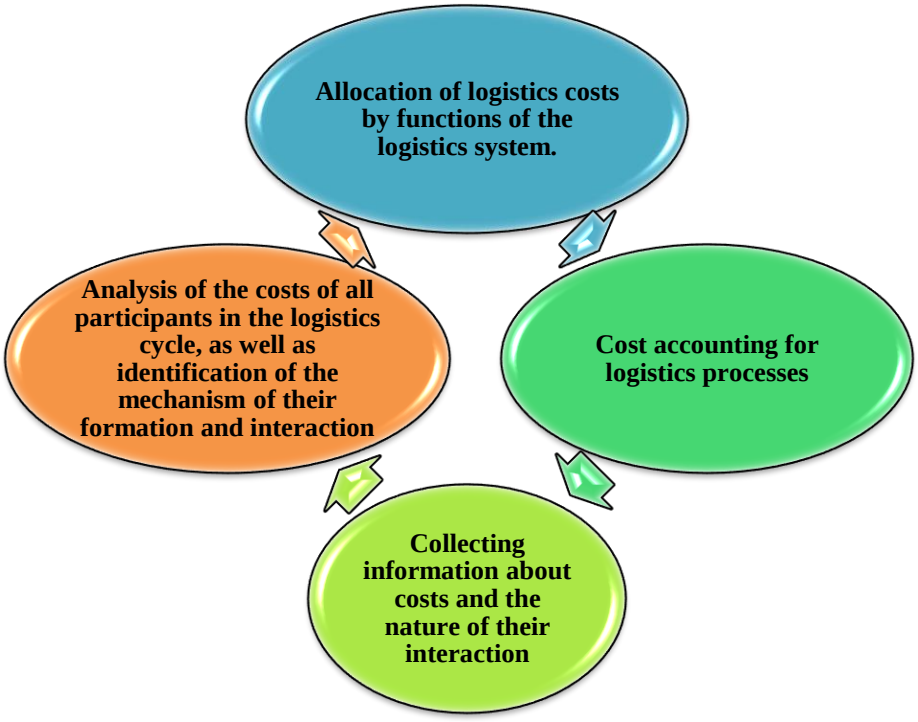

Figure 1 - basic requirements of the logistics cost accounting system
Note - compiled from source[12]

Modern methods for analyzing logistics costs are constantly evolving, introducing new guidelines, procedures and mechanisms for cost management. Among the most common methods are benchmarking the structure of logistics costs, cost analysis of costs, and functional cost analysis.

One example is the Koldau platform, created to integrate and optimize logistics processes in Kazakhstan and Central Asia. It includes the integration of various transport infrastructure systems, such as railways, roads, ports and airports, as well as the collection and processing of data using big data and artificial intelligence technologies. The platform allows integration with other digital

services such as online payment and digital documents. The Koldau platform is one of the innovative projects in the field of digitalization of transport logistics in Kazakhstan. However, like any other project, it has its problems.

Failures and failures in the platform resulted in delays in cargo delivery and increased logistics costs, which affected the price of the final product.

For example, CarGoRuqsat, part of the Koldau platform, an electronic queuing system designed to ensure transparency in the border movement process, led to delays at the border in March 2023 [13]. Trucks queued to cross the border for a month. The reason was that the system was not perfect in terms of access to the queue. The driver must have a transportation permit and a visa, which not all drivers have obtained in advance. This data had to be checked in advance before queuing, and this fact led to colossal losses on the part of carriers, who would naturally share these losses with the end consumer. One of the ways to reduce transportation costs is to reduce border crossing costs.

To the main costs are added costs in the form of value added tax (VAT) of 12%, customs costs on average of 10% duties (depending on the product), certification and permits (individual, depending on the product).

Kedentransservice JSC the largest operator of logistics terminals in the Republic of Kazakhstan, which has been present in the market of transport and logistics services for more than 20 years. The company has unique assets and competencies in the field of terminal cargo handling, and also occupies a leading position in transshipment of goods imported from China at the Dostyk and Altynkol border stations, operates 5,000 fitting platforms, and carries out container transportation along various routes [14].

Steps to develop tools:

Definition of Goals: The goal is to analyze and optimize logistics costs focused on transport. Key performance indicators (KPIs) include total transport costs, average freight costs, delivery times and service levels.

Data collection: Integration of transport cost data from accounting systems and company annual reports

Categorization of Costs: Division of costs for fuel, depreciation of fixed assets and intangible assets (fixed assets and intangible assets), wages of workers and maintenance of vehicles (million tenge).

Table 1-Categorization of Costs

Expenditures	2019	2020	2021	2022
Fuel	205	231	270	321
Depreciation of fixed assets and intangible assets	1386	1771	2769	2394
Workers' salaries	10455	10041	13636	12391
Vehicle servicing	66	57	46	79
Note: compiled by the author based on source 14				

Data visualization: Creating dashboards with graphs showing the share of each category in total transport costs.

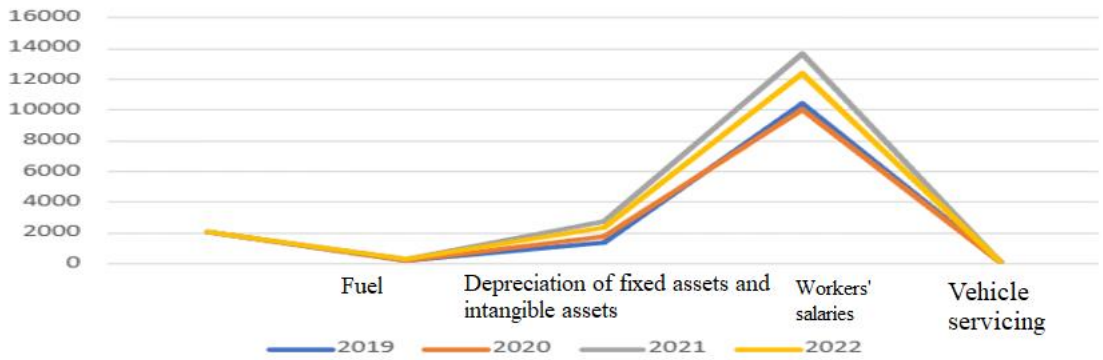

Figure 2. Cost diagram 2019-2022

• Visualization of cost changes by year.

Application of analytical methods:

• Apply statistical methods to identify patterns and trends in transportation cost data.

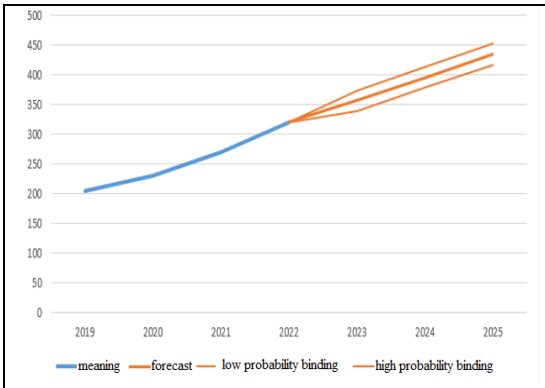

Figure 3. Forecast of further development of costs (fuel)

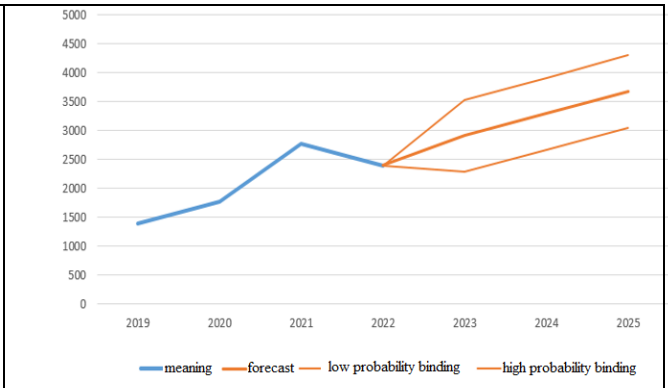

Figure 4. Forecast of further development of costs (Depreciation of fixed assets and intangible assets)

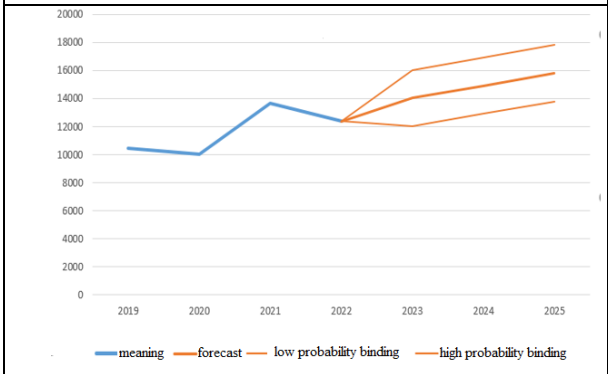

Figure 5. Forecast of further development of costs (worker's salary)

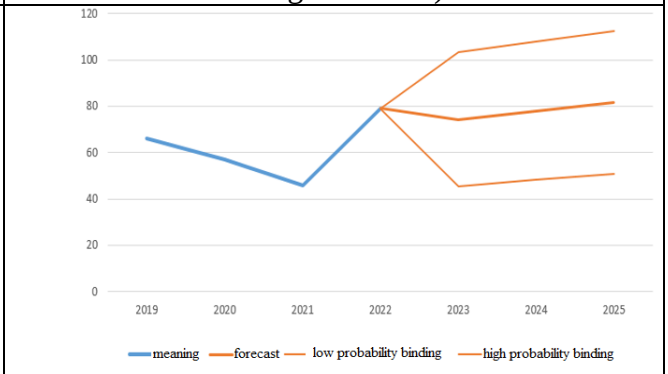

Figure 6. Forecast of further development of costs (Vehicle maintenance)

Scenario simulation:

• Development of optimization models for scenarios such as selecting optimal routes, optimizing fuel costs and improving transport service efficiency.

Efficiency mark:

• Establishing KPIs such as reducing overall transport costs, increasing transportation efficiency and reducing delivery times.

Total transport costs (TC):

Formula: TC = Fuel + Wear and tear of fixed assets and intangible assets + Salary of workers + Vehicle maintenance

KPI value: Reduction in total transport costs in % compared to the previous period.

Average Cost per Cargo (CPT):

Formula: CPT = Total transport costs / Volume of goods transported
KPI value: Reduction in average costs for cargo transportation in %.
Delivery times (DT):
Formula: DT = Shipping Time - Delivery Time
KPI value: Reduction of delivery time in hours or days.
Service Level (SL):
Formula: SL = (Number of on-time deliveries / Total number of deliveries) * 100
KPI value: Increase in service level as a percentage.
Fuel Cost Efficiency (FE):
Formula: FE = Total fuel costs / Volume of goods transported
KPI value: Reduction in effective fuel costs in %.

These KPIs will help evaluate the overall efficiency of logistics costs in the Kedentransservice company. Regular monitoring and analysis of these indicators will allow the company to identify problem areas and take measures to optimize them

Cost development forecast: Using cost data from 2019 to 2022, conduct a trend analysis and develop a forecast of transport costs for the following periods (Table 2).

Table 2 - Cost development forecast

Year	Fuel	Depreciation of fixed assets and intangible assets	Salary of workers	Vehicle maintenance
2023	356	2914	14 027	74
2024	395	3296	14920	78
Note: compiled by the authors based on research				

Optimization model:

• Creation of an optimization model for each cost category, taking into account the forecast and various scenarios.

• Implementation of optimal solutions in logistics processes.

Conclusion and comparison with KPI:

• Comparison of analysis and optimization results with established KPIs.

• Conclusion on how successful the measures taken were and recommendations for further optimization.

This approach will allow Kedentransservice to more effectively manage transport costs, which will reduce overall costs and improve the company's competitiveness in the logistics market.

Conclusions

Logistics costs play a crucial role in any organization's overall budget, and optimizing these costs is essential for maintaining competitiveness and profitability. Modern methods of analysis and practical recommendations can help businesses streamline their logistics operations and reduce costs. Here are some key strategies for optimizing logistics costs:

Utilize data analytics and technology: Utilize advanced data analytics and technology tools to analyze your logistics operations and identify areas for improvement. These tools can help you track key performance indicators (KPIs), identify inefficiencies, and make data-driven decisions to optimize costs.

Implement supply chain visibility and transparency: Enhance visibility and transparency across your supply chain to identify bottlenecks, optimize routes, and improve efficiency. Utilizing technologies like GPS tracking, RFID, and supply chain management software can help you gain real-time visibility into your logistics operations and make informed decisions.

Collaborate with partners and suppliers: Collaborate with your partners and suppliers to improve coordination and communication throughout the supply chain. Establishing strong relationships with key stakeholders can help you negotiate better rates, share resources, and streamline processes to reduce costs.

Implement lean and agile practices: Adopt lean and agile practices in your logistics operations to eliminate waste, improve efficiency, and enhance flexibility. Implementing practices like just-in-time inventory management, cross-docking, and continuous improvement can help you reduce lead times, decrease inventory holding costs, and respond quickly to changing market demands.

Outsource non-core logistics activities: Consider outsourcing non-core logistics activities, such as warehousing, transportation, and inventory management, to third-party logistics providers (3PLs). Outsourcing these activities to specialized providers can help you reduce overhead costs, improve service levels, and focus on your core business activities.

Optimize transportation routes and modes: Analyze your transportation routes and modes to identify opportunities for consolidation, optimization, and cost savings. Consider using multi-modal transportation solutions, such as rail, road, air, and sea, to minimize costs, reduce emissions, and improve delivery times.

Monitor and benchmark performance: Monitor your logistics performance regularly and benchmark against industry standards and competitors to identify areas for improvement. Continuously measuring and analyzing key performance metrics, such as on-time delivery, order accuracy, and transportation costs, can help you identify inefficiencies and implement corrective actions.

By implementing these modern methods of analysis and practical recommendations, businesses can optimize their logistics costs, improve efficiency, and enhance their competitiveness in today's fast-paced global marketplace.

The use of information technology in regional logistics also increases the efficiency of its work and reduces logistics costs in several directions (Table 3):

Table 3 - Application of information technology in regional logistics

№	Description
1	improved control and management. With the help of information systems, you can obtain early information about supplies, inventory and other factors, both your own and partner organizations. The availability of operational information allows you to make more informed decisions, increase the speed of response to emerging problems and speed up processes [15];
2	reduction of order processing time. Convenient Internet platforms, the possibility of online payment and ordering of goods and services significantly reduce the time between order and delivery, as well as the risk of errors when manually entering information [16];
3	cost reduction. Logistics using information technology helps reduce costs associated with paper documentation, reduce time for the processes of placing orders and documents, improve the use of warehouses, and reduce losses of goods;
4	improved communication and collaboration. The use of a common information base and data exchange tools makes it possible to speed up and coordinate interaction with counterparties, which significantly reduces the risks of delays in deliveries and improves the overall efficiency of logistics processes [15].
Note - compiled by the author	

To ensure more efficient operation of regional logistics, it may be necessary to create a joint data exchange platform. The use of the platform can help improve communications between all participants in the transport process, increase the level of trust between participants and increase the efficiency of logistics in general [17]. Data can be collected through surveys, quantitative analysis and data sharing. The platform itself is a complex information system that brings together various stakeholders, such as multi-industry administrative sections, logistics parks, logistics enterprises, and end users of transport services. Thus, the information system sends publicly available data to special devices according to the relevant rules, after which the platform maintains and stores this data, providing services based on it.

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METHODOLOGICAL TOOLS IN THE STUDY OF GOVERNMENT REGULATION

R.A. Muslimov*, A.A. Adambekova
Al-Farabi Kazakh National University, Almaty, Kazakhstan.
*E-mail: muslimovramilgwt@gmail.com

Abstract

The article delves into the multifaceted role of methodological tools in government regulation, aiming to enhance the effectiveness of policy evaluation and adaptation. It meticulously explores both qualitative and quantitative methodologies used in the study of regulatory frameworks, emphasizing the need for innovation to address contemporary regulatory challenges. The literature review provides a foundation, citing significant contributions that examine the evolution of regulatory systems, the economic impact of government regulation, and the underlying economic theories of regulatory practice. Through a comprehensive analysis, the article presents a nuanced understanding of how economic, legal, and social tools are employed within regulatory frameworks to achieve societal and economic objectives, such as reducing income inequality, protecting consumer rights, and fostering public health and environmental sustainability. The discussion highlights the challenges of balancing regulation with market freedom, underscoring the importance of adaptability, stakeholder engagement, and evidence-based policy-making in navigating the complexities of modern governance.

Keywords: government regulation, methodological tools, policy evaluation.
JEL codes:A1, B0, B4

Introduction

The regulatory landscape crafted by governments worldwide is foundational to the efficacy of public policies and their resultant impacts on societies. As the complexities of societal challenges escalate, so does the imperative for sophisticated regulatory frameworks that can navigate these intricacies with precision and adaptability. This necessitates an in-depth investigation into the methodologies underpinning governmental regulatory research, aiming to refine and advance the tools available for policy evaluation and formulation.

This study sets forth to illuminate the spectrum of methodological tools employed within the realm of state regulation, with a dual focus: firstly, to evaluate the effectiveness of existing methodologies in policy research, and secondly, to advance the discourse on how these methodologies can be innovated or adapted to meet the evolving demands of regulatory governance. Central to our investigation is the analysis of both qualitative and quantitative approaches in scrutinizing regulatory policies across varied governance landscapes. By doing so, this research seeks to contribute to the broader academic and practical understanding of how methodological rigor and innovation can enhance the development, assessment, and recalibration of regulatory frameworks.

The scope of this study is intentionally broad yet discerning, acknowledging the vast array of governance systems and regulatory challenges present across different geographical regions and sectors. However, the research primarily orients itself towards those methodological practices that have shown widespread applicability and potential for adaptation in diverse regulatory contexts. By examining a selection of case studies that span various governance models and regulatory issues, this study endeavors to extract universally applicable insights while also acknowledging the unique nuances that sector-specific or region-specific challenges present.

Literature Review

The literature review explores the development and implications of methodological tools in government regulation studies. This review aims to identify the trends, challenges, and outcomes associated with various methodological approaches within this field. Given the pivotal role of

regulation in shaping public policy and governance outcomes, understanding these methodological nuances is crucial for advancing regulatory research.

The publication "Governance-Based Analysis of Regulation" by Minogue (2002) offers a comprehensive overview of the evolving nature of regulatory systems and reforms, situating these within the broader context of public policy processes and institutions. Minogue argues that understanding the 'governance of regulation'—the framework within which regulatory policy and practice operate—is crucial for grasping the strengths and weaknesses of regulatory practice.Minogue highlights the importance of the governance framework, asserting that it shapes how regulatory policies are delivered and executed. This framework involves understanding the interactions between state-market relations and managerial reforms within the regulatory space.The paper also addresses the issue of policy transfer between developed and developing economies, underscoring the need for policy-relevant research into regulatory systems and policies in different countries.

Minogue calls for an institutional analysis of regulation, suggesting that such an approach can provide insights into the corrective and redistributive rationales inherent in regulatory restrictions.By examining the governance of regulation, Minogue contributes to a deeper understanding of regulatory policies' formulation, implementation, and impact. The paper stresses the complexity of regulatory governance and the need for nuanced, informed approaches to regulatory reform, especially in the context of developing countries. Through this governance-based analysis, the publication aims to shed light on how regulatory frameworks can be designed and reformed to better serve public interests.

Written by J. Nicoletti and Frederick L. Pryor explore the impact of government regulation on economic performance in various OECD countries, recognizing the difficulty of accurately measuring such regulation.

The paper aims to construct indices for measuring the extent of government regulation across OECD nations, acknowledging the methodological challenges involved. It contrasts subjective measures (based on surveys of business people and experts) with objective measures (based on detailed government regulations).The study delves into methodological issues related to constructing these indices, distinguishing between "objective" and "subjective" measures of regulation. It highlights the advantages and disadvantages of each method, such as the objectivity and specificity of regulations versus the subjective perceptions of business professionals and experts, including their assessment of enforcement effectiveness.The advantages of objective indicators are considered to be that they are exogenous, that is, they are not influenced by economic conditions at the time of data collection, making them suitable for empirical analysis. they are considered to be «accurate» to the extent that they are noise-free, except for potential small measurement errors. Disadvantages of objective indicators: objective measures may not fully reflect local or regional rules in federal countries and may ignore certain laws and regulations, they do not take into account how regulations are respected, or the impact of the legal system on the effectiveness of law enforcement.

Advantages of subjective indicators: Subjective measures may reflect actual compliance with regulations, taking into account the regulatory burden in terms of those directly affected. These measures may include regulations at all levels of government, depending on the structure of the survey. Responses may be influenced by personal biases, ideological beliefs, ignorance or current business conditions that affect the accuracy and comparability of data. Variability due to unrelated factors and measurement error may be greater than in objective measurements, which complicates cross-country comparisons if large samples are not used.

The paper concludes that the regulatory landscape across OECD nations can be understood through both subjective and objective lenses, with both methods pointing towards similar realities of regulatory practices. It suggests that future research should aim to further elucidate the impact of these regulatory differences on economic performance.

The document "An Introduction to the Law and Economics of Regulation" by Alessio M. Pacces and Roger J. Van den Bergh provides a thorough examination of the economic theories underlying regulation, the purposes of regulation, and a broad overview of regulatory practices

across various sectors. he document emphasizes the omnipresence of regulation in daily life, from the use of utilities like electricity and gas to transportation and telecommunication services. It discusses how regulation addresses issues arising from natural monopolies, ensuring consumer protection against high prices and limited supply.

The authors strive to provide a comprehensive framework for understanding regulation, including both its economic justifications (normative approach) and the interests that shape regulation (positive theory). This includes a discussion on the importance of comparing different forms of regulation and the real-world application of economic analysis to regulatory practices.The pervasiveness of regulation in everyday life, from utilities such as electricity and gas to transportation and telecommunications services, is emphasized. It discusses how regulation addresses problems arising from natural monopolies by protecting consumers from high prices and limited supply.This publication is a key resource for understanding the complex interaction between economic principles and regulatory practice. By examining in detail the rationale for regulation, the specific problems of the industry and the evolving picture of regulatory reform, the authors contribute significantly to the legal and economic debate.

Results and Discussion

In the realm of public administration and policy studies, the examination of state regulation mechanisms is pivotal. State regulation, encompassing a broad spectrum of laws, directives, and policies, aims to steer societal and economic activities towards desired outcomes.

In order to thoroughly examine existing regulatory policy mechanisms in different governance contexts, the methodological tools used in the examination of government regulation should be examined using both qualitative and quantitative analysis.

In the complex tapestry of governance, state regulation stands out as a critical mechanism for maintaining order, encouraging economic growth, and protecting citizen welfare. At the heart of effective state regulation are methodological tools—strategies and instruments employed by governments to guide, control, or influence economic and social outcomes. The importance of these tools cannot be overstated; they shape the very foundation upon which policies are crafted and implemented to steer a country towards its desired future.

The evolution of methodological tools in state regulation reflects a dynamic response to changing societal needs, economic conditions, and global challenges. From the rudimentary regulations of ancient civilizations to the sophisticated policy instruments of today, the journey has been marked by continuous innovation and adaptation. In the present time, these tools encompass a wide range of mechanisms, including economic incentives, legal mandates, and social programs, each with its unique advantages and inherent limitations.

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Economic tools serve as one of the cornerstones of state regulation, wielded by governments to shape economic activity, influence market behavior, and achieve policy goals. These tools can be broadly categorized into three types: taxation, subsidies, and tariffs. Each of these tools has distinct mechanisms of action, advantages, and potential drawbacks.

Taxation is arguably the most direct tool at the disposal of governments to regulate economic activities. By levying taxes on income, property, sales, and other transactions, governments can generate revenue necessary for public services and investments while influencing economic

behaviors. Progressive taxation, where tax rates increase with income levels, aims to reduce income inequality and redistribute wealth. However, excessive taxation can deter investment and economic growth, highlighting the need for balanced tax policies.

Subsidiesare financial grants provided by governments to businesses or individuals, intended to support and promote specific economic activities or industries. They can help emerging sectors become competitive, ensure the provision of essential services, or promote behaviors beneficial to society, such as renewable energy adoption.

Tariffs are taxes imposed on imported goods, making them more expensive relative to domestic products. By adjusting tariff rates, governments can protect nascent industries from foreign competition, encourage domestic production, and negotiate trade terms. However, tariffs can also lead to trade disputes and may result in increased costs for consumers and businesses relying on imported goods.

The effectiveness of economic tools in achieving regulatory objectives is a delicate balance. On one hand, they can provide targeted interventions to correct market failures, incentivize desired behaviors, and fund public goods. On the other hand, poorly designed economic policies can lead to inefficiencies, distort markets, and provoke unintended consequences.

Economic Tool	Description	Examples	Advantages	Disadvantages
Subsidies	Financial grants provided by governments to support specific economic activities or industries.	Many countries offer subsidies for renewable energy projects to promote the adoption of sustainable energy sources.	- Direct impact on economic behaviors. -Generate revenue for public expenditure. - Can be adjusted to address specific policy goals.	- Risk of market distortion and unintended economic effects. - Can be regressive, impacting lower-income groups more severely. - Implementation and enforcement can be challenging.
Tariffs	Taxes imposed on imported goods to make them more expensive than domestic products.	The United States has imposed tariffs on imported steel and aluminum to protect domestic industries.	- Direct impact on economic behaviors. - Generate revenue for public expenditure. - Can be adjusted to address specific policy goals.	- Risk of market distortion and unintended economic effects. - Can be regressive, impacting lower-income groups more severely. - Implementation and enforcement can be challenging.

Table 1. Economic Tools' Advantages and Disadvantages

Economic tools are indispensable for addressing market failures, redistributing resources, and protecting public interests. Yet, their success and sustainability lie in the careful design, implementation, and continuous evaluation of these policies to ensure they serve the broader goals of economic efficiency, social equity, and environmental sustainability. The quest for this balance is a testament to the evolving nature of economic policy-making in response to the complexities of modern economies and the diverse needs of societies around the globe.

Legal tools are crucial in shaping the regulatory landscape for economic activities, including laws, regulations, and directives. They aim to ensure fair competition, consumer protection, environmental conservation, and workers' rights by establishing legal boundaries for operation. Their effectiveness depends on precise legal language, fair enforcement, and adaptability to changing economic conditions and societal norms. Technological advancements challenge existing legal frameworks, creating gaps that may hinder innovation or lead to exploitation. The adaptability of legal regulations, like the GDPR in the EU, is essential but must balance protection with the flexibility to encourage innovation. Over-regulation, particularly evident in the financial sector post-crisis, can suppress innovation, increase costs, and lead to economic inefficiencies, highlighting the need for a balanced approach to regulation that supports safety, stability, and economic growth.

Social tools are strategies designed to influence public behavior and support regulatory goals, including public awareness campaigns, education programs, and community engagement. They complement economic and legal mechanisms by fostering public understanding and acceptance of policies, encouraging voluntary compliance, and supporting initiatives for societal benefits like public health and environmental conservation. The success of these tools is evident in areas like reducing smoking rates through anti-smoking campaigns and increasing recycling participation through conservation efforts.

However, measuring the direct impact of social tools is challenging due to their long-term effects and the influence of external factors, complicating the attribution of changes to specific initiatives. To enhance their efficacy, strategies such as targeted messaging, leveraging social media, community engagement, multi-faceted approaches combining social with economic and legal interventions, and continuous monitoring for real-time adjustments are recommended. Despite measurement challenges, well-designed social tools can significantly influence public behavior and norms, playing a crucial role in achieving regulatory objectives and fostering long-term societal changes.

There is a delicate balance between regulation and market freedom, emphasizing its importance in economic policy for stability, growth and social well-being.This balance is dynamic, needing continuous adjustments to adapt to economic conditions, societal values, technological advancements, and globalization. Regulations address market failures, protect consumers, ensure fair competition, and safeguard the vulnerable, but excessive regulation can hinder innovation and efficiency. Market freedom, on the other hand, encourages competition, innovation, and consumer choice, contributing to economic growth.

Successful examples include post-2008 financial reforms, the European Union's environmental policies like the Emissions Trading System, and the GDPR for data protection, all of which attempt to find a middle ground between stringent regulation and fostering market dynamism.

Future policy-making must navigate the complexities of balancing regulation and market freedom in a rapidly changing world. This involves creating adaptive regulatory frameworks, engaging stakeholders, relying on evidence-based policy-making, and fostering international cooperation. Achieving this balance is crucial for economic stability, social welfare, and sustainable growth, requiring a holistic approach that integrates regulatory oversight with market mechanisms.

Conclusion

The exploration of methodological tools in state regulation uncovers the intricate balance required to navigate the evolving demands of societal governance. Economic, legal, and social tools each play a pivotal role in shaping regulatory outcomes, with their effectiveness deeply influenced by the precision of their application and their adaptability to changing societal needs and economic conditions. The analysis reaffirms the critical nature of achieving a dynamic equilibrium between regulation and market freedom, a balance that is essential for fostering economic stability, growth, and social welfare. This equilibrium is not static but requires constant recalibration in response to new technological advancements, economic paradigms, and global interdependencies. Successful regulation thus hinges on the deployment of adaptive, flexible methodological tools that are informed by comprehensive stakeholder engagement and grounded in empirical evidence. The

future of regulatory governance will undoubtedly depend on our ability to innovate and refine these methodological approaches, ensuring they are capable of meeting the complex challenges of 21st-century governance while fostering an environment where market dynamism and regulatory objectives coexist harmoniously.

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COMPARATIVE ANALYSIS OF THE SUSTAINABLE DEVELOPMENT BETWEEN GLOBAL GATEWAY AND BELT ROAD INITIATIVE: CHALLENGES, CONSEQUENCES, AND OPPORTUNITIES

Shao, Liang*
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: shaoliang08111991@gmail.com

Abstract.
1) Background: This study compares the EU's Global Gateway and China's Belt and Road Initiative (BRI), analyzing their roles in sustainable development. While the Global Gateway emphasizes connectivity and sustainable infrastructure, the BRI focuses on infrastructure projects to enhance regional cooperation.
2) Methods: A systematic literature review was conducted to assess challenges, consequences, and opportunities related to sustainable development.
3) Results: The findings reveal that both initiatives face environmental sustainability challenges, notably in balancing economic growth with environmental protection. The BRI primarily grapples with environmental degradation and carbon emissions from its infrastructure projects, while the Global Gateway emphasizes policy coherence and sustainable development alignment. Opportunities identified for both initiatives include fostering economic cooperation, regional integration, and the promotion of sustainable practices and value chains.
4) Conclusions: Despite their differences, both initiatives significantly contribute to sustainable development, offering lessons on integrating large-scale infrastructure projects with sustainability goals.

Keywords: Sustainable Development; Belt and Road Initiative; EU Global Gateway; Environmental Sustainability; Infrastructure Projects
JEL codes:F63 - Economic Development; Q01 - Sustainable Development; F68 - Policy and Regulation; R42 - Transportation Infrastructure; Q56 - Environment

1 Introduction

In recent years, the European Union's Global Gateway initiative and China's Belt and Road Initiative (BRI) have emerged as significant drivers of sustainable development on a global scale. The EU's Global Gateway aims to enhance connectivity, promote sustainable infrastructure development, and foster economic growth (Häbel & Hakala, 2021). On the other hand, China's BRI seeks to create a network of infrastructure projects to enhance regional cooperation and sustainable development (Teo et al., 2019). Understanding the challenges, consequences, and opportunities presented by these initiatives is crucial for policymakers, researchers, and stakeholders involved in sustainable development efforts.

The EU and China are key players in the global sustainable development landscape, with their respective initiatives shaping the future of infrastructure development, economic cooperation, and environmental sustainability (Waloven et al., 2023). The EU's emphasis on policy coherence for sustainable development and renewable energy integration Menhas et al. (2019) contrasts with China's focus on infrastructure development and socio-economic impacts under the BRI (Feng et al., 2019). These differing approaches highlight the complexity of sustainable development efforts in a rapidly changing world.

This research aims to compare the challenges, consequences, and opportunities of the EU's Global Gateway and China's BRI from the perspective of sustainable development. By analyzing these two initiatives, the goal is to provide insights into how different approaches to infrastructure

development and economic cooperation can impact sustainable development outcomes in diverse regions.

The central research question guiding this study is: How do the EU's Global Gateway and China's BRI compare in terms of their challenges, consequences, and opportunities for sustainable development? By examining the experiences of these two initiatives, this research seeks to identify key factors that influence the success or failure of sustainable development efforts in different geopolitical contexts.

This article is structured as follows:
2. Literature Review: A comprehensive review of existing literature on the EU's Global Gateway and China's BRI, focusing on sustainable development perspectives.

3. Methodology: Explanation of the research methodology employed to compare the challenges, consequences, and opportunities of the two initiatives.

4. Results and Discussion: Presentation and analysis of the data collected, highlighting key differences and similarities between the EU's Global Gateway and China's BRI. Interpretation of the results in the context of sustainable development goals and implications for future policy and research.

5. Conclusion: Summary of the main findings, implications for sustainable development practices, and suggestions for future research directions. By examining the EU's Global Gateway and China's BRI through the lens of sustainable development, this research aims to contribute to a deeper understanding of the complexities and opportunities associated with large-scale infrastructure projects in the contemporary global context.

2 Literature review

The Belt and Road Initiative (BRI) and Global Gateway initiatives are significant global undertakings that have garnered attention for their potential impact on sustainable development. The BRI, launched by China in 2013, aims to enhance connectivity and cooperation across Asia, Europe, and Africa through infrastructure projects and economic partnerships (Méndez et al., 2022). On the other hand, the Global Gateway initiative, introduced by the European Union, seeks to provide democratic, secure, and sustainable alternatives to lower-income partners, emphasizing quality over quantity in investments (Karjalainen, 2023). The Belt and Road Initiative (BRI) and the European Union's Global Gateway initiative represent significant global strategies aimed at enhancing connectivity, economic cooperation, and sustainable development. Several studies have explored these initiatives, shedding light on their economic, geopolitical, and environmental dimensions.

In terms of economic implications, the BRI and Global Gateway initiatives offer opportunities for economic growth, innovation, and sustainable urban development. Kang et al. (2018) investigated the impact of the Belt and Road Initiative on China's outward foreign direct investment (OFDI), highlighting the potential for promoting China's economic expansion and global integration. Studies by Tang et al. (2017) and Tambo et al. (2019) have examined the role of the BRI in global health and economic growth, emphasizing China's unique global engagement and its impact on public health measures. Studies by Cotella & Berisha (2021) and Gui et al. (2019) have examined the impact of Chinese government policies on outward foreign direct investment and the scientific collaboration network among countries along the Belt and Road. The BRI has been viewed as a means to stimulate growth, increase trade, and promote economic integration among participating countries (Méndez et al., 2022). Zhang (2023) explored the optimized development of China's service industry within the Belt and Road region, emphasizing the importance of social network analysis in understanding China's service trade dynamics.

Moreover, the BRI and Global Gateway initiatives have geopolitical implications that shape global order and power dynamics. The BRI signifies a turning point in Chinese national policy, promoting connectivity and cooperation among countries along its routes (Manzoor et al., 2022). Comparative studies by Damoah et al. (2022) and Yang et al. (2021) have delved into the allocation of Belt and Road projects and the strategic selection of ports, providing insights into the economic and strategic implications of these initiatives. Karjalainen (2023) analyzed the EU's Global Gateway initiative, focusing on its democratic and sustainable alternatives to the BRI, highlighting the EU's commitment to quality investments and connectivity policies.

Several studies have explored the environmental implications of these initiatives. For instance, research has investigated the relationship between political risk, globalization, and ecological footprints in BRI countries, highlighting the need to understand how these factors influence environmental quality (Ashraf, 2022). Additionally, studies have examined carbon emissions and economic development across regions involved in the BRI, emphasizing the importance of addressing carbon inequality and promoting sustainable regional development (Han et al., 2020). Häbel & Hakala (2021) examined the policy coherence for sustainable development in the EU's renewable energy sector, revealing areas where sustainability dimensions could be further enhanced.

Overall, the studies on the Belt and Road Initiative and Global Gateway initiatives reveal a complex landscape of economic, environmental, and geopolitical considerations, which is crucial for policymakers and stakeholders seeking to promote sustainable development and global cooperation. However, the comparative analysis of the sustainable developments of BRI and Global Gateway is insufficient in current studies.

3 Methodology

This study aims to conduct a comparative analysis of the challenges, consequences, and opportunities between the European Union's Global Gateway initiative and China's Belt and Road Initiative (BRI) on the perspective of sustainable development. The research methodology employed in this study is based on a systematic literature review of relevant academic articles and research studies that match the aim of this study.

The selection of literature for this comparative analysis was based on a comprehensive search of academic databases, including but not limited to Scopus, PubMed, and Google Scholar. The search terms used included variations of "EU Global Gateway," "China Belt and Road Initiative," "sustainable development," "challenges," "consequences," and "opportunities." The search was limited to articles published in English between 2010 and 2023 to ensure the relevance and currency of the literature.

The inclusion criteria for selecting literature involved articles that specifically discussed the challenges, consequences, and opportunities associated with the EU's Global Gateway initiative and China's Belt and Road Initiative on the perspective of sustainable development.

The data extraction process involved identifying key themes, findings, and comparisons related to challenges, consequences, and opportunities between the Global Gateway and BRI initiatives in their sustainable development. The extracted data were then synthesized to provide a comprehensive overview of the similarities and differences in the sustainable development perspectives of these initiatives.

The analysis of the literature will focus on identifying commonalities and disparities in the challenges faced, the consequences observed, and the opportunities presented by the EU's Global Gateway initiative and China's Belt and Road Initiative on the dimension of sustainable

development. By synthesizing the findings from the selected literature, this study aims to offer valuable insights into the sustainable development implications of these two global initiatives.

4 Results and Discussion

4.1 Challenges

4.1.1 BRI

The Belt and Road Initiative (BRI) faces several challenges from a sustainable development perspective. Environmental challenges are a significant aspect, with concerns raised about environmental degradation, energy consumption, and carbon emissions (Ascensão et al., 2018; Zhang & Han, 2022; Mohsin et al., 2022). The rapid economic growth associated with the BRI projects can lead to increased carbon emissions, putting pressure on the environment (Zhang & Han, 2022). Additionally, the BRI's focus on infrastructure development and increased trade can lead to environmental issues if not managed sustainably (Mohsin et al., 2022).

Moreover, there are concerns about the sustainability of the projects under the BRI. Questions have been raised about whether these projects are as environmentally friendly as claimed, highlighting the need for a thorough assessment of their impact on the environment (Zubedi et al., 2022). The BRI's emphasis on economic growth and infrastructure development must be balanced with environmental considerations to ensure long-term sustainability (Rasel et al., 2020).

Furthermore, the BRI's impact on regional cultures and economies poses challenges for sustainable development. While the initiative aims to promote economic development and connectivity, there is a need to address cultural heritage, innovation, and contemporary values to ensure a balanced approach to development (Wang &Zhu, 2023). The BRI's influence on the construction industry and geo-economic relations also requires careful analysis to ensure sustainable development practices are followed (Yi, 2022; Hu et al., 2020).

Overall, the challenges in the sustainable development perspective of the Belt and Road Initiative encompass environmental concerns, the need for sustainable project implementation, and the balance between economic growth and cultural preservation. Addressing these challenges will be crucial for ensuring that the BRI contributes positively to sustainable development goals.

4.1.2 Global Gateway

The challenges in the sustainable development perspective of the EU's Global Gateway initiative are multifaceted and require careful consideration. One of the key challenges lies in ensuring that the Global Gateway initiative aligns with sustainable development goals while competing with other global initiatives like China's Belt and Road Initiative (Karjalainen, 2023). The EU's emphasis on providing democratic, secure, equal, green, transparent, and sustainable alternatives to lower-income partners highlights the need to balance economic development with environmental and social sustainability (Karjalainen, 2023).

Moreover, the EU's Global Gateway initiative must address issues related to policy coherence and performance evaluation to ensure that its actions are in line with sustainable development objectives (Keijzer, 2017). Expectation management and evaluating policy coherence for development are crucial aspects that need to be carefully managed to achieve sustainable outcomes (Keijzer, 2017).

Additionally, the EU's engagement in sustainable development through initiatives like the Global Gateway requires a comprehensive approach that considers environmental, economic, and social factors. The EU's commitment to being a global leader in achieving the Sustainable Development Goals (SDGs) necessitates aligning research with policy and practice to ensure sustainable agricultural land systems in Europe (Scown et al., 2019). This alignment is essential for promoting sustainable development practices within the EU and beyond.

Furthermore, the EU's efforts to promote global sustainable development through initiatives like the Global Gateway require effective global governance mechanisms and cooperation with partners like China and Africa (Dong & Jiang, 2021). Trilateral development cooperation between the EU, China, and Africa aims to address global challenges and promote sustainable development through collective action (Dong & Jiang, 2021).

Overall, the challenges in the sustainable development perspective of the EU's Global Gateway initiative revolve around balancing economic growth with environmental sustainability, ensuring policy coherence and performance evaluation, aligning research with sustainable practices, and fostering global cooperation for sustainable development goals.

4.1.3 Comparative analysis

Comparably speaking, BRI's main challenges include managing its environmental impact due to infrastructure and economic development, ensuring the sustainability of its projects, and balancing economic growth with cultural preservation.The Global Gateway initiative's challenges revolve around aligning its efforts with sustainable development goals while offering a competitive alternative to initiatives like BRI. It focuses on environmental sustainability, policy coherence, performance evaluation, and fostering global cooperation for sustainability.

While both initiatives face the fundamental challenge of balancing economic growth with environmental sustainability, the BRI is more focused on managing the direct environmental impacts of its infrastructure projects. In contrast, the Global Gateway initiative places a stronger emphasis on policy coherence, performance evaluation, and global cooperation for sustainable development. Both initiatives recognize the importance of sustainable project implementation, but the Global Gateway explicitly addresses the need for aligning research with sustainable practices and engaging in trilateral development cooperation to achieve global sustainability goals.

4.2 Consequences

4.2.1 BRI

The implications of the Belt and Road Initiative (BRI) on sustainable development are diverse and significant. One key aspect is its impact on carbon emissions and environmental sustainability. The extensive infrastructure projects and economic activities associated with the BRI have the potential to increase carbon emissions, which could hinder efforts to achieve environmental sustainability goals (Rauf et al., 2020). It is crucial to address carbon inequality and reduce emissions in manufacturing-oriented developing countries along the BRI route to mitigate the environmental impact of the initiative (Han et al., 2020).

Furthermore, the BRI's influence on economic development and global trade can affect sustainable growth and energy consumption. It is essential to balance economic growth with sustainable practices to ensure that the BRI contributes positively to sustainable development goals (Rauf et al., 2020). Aligning the initiative's focus on economic cooperation and infrastructure development with sustainable growth principles is necessary to minimize adverse effects on the environment and energy consumption (Liu et al., 2018).

Moreover, the BRI's role in enhancing global connectivity and economic integration can impact inclusive globalization and regional development. While the BRI presents opportunities for economic cooperation and regional integration, it is important to ensure that these endeavors are inclusive and beneficial to all participating nations (Liu et al., 2018; Zhu, 2023). Integrating sustainable development objectives into the BRI can establish a new model for green and sustainable investment, supporting economic growth while upholding environmental and social sustainability (Zhu, 2023).

Additionally, the BRI's influence on global value chains and industrial environmental performance is another critical consideration. By promoting trade integration and regional cooperation, the initiative can help narrow the environmental performance gap between countries, encouraging more sustainable practices within the global value chain (Li et al., 2022). Evaluating the effects of the BRI on economic and environmental efficiency in transportation infrastructure is vital for understanding the regional variations in its impact on sustainable development (Wang, 2021).

In summary, the implications of the Belt and Road Initiative on sustainable development encompass challenges related to carbon emissions, energy consumption, economic growth, inclusive globalization, global value chains, and industrial environmental performance. Addressing these consequences is essential to ensure that the BRI contributes to sustainable development goals while fostering economic cooperation and regional integration.

4.2.2 Global Gateway

The implications of Global Gateway initiatives on sustainable development are intricate and multifaceted. Global gateways, like the Bering Strait and the Mediterranean–Atlantic exchange, act as crucial points of interaction between human and natural systems, impacting the sustainability of these regions in various ways Waloven et al. (2023)Flecker et al., 2023). The socioeconomic and environmental interplays among distant coupled human and natural systems influence the sustainability of global gateways, underscoring the necessity for comprehensive approaches to tackle the challenges and opportunities posed by these gateways.

Global gateways play a pivotal role in shaping global ocean circulation, heat transport, and climate patterns, with alterations in gateway geometry significantly impacting both local and global environmental conditions (Flecker et al., 2023). Grasping the dynamics of gateway exchanges is imperative for managing the environmental repercussions and ensuring sustainable development in these regions. Furthermore, the evolving estuarial city-regional spaces linked with global gateways necessitate adaptable spatial concepts to navigate the complexities of urban and regional development (Haughton & Allmendinger, 2015). Effective governance mechanisms and spatial planning strategies are crucial for fostering sustainable development in these dynamic gateway regions.

In summary, global gateways offer both challenges and opportunities for sustainable development, demanding a comprehensive understanding of the interactions between human activities and natural systems. By addressing the environmental, social, and economic implications of global gateways, stakeholders can strive towards promoting sustainability and resilience in these critical regions.

4.2.3 Comparative analysis

Both initiatives stress the importance of mitigating environmental impacts. BRI emphasizes reducing carbon emissions and integrating sustainable development objectives, whereas Global Gateway focuses on understanding and managing the interactions between human activities and natural systems for sustainability.

BRI places a strong emphasis on economic growth, infrastructure development, and the promotion of global trade and value chains. In contrast, Global Gateway highlights the importance of managing the environmental and socioeconomic implications of global interactions and gateway exchanges.

BRI calls for aligning economic cooperation with sustainable growth principles and fostering inclusive globalization. Global Gateway points to the necessity of comprehensive governance mechanisms and spatial planning strategies to address the complexities of sustainability in gateway regions.

BRI's approach to sustainability is more focused on aligning economic and infrastructural initiatives with sustainable development goals, while Global Gateway takes a broader view, emphasizing the critical role of understanding and managing the complex interplays between human and natural systems at global gateways.

In summary, while both initiatives recognize the importance of sustainability, their approaches differ significantly in focus areas, strategies, and the balance between economic development and environmental sustainability.

4.3 Opportunities

4.3.1 BRI

The Belt and Road Initiative (BRI) offers various opportunities for sustainable development. One significant opportunity is fostering economic cooperation and deeper regional integration among emerging economies, providing avenues for sustainable development Khan et al. (2018). The BRI's international projects promote economic collaboration, potentially leading to sustainable growth and development in participating countries (Yuan et al., 2021). By connecting people globally and facilitating opportunities for peace and development, the BRI acts as a catalyst for sustainable regional and global progress (Toai et al., 2018; Sarker et al., 2018).

Furthermore, the BRI presents new prospects for countries along its routes to enhance their transportation infrastructure, contributing to sustainable economic development (Wang, 2021). The initiative's focus on economic cooperation and regional integration creates opportunities for

developing sustainable value chains and improving industrial environmental performance (Liu et al., 2019; Li et al., 2022). By narrowing the environmental performance gap between countries through trade integration and cooperation, the BRI can drive sustainable practices within the global value chain (Li et al., 2022).

Moreover, the BRI provides opportunities for the development of green logistics and sustainable operations, aligning economic growth with environmental protection (Mohsin et al., 2022). The emphasis on green logistics and environmental considerations can lead to the implementation of sustainable practices benefiting both economic and environmental aspects (Mohsin et al., 2022). Additionally, the BRI's role in promoting servitization and sustainable value creation strategies in the manufacturing industry offers avenues for economic cooperation and regional integration, fostering sustainable development in participating countries (Yuan et al., 2021).

In summary, the Belt and Road Initiative offers numerous opportunities for sustainable development, including economic cooperation, regional integration, transportation infrastructure development, green logistics, and industrial environmental performance. Leveraging these opportunities effectively can contribute to advancing sustainable practices and economic growth along the BRI routes.

4.3.2 Global Gateway

Opportunities in the sustainable development perspective of Global Gateways are significant and multifaceted. Global gateways serve as crucial points of interaction between human and natural systems, offering opportunities for sustainable development through various avenues (Waloven et al., 2023)Schorr et al., 2021). These gateways facilitate global connectivity and trade, providing platforms for economic cooperation and regional integration that can contribute to sustainable growth and development (Waloven et al., 2023). By leveraging global gateways, countries can enhance their participation in global value chains, fostering competitiveness and sustainable practices (Humphrey & Schmitz, 2002).

Moreover, global gateways present opportunities for enhancing environmental sustainability through the management of human activities such as fishing, tourism, and oil and gas development (Waloven et al., 2023). By implementing sustainable practices in these activities, countries can promote environmental conservation and sustainable resource management. Additionally, global gateways offer prospects for enhancing knowledge exchange and international partnerships to inform sustainability transitions and address global challenges (Schorr et al., 2021). Collaborative efforts through international partnerships can drive sustainable development initiatives and shape sustainability transitions on a global scale.

Furthermore, the strategic positioning of global gateways can create opportunities for economic growth, innovation, and sustainable urban development (Eljiz et al., 2023). By utilizing gateway frameworks and spatial planning strategies, countries can promote safe, high-quality care, and sustainable urban environments. Global gateways also offer avenues for promoting green competitiveness, research and development, and business opportunities, fostering sustainable economic growth (Chygryn et al., 2021). Embracing green competitiveness and sustainable practices can drive innovation and economic development while contributing to environmental sustainability.

In summary, Global Gateways present diverse opportunities for sustainable development, including economic cooperation, environmental conservation, knowledge exchange, and green competitiveness. By harnessing these opportunities effectively, countries can advance sustainable practices, foster economic growth, and address global challenges in a collaborative and sustainable manner.

4.3.3 Comparative analysis

Both the BRI and Global Gateway present substantial opportunities for advancing sustainable development, yet they do so through slightly different mechanisms and focus areas.

The BRI is more directed towards physical infrastructure development and economic collaboration among countries, primarily in the context of emerging economies. Its initiatives are targeted at creating sustainable value chains and improving industrial environmental performance through green logistics and the promotion of sustainable operations. On the other hand, Global

Gateway focuses more broadly on global connectivity and trade, environmental conservation, and the promotion of green competitiveness and innovation. It highlights the importance of managing human activities in a sustainable manner and leveraging strategic positioning for sustainable urban development and economic growth.

The BRI places a strong emphasis on infrastructure and trade as the backbone of sustainable development, aiming to bridge economic and environmental objectives through tangible projects. Conversely, Global Gateway appears to adopt a more holistic approach, integrating economic growth with environmental sustainability, knowledge exchange, and innovation to tackle global challenges collaboratively.

In essence, while both initiatives seek to promote sustainable development, the BRI leans more towards enhancing physical infrastructure and economic cooperation as a means to achieve sustainability. At the same time, Global Gateway encompasses a wider array of sustainable development opportunities, including environmental conservation, innovation, and collaborative global efforts to address sustainability challenges.

5 Conclusions

This research provides a comprehensive examination of the European Union's Global Gateway initiative and China's Belt and Road Initiative (BRI) within the framework of sustainable development, highlighting their challenges, consequences, and opportunities. The analysis reveals a complex landscape of sustainable development efforts characterized by both distinctive and shared challenges faced by each initiative.

The challenges highlighted for both initiatives underscore the difficulty in balancing economic growth with environmental sustainability. The BRI's environmental sustainability concerns, stemming from its infrastructure projects, contrast with the Global Gateway's challenges in aligning its ambitions with sustainable development strategies and fostering global cooperation. Despite these differences, both initiatives face the universal challenge of integrating sustainable development principles into their core strategies.

The consequences of the BRI and Global Gateway on sustainable development are significant, with each initiative impacting global sustainability in unique ways. The BRI's potential to increase carbon emissions due to extensive infrastructure projects presents a considerable challenge to environmental sustainability goals. In contrast, the Global Gateway's focus on managing the complex interactions between human and natural systems highlights the initiative's broader approach to sustainability. Yet, both initiatives underscore the critical need for sustainable practices to ensure that economic growth and connectivity enhancements do not come at the expense of the environment.

Opportunities for advancing global sustainable development emerge from both the BRI and Global Gateway, albeit through different avenues. The BRI offers prospects for economic cooperation and infrastructure development, aiming to foster sustainable value chains and industrial environmental performance. Simultaneously, the Global Gateway brings to light the importance of global connectivity, environmental conservation, and the promotion of collaborative efforts to address sustainability challenges. These opportunities illustrate the initiatives' potential to contribute to sustainable development, highlighting their respective focuses on infrastructure and broader sustainability goals.

This analysis demonstrates that while the BRI and Global Gateway have distinct paths towards sustainable development, their goals intersect in the broader context of global sustainability efforts. The BRI's infrastructure-centric approach complements the Global Gateway's comprehensive sustainability vision, presenting a multifaceted approach to sustainable development. The comparative analysis not only enriches the understanding of how these large-scale initiatives can

navigate the complexities of sustainable development but also sets the groundwork for future research into optimizing their impacts on global sustainability.

By drawing from the insights of this research, it is clear that a nuanced approach to sustainable development is necessary, one that appreciates the balance between economic, environmental, and social factors. The comparative analysis of the BRI and Global Gateway initiatives offers valuable lessons for policymakers, stakeholders, and the international community in advancing sustainable development in an interconnected and rapidly changing global landscape.

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THE IMPORTANCE OF MARKETING IN THE DEVELOPMENT OF DESTINATIONS

Tleuberdinova Aizhan Tohtarovna[1]*,Tulenbayeva Zhaniye Muratkyzy[2]

[1] Institute of Economics, Almaty, Kazakhstan

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

*E-mail: zhaniye.t@gmail.ru

Abstract. This study explores into the complex field of marketing management, with a particular emphasis on the development of strategic frameworks and how important they are in determining customer behavior and brand equity in the modern digital environment. This study clarifies the shift from product-centric to customer-centric marketing strategies by incorporating foundational theories from eminent academics like Philip Kotler, Kevin Lane Keller, and Jerome McCarthy. It emphasizes the significance of comprehending consumer behavior and utilizing digital technologies.

Methodologically, the study breaks down and synthesizes important marketing management theories, strategic planning models, and consumer behavior insights using a thorough literature analysis, case study analyses, and comparative analytical techniques. This method makes it easier to delve deeply into the dynamics of brand-consumer interactions in digital ecosystems as well as the strategic foundations of successful marketing strategies.

Outcomes reveal that a strategic orientation towards holistic marketing management, augmented by a robust understanding of digital consumer behavior, significantly enhances brand equity and market positioning. The findings emphasize the criticality of integrating cross-functional insights and adopting agile marketing strategies in response to evolving consumer expectations and technological advancements.

Conclusions drawn from the research highlight the transformative impact of digitalization on marketing strategies and consumer engagement. The study advocates for the adoption of a strategic, integrated approach to marketing management that prioritizes consumer insights, brand equity, and digital engagement. This approach not only fosters sustainable competitive advantages but also aligns with the shifting paradigms of global marketing practices, thereby ensuring organizational resilience and growth in a rapidly changing market landscape.

Keywords: Marketing management, consumer behavior, brand equity, digital marketing strategies, strategic planning

JEL codes: M31 – Marketing, M37 – Advertising, M15 - IT Management, O33 - Technological Change: Choices and Consequences; Diffusion Processes, D12 - Consumer Economics: Empirical Analysis

Introduction

The field of marketing management has become a crucial area of study and practice in the ever-changing business and commerce world. It has completely changed how companies interact with their customers and fight in the global market. The shift from conventional, product-focused marketing techniques to sophisticated, customer-focused tactics that make use of digital technologies and in-depth consumer insights to promote brand loyalty and propel corporate growth is at the core of this change. The core theories of marketing management, as expressed by notables like Philip Kotler, Kevin Lane Keller, and Jerome McCarthy, are examined in depth in this research study, along with their applicability and relevance in the current digitally-driven market environment.

This study is conducted against the backdrop of rapidly evolving technology and shifting customer tastes that have completely changed the marketing landscape and forced companies to embrace more strategic, integrated marketing strategies. This research has two goals: first, it will give a thorough overview of the major theoretical frameworks that have influenced marketing management; second, it will look into how these theories are used in relation to digital marketing tactics and consumer behavior insights to build long-term brand equity and competitive advantage.

This study intends to discover the strategic foundations of effective marketing strategies and

the impact of digital technologies in boosting customer engagement and brand performance through a methodological synthesis of literature review, case analysis, and empirical research. By doing this, it hopes to provide insightful guidance on navigating the intricacies of the contemporary marketing landscape for academics and industry professionals alike, highlighting the significance of brand management, strategic planning, and consumer-centric marketing techniques in attaining corporate success.

Literature review

Many academics have made significant contributions to the field of marketing management, each providing distinctive viewpoints that have combined to form the field into what it is today. With a focus on the writings of Philip Kotler, Kevin Lane Keller, Jerome McCarthy, *David A. Aaker*, *Theodore Levitt*, Michael Porter, *Gerald Zaltman*, Dallen J. Timothy Chris Ryan, and others, as well as the critical examination of the foundational theories and strategic frameworks that have played a key role in this transformation, this literature review highlights the significance of digital technology in changing consumer engagement and brand equity.

In order to provide value to customers, marketing initiatives must be integrated, as highlighted by Philip Kotler's holistic marketing approach. In addition to emphasizing financial transactions, Kotler's perspective on marketing as a societal activity also takes into account social and ethical factors that help businesses maintain enduring relationships with their customers (Kotler & Keller, 2016). His concept of holistic marketing provides a comprehensive framework that harmonizes product, price, place, and promotion with the needs and preferences of consumers.

Kevin Lane Keller's Brand Equity Model introduces a strategic method to measure and manage brand equity, focusing on brand knowledge structures. Keller (1993) posits that brand equity is built on two dimensions: brand awareness and brand image. His model highlights the significance of developing a strong brand identity and leveraging it to achieve competitive advantage. Keller's work has been pivotal in illustrating how brand equity serves as a crucial intangible asset that influences consumer behavior and preferences.

Jerome McCarthy's 4Ps of Marketing presents a classic framework that has been the cornerstone of marketing strategy for decades. McCarthy's (1960) marketing mix—product, price, place, and promotion—provides a practical tool for marketers to design comprehensive marketing strategies. While the 4Ps model has faced criticism for being product-centric, its adaptability has proven effective in various contexts, including digital marketing.

Digital Marketing Strategies have transformed the interaction between brands and consumers. The literature reveals a significant shift towards digital platforms, which has altered the dynamics of consumer engagement (Chaffey & Ellis-Chadwick, 2019). Digital marketing strategies leverage online tools and social media to create personalized and interactive brand experiences. This transition underscores the importance of agility and responsiveness in marketing strategies to cater to the digitally savvy consumer.

Dallen J. Timothy [1]is known for his work in the areas of heritage tourism, border regions, and tourism planning, which contributes to the understanding of how regional tourism developments can utilize cultural and natural assets.

Chris Ryan 's work [2], particularly in the areas of tourist behavior and destination management , helps to understand the demand side of regional tourism complexes and how destinations can be managed to meet visitor needs while ensuring sustainability.

Known for his research in tourism information technology and marketing, Fesenmaier's work is relevant to the promotion and management of regional tourism destinations in the digital age.

These scholars, among others, have contributed to a broad understanding of how tourism destinations, including regional complexes, can be developed, managed and sustained over time. Their research covers a wide range of topics, from the strategic planning of tourist attractions to the socio-economic and environmental impacts of tourism on regions.

[1]Timothy, J. Timothy (2011). Cultural heritage and tourism: Introduction. (n.p.): Channel View Publications .

[2] Ryan , K. (2003). Recreational tourism: demand and impact. UK : Channel View Publications .

In the field of tourism research, the conceptualization of regional tourism complexes has received considerable scholarly attention, offering a multifaceted lens through which the integration of tourism development in specific geographic regions can be understood. Notably, Butler's (1980) seminal work on the Tourism Area Life Cycle (TALC) model provides a fundamental framework for studying the evolutionary processes of tourism destinations , including regional tourism complexes, highlighting stages from exploration to potential decline or rejuvenation, thereby emphasizing the dynamic nature of destination development (Butler , 1980). This theoretical perspective is complemented by Wall's (2007) research on tourism and environmental interactions, which highlights the critical balance between tourism growth and its conservation within regional complexes, supporting the need for sustainable planning and management practices (Wall , 2007).

Moreover, Jafari's (2000) contributions to the field, especially his advocacy of an interdisciplinary approach to tourism research, enriches the discourse on regional tourism complexes by emphasizing the importance of cultural, economic, social and environmental considerations in the development and sustainability of these complexes. areas (Jafari , 2000). Similarly, Hall (2008) and Timothy (2011) extend this dialogue by exploring the implications of sustainable tourism and cultural heritage respectively in the context of regional development, thereby highlighting the potential of regional tourism complexes to utilize unique cultural and natural assets while promoting economic and social development well- being

By synthesizing these scholarly perspectives, it is clear that the development and management of regional tourism destinations is inherently complex and requires a strategic, integrated approach that balances the needs of tourism growth with the imperatives of sustainability and public benefit. The contributions of these scholars collectively highlight the need for a comprehensive understanding of the dynamic interactions between tourism attractions, environmental protection, cultural heritage, and community interests in the planning and development of regional tourism destinations.

Characteristics of the regional tourist complex :

Geographical Integration: A regional tourism complex covers a defined geographic area, which may include multiple cities or natural landscapes within the region, offering a variety of experiences in close proximity.

Variety of attractions and services. These complexes typically include a combination of attractions (such as natural parks, cultural sites, and entertainment venues), accommodations (from luxury hotels to budget hotels), restaurants, shopping centers, and recreational activities (such as hiking). , skiing or water sports) to suit a wide range of interests and preferences.

Strategic Development and Management: Planning and development of regional tourism destinations involves the coordinated efforts of various stakeholders, including local governments, tourism boards, private businesses and community groups, to ensure sustainable tourism growth in the region.

Focus on sustainability: Many regional tourism developments are being developed with a focus on sustainability, seeking to balance tourism growth with environmental conservation and the well-being of local communities.

Economic and Social Impact: By attracting visitors to the region, these developments can make a significant contribution to the local economy by creating jobs, generating income and promoting cultural exchange.

In conclusion, the literature on marketing management reveals a dynamic field shaped by theoretical advancements and practical applications. The transition from product-centric to consumer-centric approaches highlights the discipline's adaptability to changing market conditions and technological advancements. The contributions of Kotler, Keller, and McCarthy, combined with the rise of digital marketing, offer a rich tapestry of insights that continue to influence marketing strategies and practices. As the digital landscape continues to evolve, so too will the theories and frameworks that underpin marketing management, necessitating ongoing research and adaptation.

Methodology

The methodology of this research encompasses a multi-faceted approach designed to provide a comprehensive analysis of the evolution and impact of marketing management strategies within the context of digital transformation. Given the scope and objectives of the study, the methodology is structured around a combination of qualitative and quantitative research techniques, aiming to offer a holistic view of the current marketing landscape, informed by historical perspectives and contemporary practices.

A systematic literature review serves as the foundation of the research, facilitating an in-depth examination of seminal and current academic works in the field of marketing. This review spans foundational theories posited by scholars such as Philip Kotler, Kevin Lane Keller, and Jerome McCarthy, alongside contemporary research focusing on digital marketing innovations and consumer engagement strategies. The literature review process involves sourcing material from peer-reviewed journals, industry reports, and authoritative marketing texts, ensuring a rich tapestry of insights into marketing management evolution.

To contextualize theoretical frameworks within real-world applications, a series of case studies are selected for analysis. These case studies represent a diverse array of industries and marketing challenges, showcasing the implementation of strategic marketing principles, digital engagement tactics, and brand management practices. The selection criteria for case studies include the presence of innovative marketing strategies, documented outcomes related to brand equity and consumer behavior, and the applicability of lessons learned to broader marketing contexts.

A comparative analysis methodology is employed to compare traditional marketing strategies with digital-era innovations, highlighting shifts in consumer behavior, technology's role in marketing, and the outcomes of strategic adaptations. This analysis leverages data from the case studies, literature review findings, and industry benchmarks, providing a nuanced understanding of marketing's evolution and its implications for practitioners.

Quantitative data pertaining to consumer behavior, digital marketing metrics, and brand performance indicators are collected through secondary sources, including industry databases and analytics platforms. Qualitative insights are gleaned from interviews with marketing professionals, academic experts, and case study documentation. The analysis involves both statistical evaluation and thematic content analysis, aiming to identify patterns, trends, and strategic insights relevant to marketing management's current and future landscape.

Results and Discussion

A significant shift from product-centric to consumer-centric marketing strategies was observed, underpinned by digital transformation. This shift emphasizes understanding and responding to consumer behaviors, preferences, and feedback in real-time, leveraging digital platforms.

The adoption of digital marketing strategies has become imperative for brands aiming to maintain competitive advantage. Social media, content marketing, and personalized communication were highlighted as key elements in engaging with the modern consumer.

The research identified a nuanced understanding of brand equity, emphasizing the role of digital presence, consumer experiences, and interactive engagements in building and sustaining brand value. Successful case studies illustrated that brands leveraging digital platforms effectively could enhance their equity and consumer loyalty.

The need for agile and responsive marketing planning processes was evident, with data analytics playing a crucial role in informing strategy. The integration of technological tools has enabled more precise targeting and measurement of marketing efforts, leading to optimized return on investment.

Insights into consumer behavior underscored the importance of personalization, convenience, and value alignment. Consumers today expect brands to not only understand their needs but also to reflect their personal values and social concerns.

Through a comprehensive analysis of the existing literature on tourism development and strategic marketing management, the authors have distilled a nuanced definition of the term "Strategic Marketing Management of the Development of Regional Tourist Complexes." This definition encapsulates the essence of a sophisticated and dynamic approach necessary for fostering

the growth and sustainability of tourism within specific geographical regions. Recognizing the complexity of this endeavor, the authors highlight the critical stages of careful planning, thorough analysis, meticulous implementation, and ongoing control of marketing strategies as foundational to the promotion, improvement, and development of tourism sectors.

This intricate process is characterized by its multifaceted nature, involving the identification of unique regional attractions and resources that form the bedrock of a region's tourism appeal. The authors underline the importance of understanding the diverse needs and preferences of various tourism groups, acknowledging that a one-size-fits-all strategy is insufficient in today's competitive tourism market. Central to this definition is the development of marketing strategies that not only highlight but effectively communicate the region's unique value proposition to potential visitors, ensuring that the region stands out in a global marketplace.

This author's definition, emerging from the synthesis of broad scholarly contributions, brings a significant advancement to the academic discourse on strategic marketing within the tourism industry. It provides a clear, comprehensive framework that captures the complexity of marketing management in the context of regional tourist complexes, serving as a valuable guide for practitioners, scholars, and policymakers engaged in the strategic development of tourism destinations.

Discussions

The results of this study illuminate the transformative impact of digital technologies on marketing management. The evolution towards consumer-centric strategies reflects a broader shift in market dynamics, where power has transitioned to consumers, empowered by information and connectivity. This paradigm shift necessitates that marketers adopt more nuanced, data-driven approaches to engage with their audiences.

Digital engagement emerges as a cornerstone of modern marketing, with platforms and tools offering unprecedented opportunities for brands to connect with consumers. However, this also presents challenges in terms of data management, privacy concerns, and the need for authentic engagement strategies that resonate with consumers on a personal level.

The evolution of brand equity in the digital age highlights the increasing importance of experiential and relational factors over traditional advertising. Brands that succeed in creating meaningful, value-driven experiences for consumers can foster deeper loyalty and advocacy, translating into sustained competitive advantage.

Strategic marketing planning now requires an agile approach, responsive to rapid market changes and consumer trends. The integration of analytics and technological tools facilitates a more dynamic, iterative planning process, allowing marketers to adapt strategies in real time.

Understanding consumer behavior has become more complex in the digital age, with a multitude of factors influencing decision-making processes. Personalization, convenience, and value alignment are key drivers of consumer engagement, underscoring the need for brands to adopt a more holistic, consumer-centric approach in their marketing efforts.

In conclusion, the research highlights the need for a strategic reevaluation of marketing practices in the context of digital transformation. Marketers must embrace technological advancements, prioritize consumer insights, and foster authentic engagements to navigate the complexities of the modern marketing landscape successfully.

Conclusions

The comprehensive analysis undertaken in this study illuminates the profound impact of digital transformation on the realm of marketing management. It underscores a pivotal shift from traditional, product-centric strategies to a more nuanced, consumer-centric approach, driven by the need to engage digital-savvy consumers. The findings elucidate the importance of leveraging digital platforms for engagement, the evolving concept of brand equity in the digital age, the imperative for agile strategic planning influenced by real-time data analytics, and the complex dynamics of modern consumer behavior.

The digital era mandates a marketing paradigm that prioritizes understanding and meeting consumer needs, preferences, and values. Brands must adopt a consumer-centric mindset,

employing digital tools and platforms to foster meaningful interactions and relationships with their audiences.

Effective digital engagement strategies—encompassing social media, content marketing, and personalization—are critical for building and sustaining brand presence and loyalty. These strategies enable brands to connect with consumers in a relevant, authentic manner.

The study reveals that brand equity now increasingly hinges on digital experiences, consumer engagement, and the alignment of brand values with consumer expectations. Digital platforms offer unique opportunities for brands to enhance their equity by engaging consumers in interactive, value-added experiences.

The rapid pace of digital transformation necessitates agile marketing strategies that can adapt to changing consumer behaviors and market dynamics. Data analytics emerge as a key enabler, providing insights that inform strategic decisions and optimize marketing performance.

In the digital age, consumer behavior is influenced by a multitude of online and offline factors, including the desire for personalization, convenience, and social responsibility. Marketers must delve deeper into these behavioral insights to tailor their strategies effectively.

This study's insights advocate for an integrated, strategic approach to marketing management that embraces digital innovation while remaining steadfastly focused on consumer needs and behaviors. Future research should explore the long-term implications of digital transformation on marketing strategies, particularly in emerging markets and sectors. Additionally, there is a need for ongoing investigation into the ethical considerations and consumer privacy concerns associated with digital marketing practices.

In conclusion, navigating the complexities of the digital landscape requires marketers to be agile, informed, and empathetic. Success in this environment is not just about adopting new technologies but about fundamentally rethinking marketing strategies to prioritize consumer engagement, brand value, and strategic agility.

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MOTIVATION IN AGILE PROJECT MANAGEMENT METHODOLOGY

Altynay K. Tyulkubayeva*, Gulmira B. Nurseiytova
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: altynay_89@mail.ru

Abstract. The methodology of agile project management has become widely used in modern organizational practice due to its adaptive and iterative approach to project implementation. However, the effectiveness of agile methodologies largely depends on the motivation of the involved team members. This article explores the concept of motivation in the context of flexible project management, examines its importance, problems and factors, strategies to stimulate and maintain motivation throughout the project lifecycle. Based on the existing literature and practical conclusions, the purpose of this article is to provide a comprehensive understanding of how motivation affects the results of flexible projects, and to offer practical recommendations for project managers and team leaders to increase motivation in flexible teams.

Keywords. motivation, agile, project, flexible, team, project management

1 Introduction

Nowadays when companies need to respond quickly to their customers and stakeholders, they need to bring products to market faster and make improvements to their services and solutions. In this article, we will try to find out what role Agile plays today and how Agile practices can help organizations be successful on their way.

The Agile Software Development Manifesto itself includes 4 principles, one of the first is the following: People and their interaction are more important than processes and tools. In order for people to work more efficiently, processes and tools should not limit them. In Agile, neither the process nor the software tool dictates what people should do. Moreover, they decide for themselves how to change the processes/tools of their work.

To speed up the development process, people should also interact directly (without intermediaries in the form of documents or other people), actively communicate with each other in person, and not in writing. However, in modern business, communication is often forced to switch to online. But then it should be a video link with interactive online boards, not just emails and chats.

Do not forget about the third principle, which states the following: Cooperation with the customer is more important than agreeing on the terms of the contract. In order to get a product that is really valuable to the customer at the exit, it is worth giving up unnecessary details in the contract between the contractor and the customer (as well as in the requirements of the internal customer to the internal product developer).In order for the business value of the product to grow rapidly, the customer and the developer must communicate closely as they work. In this case, all changes and problems that arise are promptly handled by both parties.

And in order for such cooperation between the contractor and the customer to become possible, it is necessary to build their trust in each other. All this makes it possible not to forget to motivate the stakeholders of the project, which in turn is an important component of the entire project.

Flexible project management has become an important approach to solving the complexities and uncertainties inherent in modern projects. Unlike traditional project management methodologies, agile methodologies emphasize adaptability, collaboration, and continuous improvement. Central to the success of agile projects is the motivation of individuals and teams involved in them. Motivation plays a key role in maintaining momentum, facilitating collaboration, and stimulating innovation in agile teams. This article examines the importance of motivation in flexible project management, sheds light on its dynamics, problems and optimization strategies.

The use of flexible methodologies significantly increases the chances of project success (Gemino et.al., 2021), which is reflected in the growing adoption of agile methodologies and practices (Dingsøyr et.al., 2018; Uludağ et al., 2021).

Agility is becoming relevant in practice, which leads to equally high scientific interest (Sithambaram et al., 2021). Most studies focus on methods to increase flexibility (Conforto et al., 2014; Copola Azenha et al., 2021). Other researches highlights the important of relationship between flexibility and performance (Bechtel et al., 2023; Kaufmann et al., 2020). And very few studies address the human aspects of agility (Burga et al., 2021). This shortcoming is surprising, since the Agile manifesto emphasizes the high importance of people.

2. Understanding Motivation in Agile Project Management: Motivation in the context of agile project management refers to an incentive or incentive that causes individual members of the project team to actively participate, collaborate and strive to achieve project goals. Motivated team members are more likely to show a higher level of commitment, creativity, and resilience, the necessary attributes to navigate the iterative nature of agile projects. Motivation in a flexible environment is multifaceted, it is influenced by both internal and external factors. Intrinsic motivation comes from a person's inner desires, such as single-mindedness, autonomy, skill, and the pleasure derived from the work itself. Extrinsic motivation, on the other hand, includes extrinsic rewards or incentives such as recognition, bonuses, or career opportunities.

The flexible methodology is characterized by minimal, informal and easily interpreted documentation, created only for the purpose of improving efficiency, and deep cooperation, in which stakeholders are given time to share their successes on a daily basis. This in turn facilitates informal knowledge sharing and makes each participant accountable. At the same time, the high importance of human factors is emphasized due to the emphasis on “individuals and interactions” and “cooperation with clients”.

2 Literature review

The agile project management methodology originated as a dynamic approach to software development and project execution, emphasizing adaptability, collaboration, and iterative execution. In this context, motivation plays a crucial role in improving team performance and achieving project success. This section provides an overview of the relevant literature exploring the intersection of motivation and agile project management methodology, highlighting key concepts, theoretical foundations, and empirical results.

However, there is not enough research on the relationship between flexibility and employee dedication. There are qualitative studies such as flexible approaches contribute to motivation in IT project teams, while other studies have analyzed the relationship of flexible approaches with employee satisfaction and reduced developer fatigue. (Belgian, 2022) explored how agile methods relate to the well-being of software developers, looking at the deeper mechanisms of this relationship and potential adverse effects.

Motivation Theories in Agile Context:

Motivation theories provide valuable information for understanding the factors that motivate people to engage in work-related activities and make efforts to achieve goals. In the context of agile project management, several well-known motivation theories have been applied to explain the dynamics of team motivation.

Self-determination Theory (SDT): SDT, proposed by Decaux and Ryan (1985), argues that individuals are inherently motivated to satisfy three basic psychological needs: autonomy, competence, and connection. In flexible teams, autonomy is manifested through self-organization and decision-making authority, competence is developed through skill development and mastery, and interconnectedness is strengthened through collaboration and interpersonal relationships. Research using SET in an agile environment has demonstrated its relevance for understanding the internal motivation of team members and its impact on project effectiveness (Ryan & Deci, 2000).

Goal Setting Theory (GST): GST, introduced by Locke and Latham (1990), suggests that setting specific and complex goals increases motivation and productivity. In flexible project management, the iterative nature of goal setting, characterized by short-term tasks or "sprints", is

consistent with the principles of GST. Research has shown that clear, complex goals in flexible projects can stimulate motivation, focus attention, and improve team performance (Larman & Vodde, 2009).

Scaled Agile Framework (SAFe®) is a set of organizational and workflow templates for implementing agile methodologies across the company. This platform is a body of knowledge that includes structured guidance on roles and responsibilities, ways to plan and manage work, and related values.

In general, all this is aimed at and primarily works on engagement. At the same time, it is possible to ask people for their expert opinion of highly qualified people, and listen to it. They highlight the risks of achieving business goals, and in exchange receive support from management to reduce these very risks. There is also an outline of what common goals need to be worked on. The principles of the Scaled Agile Framework provide for the improvement of the company as a whole through the adoption of flexible and lean solutions covering all functional and organizational units. These principles influence not only the decisions of managers and managers, but also the decisions of each employee of the organization; they necessitate a transition from traditional thinking to thinking based on flexible and lean management methods, which are used, for example, in Lean Portfolio Management practices.

Principle No. 8. Uncover the inner motivation of knowledge workers. This principle was created under the influence of the ideas of management consultant Peter Drucker and author Daniel Pink. It is about unlocking the potential of teams and replacing the team-administrative thinking of management with a training and helping approach to working with teams.

Factors Affecting Motivation in Agile Projects:

Success factors can be defined as inputs to a management system that directly or indirectly affect the success of a project. However, the list of success factors can be long, and it is known that people work better when they are not working in multitasking mode (Koch, 2018). This also applies to managers, which justifies the importance of minimizing the number of variables they have to keep track of and helps them prioritize these variables so they can focus on the most important ones. Based on the work of D. Ronald Daniel, John Rockart described the CSF model, which was already used by the center of the Massachusetts Institute of Technology at that time. Rockart defined CSF as "...a limited number of areas in which the results, if satisfactory, will ensure the successful competitiveness of the organization." In other words, CSF is a subset of the success factors that are necessary to achieve success. There are many ways to detect CSF. They can be identified using intuition, philosophy, or by conducting a systematic review of the literature. They can also be found empirically using methods ranging from more structured ones, such as questionnaires with only closed answers, to less structured methods, such as gathering information from conversations with experts.

The critical success factors model is one of the important aspects in motivation research. Many models of critical success factors (CSF) have been proposed and tested in research) (Radhakrishnan et.al., 2022; Serrador et.al., 2015; Tam et.al., 2020) [11], [12] and human-related factors were identified (Alami et.al., 2022; Boehm et.al., 2005). For example, (Tam et al., 2020) identified the capabilities of the factory team and customer engagement as critical, and this model was able to explain 46% of the project's success. Other post-experimental studies and recent literature reviews have highlighted the same two factors (Henriksen et al., 2017; Tsoy et al., 2021). All this highlights the importance of the project team and their involvement, which is impossible without the motivation of the project team members.

Consequently, various factors influence motivation in agile project teams, affecting individual engagement, satisfaction, and productivity. Understanding these factors is important for project managers and team leaders to create a supportive environment conducive to motivation.

Leadership and Management support: Effective leadership and management methods play a crucial role in shaping the motivational climate in flexible teams. Supportive leaders who provide guidance, resources, and recognition increase team motivation and commitment (Leffingwell, 2010; Dikert et.al.,2016).

Team dynamics and collaboration: Positive team dynamics characterized by trust, communication and teamwork contribute to high motivation and productivity in flexible projects. Conversely, conflicts, interpersonal tensions, or lack of cohesion can undermine motivation and hinder project progress (Schwaber, 2004).

Feedback and Recognition: Regular feedback and recognition of individual and team contributions are essential to maintain motivation and engagement in agile projects. Timely feedback promotes learning, improvement and a sense of accomplishment, enhancing motivation.

Empirical Studies on Motivation in Agile Projects:

Empirical research has provided valuable insights into the relationship between motivation and project outcomes in an agile context, suggesting practical implications for project management practices.

The research examined the impact of motivation on team performance in agile software development projects. The results showed a significant positive correlation between intrinsic motivation, team cohesion and project success, highlighting the importance of strengthening intrinsic motivation in agile teams.

Similarly, the role of leadership and team dynamics in motivating agile teams has been studied. The results showed that management support, clear communication and norms of cooperation significantly affect the motivation of the team and the results of the project.

A systematic review of the success factors of scaling flexible methods in the global software development environment conducted from the perspective of the client and supplier (Shameem et.al., 2017) revealed the following in Human Resource Management: conducting trainings, motivating developers, creating self-organizing teams.

The literature review highlights the importance of motivation in the methodology of flexible project management, relying on theoretical foundations and empirical research to clarify its determinants and results. By combining ideas from motivation theories and empirical research, project managers and team leaders can use motivational factors to improve team performance and achieve project success in flexible environments.

3. Methodology

When researching the role of motivation within the framework of the agile project management methodology, a mixed-method approach was used to provide a comprehensive understanding of the topic. This methodology included methods for collecting data from various sources, including a literature review, case studies.

A thorough review of the existing literature was conducted to create a theoretical basis for understanding motivation in the context of agile project management methodology. Academic databases such as ScienceDirect, Scopus and Google Scholar were systematically searched for relevant keywords, including "agile project management", "motivation", "intrinsic motivation" and "extrinsic motivation". Peer-reviewed journals, conference proceedings, books and official documents have been thoroughly studied in order to identify key concepts, theoretical models and empirical studies related to motivation in an Agile environment.

The methodology described above has contributed to a thorough and systematic study of the role of motivation in the methodology of flexible project management. Combining information from a literature review, case studies, this study aims to complement the existing body of knowledge about motivation in an Agile environment, offering practical recommendations to project managers, team leaders and organizations seeking to increase motivation and productivity in Agile projects.

4.Results and discussion

Challenges to Motivation in Agile Projects

Despite its importance, maintaining a high level of motivation in agile projects can be challenging. Several factors contribute to motivation problems, including:

Unclear goals: Frequent changes in project goals can demotivate team members, leading to confusion and disconnection.

Team dynamics: Conflicts, poor communication, or lack of trust between team members can negatively affect motivation and collaboration.

Ambiguity of roles: Unclear roles and responsibilities within a team can create confusion and frustration, hindering motivation.

Emotional burnout: The rapidly changing nature of flexible projects, combined with high workloads, can lead to emotional burnout and decreased motivation over time.

Strategies for Enhancing Motivation in Agile Teams

To mitigate the above-mentioned problems and promote a culture of motivation in agile teams, project managers and team leaders can implement the following strategies:

Clear communication: Transparent communication about the goals, expectations and progress of the project helps to understand the purpose and coordinate the actions of team members. Ready-made solutions from agile development can help you here, such as Scaled Agile Framework

Continuous feedback: Regular feedback cycles promote learning, improvement, and recognition of individual and team contributions, enhancing motivation.

Skill Development: Providing opportunities for skill development and mastery is consistent with intrinsic motivation for personal growth and development.

Celebrating Success: Recognizing and honoring milestones and achievements helps create a positive work atmosphere and increases motivation.

Work-life Balance: Maintaining work-life balance and solving workload-related problems helps prevent burnout and supports motivation in the long run.

Intrinsic vs. Extrinsic Motivation. The results highlight the importance of both internal and external motivational factors in the methodology of flexible project management. While internal motivators promote long-term engagement and satisfaction, external motivators can provide short-term incentives and rewards. A balanced approach that takes into account both internal and external motivation is necessary to maintain motivation and maximize productivity in agile teams.

Implications and Recommendations

The results obtained have a number of implications for practitioners and organizations seeking to optimize motivation within the framework of flexible project management methodology:

Leadership and Culture: Effective leadership, characterized by empathy, communication, and empowerment, is essential to increase motivation and resilience in agile teams. Organizations must cultivate a culture of trust, cooperation, and psychological security in which employees feel valued, respected, and motivated to make their best contribution.

Training and Development: Investing in training and development programs can equip Agile practitioners with the necessary skills and competencies to effectively solve motivation problems. This may include training in communication, conflict resolution, emotional intelligence, and Agile methodologies to enhance team cohesion and productivity.

Continuous Improvement: Agile principles support continuous improvement and adaptation based on feedback and lessons learned. Organizations should foster a culture of experimentation, innovation, and reflection by encouraging teams to repeat their processes, experiment with new approaches, and learn from both successes and failures.

Limitations and Future Research Directions

This study should be interpreted with an awareness of its limitations. Although the results provide valuable information about motivation in the methodology of flexible project management, certain limitations should be recognized. The study was mainly based on data provided in scientific databases. Future research could use longitudinal studies or experimental developments to assess the causal relationships between motivational factors and project outcomes. In addition, the study of the role of cultural differences, team diversity, and organizational context in shaping motivational dynamics in agile teams requires further study.

Considering the discussion above, the results of this study, although not fully consistent with expectations, provide greater consistency and clarity in the literature, contributing to a better understanding of the impact of motivation in agile projects

The results and discussion highlight the importance of motivation in agile project management methodology and offer practical ideas to increase motivation and productivity in agile teams. By addressing motivation issues, leveraging internal and external motivational factors, and encouraging a culture of continuous improvement, organizations can maximize the benefits of agile methodologies and achieve excellent project results.

5.Conclusion

In conclusion, this study has shed light on the importance of motivation within the framework of agile project management methodology. Thanks to a comprehensive study of motivational factors, problems and strategies, valuable information has been obtained about the dynamics of motivation in flexible projects. The results highlight the importance of creating a motivating work environment characterized by clear communication, empowerment, constant feedback and a supportive organizational culture.

Moving forward, it is crucial for organizations to recognize the crucial role of motivation in the success of agile projects and prioritize efforts to increase motivation at both the individual and team levels. By implementing effective motivation strategies and reactively solving problems, organizations can unlock the full potential of flexible methodologies and achieve excellent project results.

This research provides the basis for further research in the field of motivation and agile project management, encouraging ongoing research and innovation in this dynamic field. Based on the findings presented here, future research may delve deeper into specific aspects of motivation, explore alternative methodologies, and explore the long-term impact of motivational interventions on the effectiveness of agile projects.

In conclusion, it should be noted that motivation remains the cornerstone of the agile project management methodology, shaping team dynamics, productivity and, ultimately, project success. It is through a subtle understanding of motivation and its complex interaction with Agile principles that organizations can truly harness the transformative power of agile methodologies in today's rapidly changing business landscape.

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EFFECTIVE RISK MANAGEMENT IN SUPPLY CHAINS IN THE AGRO-INDUSTRIAL COMPLEX

Bekmetova Aruna Kerneevna*, Koshkina Olga Valentinovna
Al-Farabi KazNU, Almaty, Kazakhstan
*E-mail: ak.bekmetova@gmail.com

Abstract. Effective supply chain management covers all links: supplier, manufacturer, distributor, retail. Each link has its own methods, but there is a universal one - optimization of the supply chain using the approaches of the Theory of Constraints. The article discusses the methodology and practice of risk management in the supply chain. The purpose of the study is to conduct a theoretical review and conduct a scientific and practical research to improve the effectiveness of supply chain risk management in agribusiness.The paper uses quantitative and qualitative research methods: supply chain analysis, scenario method, modeling, Ishikawa analysis. The results show how the approach and model can identify the impact of risks and measures to prevent or reduce the impact of these risks. Moreover, the approach can improve planning and control of activities while optimizing resource consumption. The conclusion is an overall improvement in the risk management of small-scale agro-industrial producers by effectively managing the agri-food chain, the overall sustainability and well-being of agribusinesses, and by increasing the efficiency of the agri-food chain by combining the digital twin with industry 4.0 technologies and modeling techniques.

Keywords. Agro-food Supply Chain Management, Crisis Management, Business Models, Sustainability, Smallholder, Product Quality, Industy 4.0, Wheat, Digital twinSimulation

JEL codes:B 40 – Economic Methodology: General

Introduction

Supply chain management has been widely used since the 1960s to improve the efficiency and responsiveness of industries. It involves organizing the stakeholders involved in the production process, from the beginning to the end of processing, to provide added value to consumers and generate profits. Problems in the agricultural sector are usually the result of lack of cash. Farmers borrow too much, the seasonality of sales is reflected in the prices of agricultural products, the need for storage facilities, holding too much inventory, and when sales decline seasonally, cash flow declines.

In order to continually thrive, agribusinesses need to maintain a balance: it is important to ensure both stability and growth. This means building a competitive advantage without taking too many risks.

The traditional approach involves gaining an advantage by lowering prices and building a physical presence in the market. However, this approach has its drawbacks, mainly in the form of much longer replenishment times, quality issues and inflated supplier minimum order quantity requirements. Excellence in physical presence means opening more and more farm produce stores in an already saturated market. This increases commercial risks so that when a downturn occurs, agribusiness producers lose profits and are forced to seek government assistance or reduce production and supply.

The real way to gain an advantage without taking the risks described above is to meet key consumer needs better than any of the competitors.

Researchers and practitioners have identified many ways in which supply chain management improves business performance, engages stakeholders to achieve goals, and increases customer loyalty.

Our research provides three key insights. First, we find a wide range of actors and complex network configurations. This indicates that the predominant focus on farmers in

sustainability policies overlooks other actors in their agri-food networks, risking suboptimal policy design and effectiveness. Second, the typology identifies three groups of networks - agro-industrial control, multifunctional value chains and community food networks - associated with different levels of agrarian autonomy. Therefore, agricultural governance must take into account the specificity of farmers' activities; policies directed at farmers' decision-making can only have an impact if agro-industries have the capacity for change. Third, the typology demonstrates the potentially complementary roles of traditional and alternative value chains, as well as top-down state support. Thus, agri-food networks provide different leverage points for transforming sustainable development.

The purpose of the study is to conduct a theoretical review of the topic under investigation and to conduct an academic and practical research aimed at identifying ways to improve the effectiveness of supply chain risk management in agro-industries.

Agribusinesses face multiple sources of risk, both on a daily and long-term basis, in various areas of their operations, from finance to electronics, in the supply chain process of agricultural products. Although they are already prepared for the challenges, they lack many opportunities to be more efficient and provide a better quality of life.

Literature review

Supply chain management plays a particularly important role in agrifood supply chains, as effective management of these global and complex chains is key to ensuring the supply of sustainable, affordable, safe and sufficient quantities of food (G. Zhao, 2019).

The following categories of success and risk factors are identified: technical and logistical, economic, financial and marketing, organizational and spatial, institutional and legal, environmental, social and cultural. At the same time, specific factors for the agricultural sector are innovative processing technologies, flexible logistics at input and output, joint investments in research and development, price competitiveness of bioproducts, partnerships with research organizations, etc. (Donner Mechthild, et al. (Donner Mechthild, 2021).

Agri-food supply chains are based on the premise that agribusinesses are embedded in socio-material chains, and organizational and managerial interactions within these chains are intertwined with overall agricultural management and sustainability. (Gaitán-Cremaschi D. 2019 ; Hambloch C.,2023)

The simultaneous analysis of forward and backward flows has a positive impact on net economic returns in this complex agribusiness supply chain. (Alfonso-Lizarazo Edgar H., 2013). It is possible to constructively collaborate and focus on positive social and environmental impacts within agri-food supply chains.(Köhler S.,2022). Asrol M. et al. propose an integrated framework for analyzing and improving sustainable supply chain performance under uncertainty using a combination of traditional approach and fuzzy evaluation modeling approach.(Asrol M.,2024)

Specifically, in agri-food supply chains, blockchain containing n blocks has been proposed to address effective risk management in agri-food supply chains. Studies have shown that blockchain can be used to provide sustainability related data to supply chain actors, third parties such as auditing bodies, and consumers (Kamilaris A., 2019; Lim M.K. 2021). This could potentially allow supply chain actors to address sustainability issues and consumers could make better informed purchasing decisions (Kouhizadeh M. 2018).

Methodology

Modern trends in the development of the domestic agro-industrial complex are characterized, on the one hand, by the direct impact of the internal desire of economic entities, producers of agricultural products to autonomy and full independence, on the other hand, by the desire for maximum conjugation of logistics operations by all participants of supply chains. This, in turn, generates a number of problematic moments in the supply chain management system at the enterprises of agro-industrial complex, which require prompt resolution.

The following materials and methods were used in the preparation of the article::

- Interviews with 100 agro-industrial producers to identify supply chain risks and map situations and events.

- Tasks are categorized according to their temporal relevance at different levels of management. Previously, the focus was on operational and tactical issues, but an active level of strategic planning is also required. Thus, the description of strategic, tactical and operational tasks of agro-industrial enterprises' activity is performed.

- Diagnosis of the current state of agro-industrial enterprises, related supply chain and the environment: the use of SWOT-analysis, which allows you to focus on the key issues affecting the formation of supply chains of agro-industrial products. Thus, it becomes an important tool in identifying factors that may affect the continuity of the supply chain, and the use of Ishikawa analysis layout as a tool to analyze the supply chain and risk management performance.

- Material flow analysis (MFA) is a systematic assessment of material flows and inventories. Using this method, material stocks and flows within the system boundaries can be qualitatively and quantitatively studied. In addition, the impact of the identified material flows can be observed.

- Literature review on supply chain, agri-food value chain, improvement strategies and industry 4.0 technologies, as well as stakeholders, corporate social responsibility and sustainability.

- Development of a conceptual model based on five key pillars: organization, human factors, process management, new technologies, product and process improvement.

- Development of a digital twin model relating to the physical assets of the agri-food activity together with related management activities at different planning horizons.

- Using agri-food supply chain modeling as a tool to test model constructs and potential scenarios.

- Extracting and interpreting results.

- Conclusions and future perspectives.

Results and Discussion

The agro-industrial complex, possessing a multi-sectoral structure, is one of the fundamental sectors of the economy of Kazakhstan, on the state of which depends on the provision of the population not only with agricultural products, but also with jobs. In confirmation of this fact it is expedient to cite the data of official statistics. According to the Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan, as of January 1, 2024, 24,335 enterprises engaged in agriculture, hunting and logging are registered in Kazakhstan. Of these, 22,993 (94.5%) are small enterprises, 1,231 (5%) are medium enterprises, and 111 (0.5%) are large enterprises. In 2023, the share of agro-industrial complex in the GDP of Kazakhstan amounted to 5.1%. Over the last 5 years (2019-2023), the share of AIC in GDP increased by 0.4%. Such a small increase (less than 1%) was primarily affected by the spreading COVID-19 pandemic, which created an economic crisis due to the disruption of the supply chain not only across the country but also between countries. Kazakhstan's agribusiness sector employs 1.4 million people, accounting for 7.8% of the country's total employment. Over the last 5 years (2019-2023), the number of people employed in the agro-industrial complex has increased by 100,000. In 2023, exports of agro-industrial products from Kazakhstan amounted to $5.7 billion. The main export goods of the agro-industrial complex are grain, flour, oil and fat products, meat and meat products.

It is important to note that the share of agro-industrial complex in Kazakhstan's GDP is lower than the average for CIS countries. There is low labor productivity in the agro-industrial complex of Kazakhstan. The state takes measures to support agro-industrial complex, but their effectiveness is not always high. In view of the above, it should be noted that the agro-industrial complex is an important sector of the economy of Kazakhstan, but its potential is not fully utilized.

To determine the effective risk management in the supply chain, first of all, the tasks of agro-industrial complex in the long term - from one year to several years, in the medium term - a few weeks and months, short term - a day and a week are defined, Figure 1.

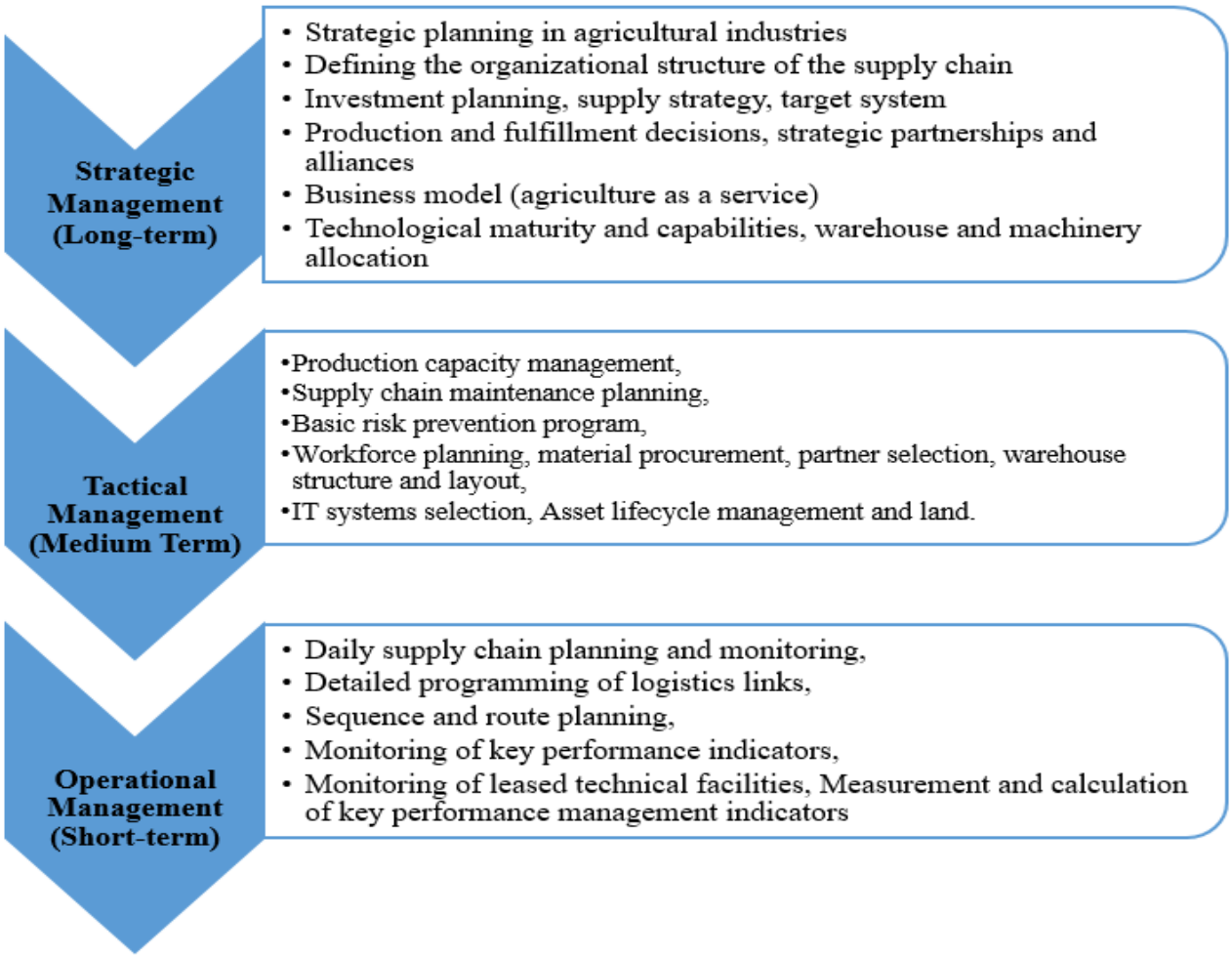

Figure 1: Tasks of agro-industrial enterprises on effective supply chain management (compiled by the authors)

Second, a SWOT analysis is conducted, based on the sustainability of the agribusiness supply chain.

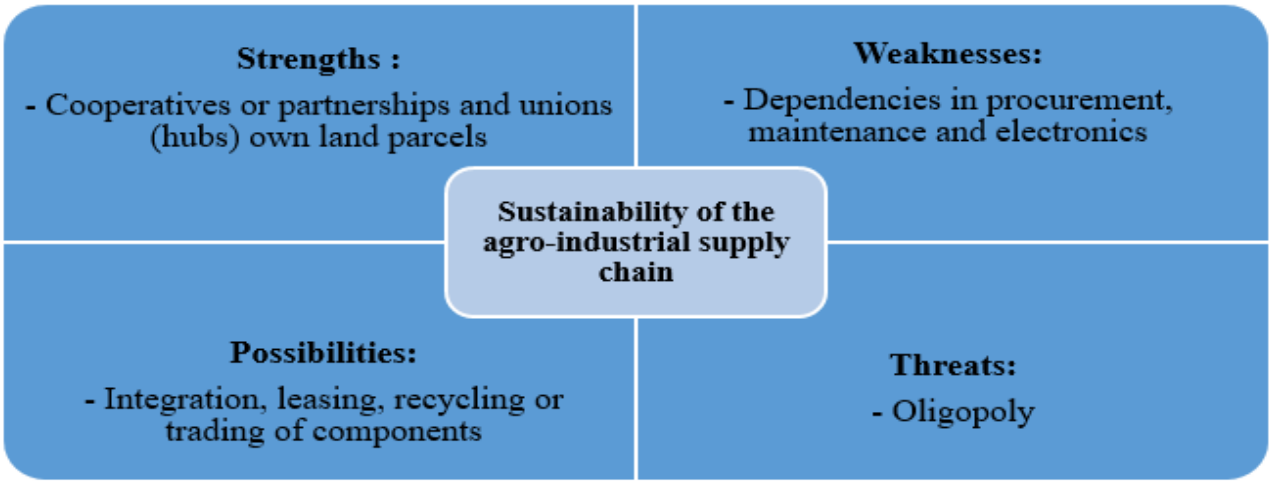

Figure 2: SWOT analysis of the current situation (compiled by the authors)

The model is based on the following elements shown in Figure 3. First, a product (agricultural products,) must be defined and to get it, a process must be described (A5). Later, new technologies in their application at different levels must be considered (A4). Then the management of all processes, from operational to strategic and regulatory, must be defined (A3). However, for successful management and control of activities, the human factor must be integrated to consider its impact and consequences both inside and outside the organization, with relevant stakeholders (A2).

Finally, the organization with its structure and relationships with related supply chain actors and stakeholders must be represented from a systems perspective (A1).

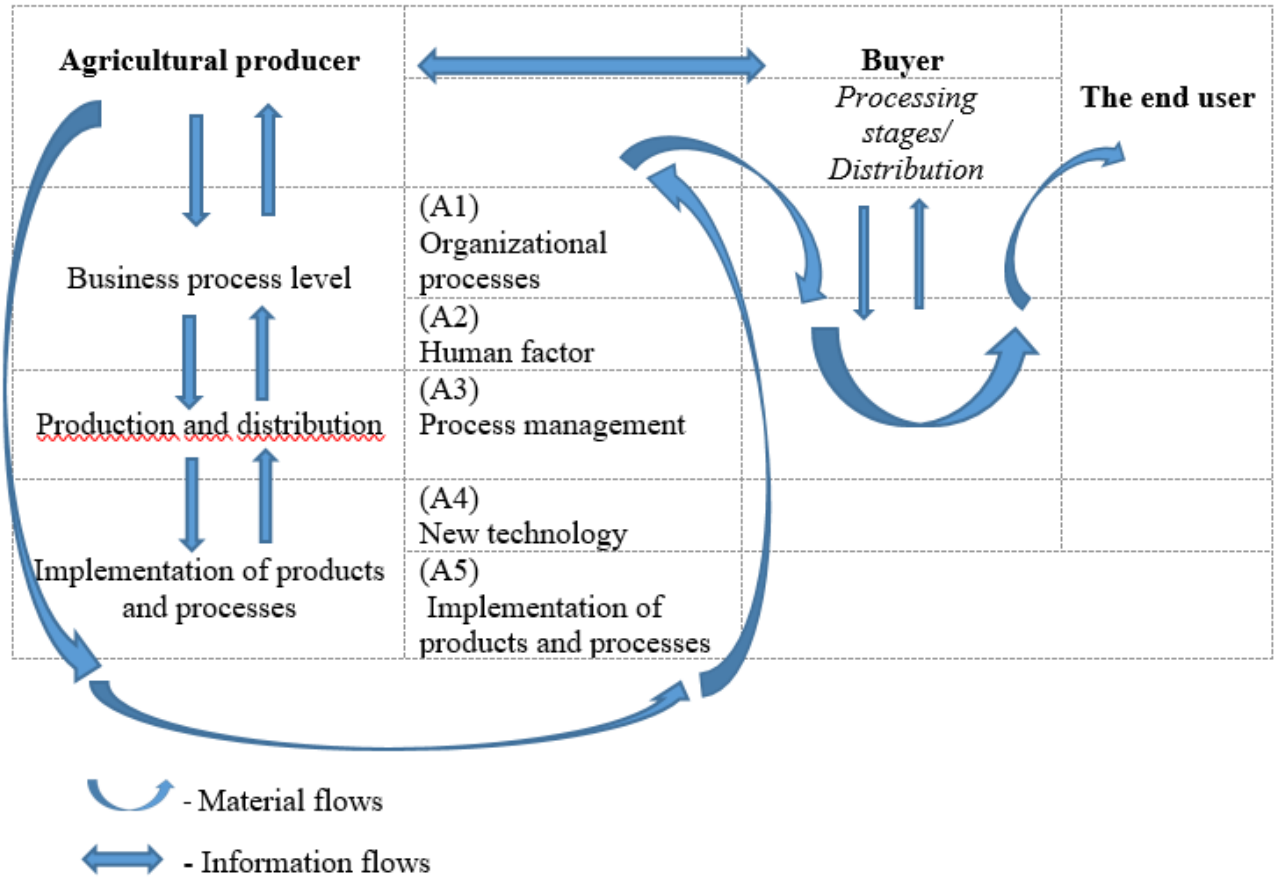

Figure 3 - Movement of material and information flows from the agricultural producer to the final consumer (compiled by the authors)

A1: Organisation (A1 in Figure 3): generation of a management function as well as a monitoring model for all flows related to the logistics operations of the agro-industrial enterprise (A1 in Figure 3).

A2: Human Factor (A2 in Figure 3): generation of a sustainability model with all relevant stakeholders, taking into account internal and external responsibilities. For each agro-industrial enterprise, whether small or large, the relevant supply chain stakeholders affected by its actions and affecting the enterprise must be selected and considered in the model, as the absence of one of them can be critical to performance, Figure 4.

A3: Process management (A3 in Figure 4): application of strategies to improve supply chain management, planning and control of agro-industrial enterprises' supply-related and logistics activities and processes, such as procurement and distribution planning. It consists of applying a sequencing model for improvement strategies consisting of good governance, theory of constraints, responsive manufacturing and flexible organisation of the agro-industrial supply chain.

A4: Emerging technologies (A4 in Figure 4): development of a model for integrating Industry 4.0 technologies into agricultural activities, taking into account strategies for effective risk management. Based on 12 technologies related to Industry 4.0 [32],the same methodology is applied to agricultural tasks and the technological chain of linkages of agribusinesses.

A5 (A5 in Figure 4): Product and process improvement: developing a model to manage product development and improving the logistics process to mitigate emerging risks. Figure 1 and Figure 2 show how many environmental factors such as natural disasters, temperature and rainfall throughout the year, and land under fallow can affect the quality of the final

product. To this end, A5 has developed a model to optimise the effectiveness of supply chain risk management and product quality of supply considering multiple factors.

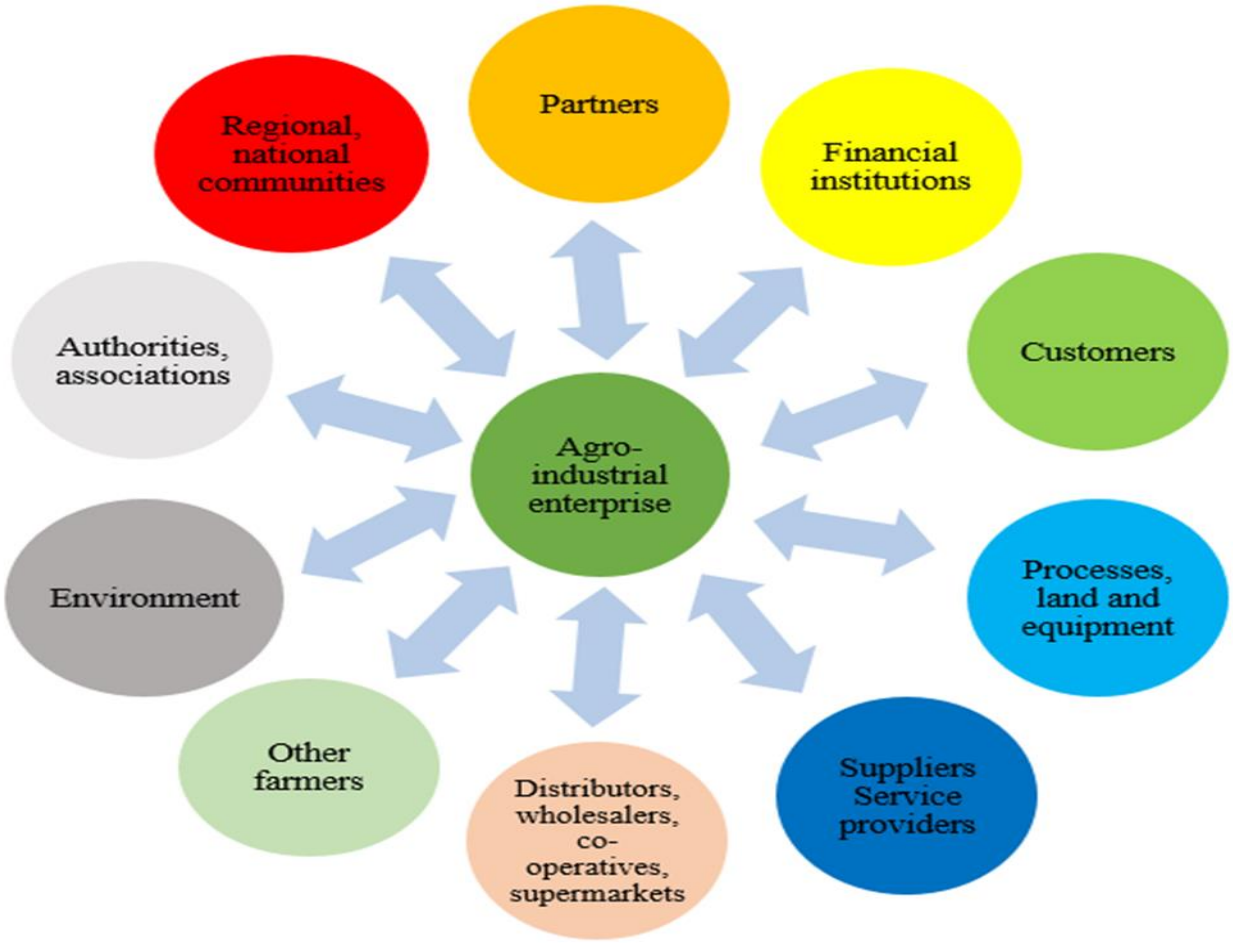

Figure 4 - Stakeholders of an agro-industrial enterprise (compiled by the authors)

For this purpose, a reference framework for the digital ecosystem based on a multiple set of BBDD information, modelling and digital twin is developed for planning, implementing, controlling and monitoring organisations and projects during their lifecycle based on the Plan-Do-Check-Act methodology.

Conclusion

This research can help stakeholders in the agri-food supply chain to better understand the application of blockchain-based technologies to manage sustainability in line with existing voluntary sustainability standards. This can further inform stakeholders of the opportunities for meaningful collaboration and focus on positive social and environmental impacts within agri-food supply chains.

Many actors have the power to reconfigure network structures, but their resources and capacities to do so vary. Consequently, different actors, network configurations and modes of governance can play complementary roles in the transition to sustainable development.

Firstly, the digital model aims to reproduce the logistics processes of an agro-industrial enterprise, the types of their linkages. By placing all this information, as well as the associated supply chain and environment, within the agro-industrial organisation's sphere of influence, a digital twin is created at three levels: the agricultural producer, the supply chain and the associated environment.

Based on the DT, the model can then be simulated under different circumstances in order to develop strategic, tactical and operational plans to prepare agro-industrial organisations for any potential risk that may arise. By doing so, opportunities can be identified and, if similar changes are

identified, an operational decision can be made, thereby increasing the potential for resilience at different horizons. This set of information coming into DT with modelling and analysis capabilities is the initial step for Farmer Manager 4.0, i.e. an application of some of the developments of academics in the specific area of improving the efficiency of agrarian supply chains. Different types of data, from environmental to land use, from interest rates and machinery prices to cost structures, purchasing contracts and new regulations, can be input into the system, and from this data, different policies and decisions can be evaluated to determine the ranges of operating modes in which the supply chain will be sustainable in the face of different internal and external risks.

An agricultural producer(smallholder) is assumed to have up to two wage labourers engaged in agriculture, with a given machinery at the beginning of the model and a certain balance of debt and liquidity. Based on the initial situation, the model allows to manage land utilisation processes and different sowing and harvesting periods throughout the year, considering short-term risks, daily or weekly risks, as well as risks in the medium and long term, within a year or for the following years. In this context, different scenarios are proposed, such as the case where a farmer, seeing that the profit generated is not able to cover the costs and will end up losing money on average every year, he can choose between different investment alternatives for later to be able to work with more productive machinery both on his land and on the plots of other landowners in such a way as to increase their profits thanks to the income from outsourcing as a service. In addition, the support scenarios allow assistance to the rural producer in all flows and tasks such as machinery maintenance tasks, etc. They are taken into account by providing alternatives and decision-making assistance to effectively manage risks in the agro-industrial supply chain while optimising the supply chain, its maintenance service and product quality.

The restructuring of agri-food networks will be a key component of any transition to resilience to risks arising in the agri-producer supply chain.

The following steps follow:

- Monitoring and analysing real and hypothetical scenarios throughout the process.
- Analysing current business models and supply chain management: analysing stakeholders and the agri-food value chain, as well as existing production and distribution strategies.

Managing the quality control process and supply chain at risk in the face of dramatic market changes. Based on this analysis of both customer needs and sustainability, threats and opportunities associated with market volatility will be identified.

Comparison of model 1 of the current situation of farmers in their management with model 2 with optimised farming activities supported by the Farmer Manager 4.0 tool, which allows:

- Monitoring and analysing real and possible scenarios along the entire food chain.
- Data analysis and optimisation of agri-food management. Identify critical issues, needs and challenges in the agri-food environment.
- Analysing current business models and supply chain management: analysing the actors and value chain of the agri-food chain, as well as existing production and distribution strategies.

Organisation of process quality control and supply chain management under uncertainty due to sudden changes in the market. Based on these analyses of customer needs and sustainability, threats and opportunities due to market variability will be identified.

- Business Potential and Future Business Models: Develop simulation models to assess different potentials under different uncertainty scenarios to identify measures to recommend future business models for a COVID-like crisis.
- Decision aid and presentation of data and information that improve the tool to improve the accuracy of impact analysis and prediction of outcomes before any type of supply chain risk.

Business potential and future business models: development of a simulation model to assess different potentials under different uncertainty scenarios in order to identify measures for small agro-industries to generate recommendations for future business models in the event of a COVID-like crisis.

First, it is necessary to analyse the current state, including SWOT and Ishikawa analysis (Figure 5) at different levels, as well as identifying market and organisational drivers and stakeholders in the agri-food value chain. Later, the business potential in the five pillars can be

identified based on the interrelationships and relevant factors of actual status or/and potential risks. Finally, the development of the existing business model can be orientated by defining the future business model and related recommendations from a "production model based on own land" to a "mixed production model based on own land plus outsourcing services to other landowners" to increase the return on investment as well as improve the liquidity situation.

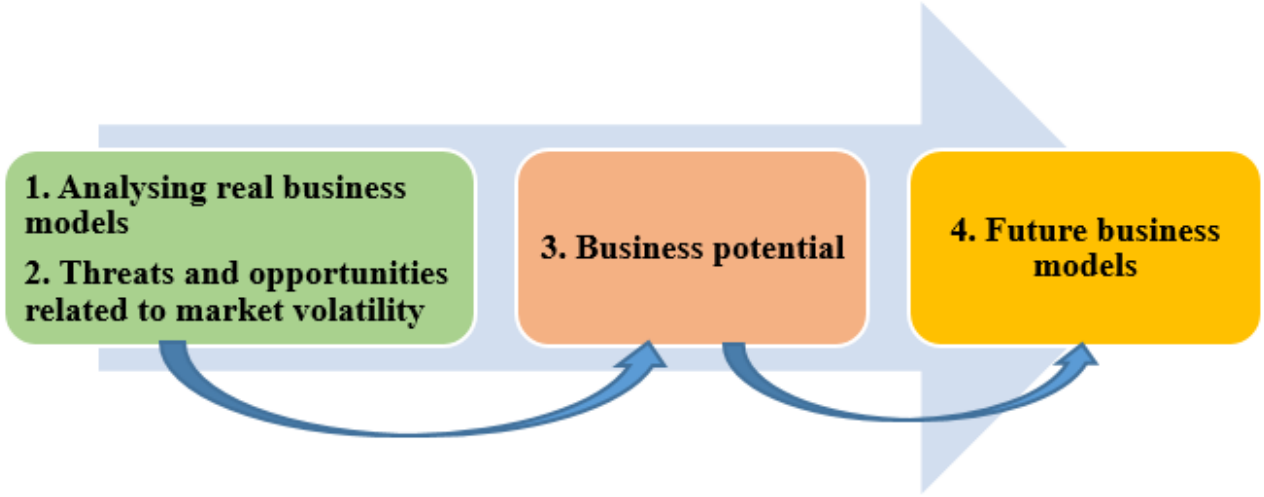

Figure 5. Project implementation process for effective agri-food supply chain risk management (compiled by the authors on the basis of (Gallego-García S.2023))

The conclusion is an overall increase in the resilience of smallholder farmers through effective agri-food chain management and overall resilience and well-being of agribusinesses, and a reduction in agri-food chain inefficiencies by combining the digital twin with Industry 4.0 technologies and modelling techniques. The results show how the approach and the model can identify the impact of risks and measures to prevent or mitigate the impact of these risks. Moreover, the approach can improve planning and control of activities while optimising resource consumption.

Thus, the main contribution of the research work is a framework and model that can enable any agricultural producer to improve its sustainability while improving the quality of life of its enterprise, building trust among stakeholders.

It is assumed that information relating to financial, material, energy resources, etc. flows are known while the main limitation is that the model needs to be augmented with data to proceed to initial validation. Future directions are to develop a model that defines the necessary data and assumptions if data is not available to apply the tool to real use cases. The vision is that agribusinesses can manage their operations like a top manager of a high technology company can, which means that they rely on the latest cutting edge technology, since technology is created to support human life activities and since one of the basic human activities is the production and distribution of food to meet the needs of one of our basic needs, so research needs to be developed to provide the answers

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MODERN TECHNOLOGIES OF HUMAN RESOURCE MANAGEMENT OF THE ORGANIZATION

Kambay G.J[1]., Sakhanova G.B*[2].
1Al-Farabi Kazakh National University
2Almaty Technological University
*E-mail: ecolady777@gmail.com

Annotation

At the moment, effective human resource management is an important fact of developing the competitiveness of an enterprise and achieving its economic goals. Many managers downplay the importance of personnel management methods that are characteristic of modern management and are used abroad with great initiative, this makes management effective and increases labor productivity. At this time, it should be argued that downplaying these methods is the primary obstacle and the weakest element of management. Changes in the principles of human resource management should be aimed at implementing the motivational policy of personnel, which is becoming crucial in modern conditions.

Personnel management helps to identify the strengths and weaknesses of the staff, to determine the individual characteristics of each employee, to find ways to overcome the "bottlenecks" in the professional and qualification characteristics of a particular individual. In this sense, the assessment of human resources is currently becoming the most important function of personnel management.

Keywords: human resource management, management, labor productivity, staff motivation, recruitment, personnel management methods.

The emergence and development of the concepts of "human resources", "management of human resources", "human capital" are inextricably linked with scientific and technological progress and socio-economic development of the society. The entire rich history of the development of social production before the first industrial revolution, all human work and life depended on physical labor. At that time, the productivity of labor was very low, social wealth was also small and distributed very unevenly, labor relations were forced and built under compulsion.

The history of managing free collective labor dates back to early England, where stonemasons, shoemakers and other artisans organized trade unions together to improve their working conditions. Human resource management in its current view objectively developed only at the end of the XVIII century with the beginning of the first industrial revolution. However, it was about this time that Karl Marx said that the worker was only an "appendage of the machine." At the end of the XIX century, scientific management methods appeared and began to actively develop, promoting the growth of well-being. Scientific management, associated with the name of Frederic Taylor ("The Principles of Scientific Management", 1911)., is reduced to the adjustment of work methods, rationalization of working hours and working conditions to solve problems of increasing labor efficiency and management. This is the time of the beginning of the second industrial revolution.

Technological and organizational changes, the growth and development of trade unions, the participation of social organizations and governments in workers' affairs have led to the emergence of personnel departments in enterprises. At that time, HR managers were called the heads of the state, and their task was to "build bridges" between employees and management, in other words, they communicated with employees in their usual language, and conveyed their conclusions and views to management.

In the 1920s, more and more organizations noticed conflicts between employees and management and had to focus on interpersonal relationships in the work process. One of the most striking examples is the Hawthorne experiment [9], which gave rise to the development of a new direction of management – behavioral management.

The Hawthorne Experiment is a series of studies conducted at the Hawthorne Laboratory of the Western Electric Plant in Chicago from 1924 to 1933. The purpose of the study was to determine the effect of lighting on female workers' productivity, but researchers found that increased attention to people led to increased motivation and improved labor relations. Employees can freely express their opinions and be encouraged, the attitude of employees to work becomes better, as a result, their work increases. In the late 1960s, the study of interpersonal relationships formed an independent science - organizational behavior.

The concept of "human resources" was proposed and clearly defined by the American scientist Peter F. Drucker, the father of modern management, in his book "The Practice of Management" ("ThePracticeofManagement") in 1954.

In the early 1960s, instead of the term "human resource management", the term "personnel management" began to be used more often, later the famous American economist Professor Schultz put forward the theory of "human investment" [79]. He explained that the rapid growth of the US gross national product does not depend on material capital, investment in human resources is also an important factor in promoting economic development. Public human capital is the skills and knowledge of people without regard to where they were acquired, and they can be used in different jobs.

Nevertheless, the earliest ideas related to human capital can be traced back to the works of the ancient Greek thinker Plato. He discussed the economic value of education and training in the famous "Ideal Country". Aristotle also recognized the economic role of education and the importance of preserving education in order to ensure public welfare. But in the eyes of ancient thinkers, education was still a consumer product, and its economic role the role was also indirect. The ancient Greeks (Socrates, Xenophon, Plato, Aristotle) found a similar formulation of the universal principleof managing the growth of social wealth.

William Petty (WilliamPetty, 1623-1687), the father of British classical political economy, the founder of statistics, the founder of British classical economics, first proposed and demonstrated the idea that labor determines cost, and laid the foundations of the theory of labor value. He said that "land is the mother of wealth, and labor is the father of wealth." He believed that because of the different personal qualities of people, their ability to work is also different. Francois Quesnay (FrancoisQuesnay, 1694-1774) was the earliest French economist who studied the qualities of people in relation to work.He calculated that people are the first factor that makes up wealth.

The first economist who considered labor resources as capital was Adam Smith (1723-1790), the creator of an economy based on the affirmation of the value created by labor and the special status of labor among various resources. He clearly pointed out that knowledge of work skills and the ability to master them should necessarily reflect people's work abilities, and work skills should be improved through education and professional training, which requires time and money. It can be said that this is a vivid example of the "germination" of investments in human resources.

Smith believed that economic growth is mainly reflected in the growth of social welfare or national wealth. The source of welfare growth depends on two conditions: first, the professional division of labor (the principle of specialization).It helps to increase its productivity, secondly, an increase of the employees’number and an improvement of the workquality.

Ricardo (David Ricardo, 1772-1823) is one of the main representatives of the British classical political economy. He is the last representative of the school of classical economics. He inherited and developed Smith's theory of labor value, insisting that the amount of the produced commodity value depends on the time spent.He also divided human labor into direct and indirect labor. Direct labor participates in the production process and creates the value of goods.Indirect labor relates to materialized labor previously invested in the means of production used, it does not create value, but only transfers the initial value to the goods. Ricardo explained that machines and natural objects cannot create value because human labor is the only source of value. Muller (JohnStuartMill, 1806-1873) also inherited some of Smith's ideas.

Muller believed that skills and knowledge are factors that have an important impact on labor productivity, and emphasized that their acquisition should be considered as part of the national

wealth, such as buildings, machinery and tools. Mueller's creative argument consists of the following: he started with traditional economic growth and a productive orientation of resource allocation, and came to the conclusion that spending on education could bring more national wealth.

Although some of the views of the French economist Say (Jean-BaptisteSay, 1767-1832) were severely criticized by Marx, he is also one of the technologists who continued to develop the ideas of human capital. He calculated that the sum of expenses spent on education and training is called "accumulated capital", and the remuneration of educated and trained people includes not only ordinary wages, but also interest on capital invested in their studies. The point is that spending on education and training is also an investment.In particular, his idea that scientific knowledge is a factor of productivity, is undoubtedly a very important epochal theoretical contribution to the development of human capital theory.

Marshall, a master of classical economics and a well-known British economist of the end of the 19th century, also noted that knowledge in the organization is an important part of capital and the most powerful component of productivity growth. In further research, Marshall pointed out that knowledge and organization are independent factors of production, and investment in education plays an important role in economic growth.

Karl Heinrich Marx (1818-1883), the founder of labor theory, many of his theoretical views on labor are an important ideological basis of the modern theory of human capital. Marx's theory of capital includes the theory of labor cost, the theory of capital production, the theory of reproduction of social capital, the theory of production prices, the theory of commercial capital, the theory of loan capital, the theory of land rent, etc. He believed that labor is the main source of creating social wealth, moreover, specific labor creates the consumer value of goods, and abstract labor creates the (exchange) value of goods.

In the article "The Nature of Capital and Income", published by I. Fischer (Irving Fiaher, 1867-1947) in 1906, a complete concept of human capital was first proposed, which he included in the theoretical framework of economic analysis. Thus, thanks to Fischer's research, the broad concept of labor capital, defended by Adam Smith and Karl Marx, was introduced into economic theory.

In a speech at the American Economic Conference in 1960, T. Schultz (Theodore W. Schultz, 1902-1998) presented the theory of human capital to a broad economic science. He systematically developed his theory, and is known as the "father of human capital." Schultz believed that the most important reason why Germany and Japan experienced the miracle of economic recovery after the war was human capital which played a major role in this. Schultz's conclusions in studying the post-war economic recovery were that the rate of recovery in different countries is directly related to the level of education and health there. Schultz proved the fact that human capital has the necessary productivity potential, can be copied and accumulated.

Becker published his seminal book Human Capital in 1962, putting forward the microeconomic basis of the theory of human capital. His proposed model laid the foundation for the subsequent development of this field. According to Becker, each employee can be considered as a combination of a simple unit of labor and a certain amount of "human capital" embedded in it, which is a combination of his income (salary) – a simple price on the labor market and individual investment income. Opportunity costs lost as a result of training during the period of time used for training, direct monetary expenditures on wages and professional training compensate for the investment of human resources. Becker revealed the possibility of determining the profitability of such investments from the point of view of individuals and society as a whole and considered this process similar to accounting for the rate of return on capital.

Human resource management technologies have been rapidly developing in recent years. At the same time, not all organizations manage to adapt them to their living conditions. The successful development and functioning of organizations is largely determined by how effectively personnel management is carried out in them.

The staff of an organization is its key resource, which largely determines the success of any company's activities and competitiveness. The process of socio-economic development shows that human resources management technologies are gradually being transformed as management as a

whole improves. And modern science declares that the breadth and effectiveness of the use of knowledge determine the future of all mankind.

Modern management is based on a wide range of elements such as staff creativity, team commitment, innovation, knowledge management.In modern management, an increasing emphasis is placed not on the performance of employees, but on their initiative.

Table 1 - Variants of models in organization management

Autocratic	**Economic**	**Coaching**
Authority	Economiccoercion	Creativity
Authoritarianism, directive	Financial reward	Humanism
Personal Dependence	Motivation	Commitment
Taylorism	Economic stimulation	Economic and moral incentives
Executive	Initiative	Creativity, flexibility and independence
Compiled by the author		

The autocratic management system in the middle of the twentieth century was replaced by an economic system based on motivation, financial incentives, and economic coercion. The economic system is characterized not by the simple diligence of employees, but by their initiative and activity. In an environment of fierce competition, a new version of the management model has developed. It was based on creative participation, the intertwining of economic and moral incentives, teamwork and commitment to the organization.Each employee not only faithfully performs his direct functions, but is also in constant search of improving methods and technologies in his work, in the activities of the entire organization.

In recent years, the emphasis in personnel management has been changing. They are transferred from the formation and development of mainly individual competencies to the formation and development of collective competencies. Formation of productive group competencies: willingness to work in a group, mastery of techniques for joint discussions and joint decision-making, willingness to coordinate personal goals and values with collective ones.Organizations strive to develop a learning-oriented culture. This can be done by creating management and work teams, as well as corporate training systems.

The HR manager must timely identify the need for training from the team as a whole or from individual employees. Based on these needs, an employee development plan should be developed and appropriate training methods selected. The HR department should interact with training centers, research existing training programs and select the appropriate ones for a specific situation.

As you know, people have needs of various kinds. A. Maslow built a hierarchical structure of such needs. In the needs of the highest order, he highlighted the spiritual needs that are associated with the self-realization of people through creative activity.

Analyzing the effectiveness of the current mechanism in staff motivation, we come to the need to clarify the concepts of "motive" and "incentive". “The motive of work is an internal motivation of a person to work, and an incentive is an external incentive to work.” The following chain is known in the scientific literature: needs → interests → motives of actions. It is motivation that is at the top of the chain. As a result of work, a person receives income that allows them to realize their interests and meet their needs. Labor stands out among other activities and a "labor motive" arises.

In turn, labor stimulation acts as the final element of a completely different chain: the needs of the organization - the interests of the organization - labor incentives. Any organization needs employees so that it can realize its interests and meet its needs. And for this, the organization encourages them to work, offers certain benefits.

Thus, the motives of work are related to the personality of the employee, and the incentives of work are related to organizations, the list of benefits that they give in exchange for work.

Human resource management technologies of an organization are a set of personnel management methods aimed at evaluating and improving the personnel of an organization.

The Human Resources (HR) system helps to solve the tasks of coaching, learning management, includes methods of managing skills and abilities (softskills), and include stimulating innovations [2]. The key reasons for the modernization of technologies and HR management tools are the transition to a new model of modern business development — the VUCA concept, digitalization and technologization of the economy and the entire system of social and labor relations. (Where VUCA: V - volatility; U - uncertainty; C - complexity; A- ambiguity).

Now more and more functions are being automated, and new challenges require new skills. For continuous development, products are being created in three directions: EdTech (education), HRTech (personnel management), and Freelance (self-employment). In the context of the fourth industrial revolution, constant changes in the requirements for people's skills, it was necessary to develop a system that can help a specialist navigate how to develop their knowledge and apply it to work [3].

HR specialists form a system of individual HR management tools that takes into account the latest methods and techniques in this field. Sustainable development will be the result of holistic thinking.

In the context of the implementation of the Industry 4.0 program, it is important to improve the interaction and partnership between science, education and industry, and it is necessary to strengthen the link between competencies based on acquired experience and research. TalentTech is an ecosystem for personnel management and talent development, such a program helps a person to remain in demand in a rapidly changing world.

The introduction of information technologies into the organization's activities becomes a determining factor in its further development and ensuring competitiveness in the market. Thanks to the introduction of high technologies, managers are able to manage human resources more effectively. Digitalization of HR management functions requires knowledge of the competencies of the digital economy, modern digital tools for automating HR processes in the company. HR processes include the interaction of employees with each other, the exchange of experience, and the transfer of knowledge. This is a complex process, which is one of the main tasks of the head of human resource management.

The modern program "humanresearchmanager" — HR manager, helps to solve the tasks facing a specialist: organization of a clear and well-coordinated work of the enterprise's workforce; training and trainings of the company's personnel; identification of the motivation of the organization's employees with an individual approach to each employee. The use of high-tech HR practices has a positive economic and social effect.

A smart enterprise can identify and identify the scope of activity, configuration parameters and production conditions, as well as independently and remotely communicate with other equipment and special adjustments are made to the workflow of people so that the machine adapts to human work. For a modern HR professional, it is important to be able to manage the constant process of change based on technology [4-6].

The unified digital ecosystem of talent management— TalentTexpresents the interest. The tasks that it solves are to find, evaluate and develop the talents of employees, manage their engagement and productivity. Consider the HCM platform from TalentTech. It is an ecosystem that helps to find, evaluate and develop talents, as well as manage their engagement and productivity. The core of the HCM platform is the employee's digital profile. This is a place where information about an employee is stored in digital format; it is a "digital double" of a person's talent. This includes information about his experience, skills, interests, psychological characteristics, professional preferences and strengths. Knowing about a person's talent allows him to understand for himself what tasks he is suitable for, in which he needs to strengthen his competencies, and which ones it is better not to take on at all.

For example, when working with a group of high-performers, it is important to focus on preventing people from burning out and analyzing the ambition of their goals. For middle-performers, it is important to pay attention to how an employee can be strengthened so that he moves to the high-performers group. The low-performers group needs to understand how to bring a person to productivity and find out what methods have already been used in working with him.

The development of the indicator model proposed by the World Bank and the United Nations is the generally recognized GlobalTalentCompetitivenessIndex rating (hereinafter - GTCI)"[7]. It allows for an indicator assessment of the level of development of all components of human resources, including physiological, cognitive, and socio-motivational. It measures how countries develop, attract, retain, and effectively employ qualified professionals. In 2023, 134 countries are represented in the ranking, where Kazakhstan ranks 67th. Analysts evaluate many factors, such as legislation, the presence of trade unions, the level of urbanization, education and the total number of companies and websites, as well as the number of publications in global scientific journals from each country.

When using indicator models for evaluating human resources, the main indicators are: "the effectiveness of the education system, which is assessed by literacy indicators of the population; the number of years of study per person; enrollment of students in educational institutions; level of training; results of international tests, etc."[8].

An example is the human development index for evaluating human resources and the human capital index for calculating the capital form of human resources.

The Human Development index is calculated as the product of three sub-indices: health, knowledge, standard of living and, according to the original methodology of the United Nations, is calculated using the following formula (1):

$$\text{HDI} = \sqrt{LEI \cdot EI \cdot II} \quad (1)$$

Where HDI – Human Development Index;
LEI – life expectancy index (health);
EI – Education index (knowledge);
II – income index (standard of living).

The human capital index is calculated as the product of three sub-indices: health, education, survival and, according to the original methodology of the World Bank, is based on the following formula (2):

$$\text{HCI} = \text{Health} \cdot \text{School} \cdot \text{Survival}, \quad (2)$$

Where HCI – Human capital index;
Health – sub-measurements of the state of health;
School – sub-measurements of the state of education;
Survival – sub-dimensions of survival.

The advantage of indicator models for evaluating human resources is the availability of data for evaluation due to the prevalence of monitoring of the education system in most countries of the world. At the same time, indicator models can be complicated by the introduction of additional synthetic calculations consisting of several partial natural values.

Scrum technology can be used to organize more effective employee interaction, increase their involvement in work, and implement the principles of team building. Scrum technology involves conducting project development in small steps, during which constant inspection of both the final product and the applied practices of its development is carried out, evaluating the effectiveness of these practices, regular adaptation of product development goals and practices of the development process.

The term Scrum was first formulated in the mid-1980s in the writings of scientists from Japan (Hirotaki Takeuchi and IkujiroNonaki) in the context of the success of teamwork in the implementation of projects, by analogy with the scrum in the game of rugby. The emergence of Scrum technology is associated with the names of programmers, software developers Jeff Sutherland and Ken Schwaber and dates back to the 1990s. This technology is based on a systematic approach and methods of project management, as well as on the idea of a multiple

increase in the efficiency of interaction of elements operating within a system with a well-established, cyclically updated feedback, in comparison with a system where there is no such connection. Scrum technology is based on the Agile flexible management system, which is based on the following provisions [9], [10]:

1) People and their interactions are more important than processes and tools;

2) Flexible cooperation with the customer is more important than agreeing on the terms of the contract;

3) A working product as a result is more important than detailed documentation about it;

4) Willingness to change is more important than following an accepted plan.

At the moment, a comprehensive modern "360-degree" human resource assessment model is actively used in domestic companies and scientific organizations 296.

"The 360 degree model" is a way to conduct an ongoing staff assessment through a survey of an employee's business environment (manager, colleagues, clients), which consists in identifying the degree of compliance of an employee with his position.

The XXI century is intended to become the era of a knowledge-intensive, intellectual economy or knowledge economy. One of the most important practical manifestations of this is already a fundamental change in organizations towards the development and comprehensive expansion of the use of information and communication technologies (ICT). These changes are related to the transition to a new stage of the technological revolution, which is called "Industry 4.0".

In a broad sense, "Industry 4.0" means the transition to a complex automated digital production, controlled by intelligent systems in real time in constant interaction with a changing external environment and with the prospect of combining into a global network of creation of broadcasting services. Complex automation and digitalization of production noticeably reduces the number of employees and changes the personnel structure of organizations, while the number of remaining personnel changes significantly, and its importance increases many times. In order to ensure long–term sustainable development, organizations should increase their investments in intangible assets from year to year, primarily in human resources and strive to constantly increase the economic return on human capital.

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GROWTH POINTS IN HIGH-TECH PROJECT SECTORS THAT LEVERAGE DIGITAL MARKETING TECHNOLOGIES

Zhanar N. Tazhiyeva*
Al-Farabi Kazakh National University, Almaty, Kazakhstan.
*Email: zhanzari@gmail.com

Abstract

This study investigates the pivotal growth points in the high-tech sector facilitated through the integration of digital marketing technologies. With the rapid evolution of the digital landscape, high-tech projects have increasingly relied on innovative marketing strategies to fuel their growth and competitiveness. This research employs a comprehensive analysis of current data, including a meta-analysis of relevant literature and case studies of successful high-tech projects significantly benefiting from digital marketing initiatives. The methodology encompasses both quantitative and qualitative approaches, analyzing performance indicators, market share expansion, customer engagement metrics, and innovation rates. Findings from this study underscore the critical role of digital marketing technologies, such as search engine optimization (SEO), social media marketing, email marketing, and content marketing, in enhancing visibility, customer acquisition, and retention in the high-tech sector. Specifically, the research identifies key growth areas including market penetration, product innovation, customer base expansion, and international market entry. The study also discusses the implications of digital marketing strategies on the sustainable growth of high-tech projects, offering insights into best practices and strategic planning for leveraging digital technologies. The conclusions drawn from this research highlight the necessity for high-tech projects to adopt and adapt digital marketing technologies to navigate the challenges of the digital age effectively, ensuring their growth and long-term success.

Keywords: High-tech sector, digital marketing technologies, growth points, innovation, market expansion

JEL code: M31, M37, O32, O33, R40

Introduction

The digital age has ushered in a transformative era for high-tech sectors, with digital marketing technologies playing a pivotal role in shaping growth trajectories. The integration of these technologies within high-tech projects has not only enabled enhanced market reach and customer engagement but has also introduced novel avenues for innovation and competitive advantage (Mocanu A.A., Szakal A.C., 2023). This paper explores the growth points in high-tech project sectors that leverage digital marketing technologies, examining how these tools and strategies drive sectoral evolution and contribute to the sustainability of high-tech initiatives.

Digital marketing technologies, ranging from analytics and search engine optimization to social media platforms and email marketing, have become indispensable for high-tech projects aiming to capitalize on the digital economy's opportunities (Umamaheswari, Vijeta Kumawat, 2020). These technologies offer the means to gather insightful data, engage with targeted audiences more effectively, and optimize marketing strategies in real-time, thus fostering growth and enhancing project outcomes (Mocanu A.A., Szakal A.C., 2023). However, leveraging these technologies successfully requires a nuanced understanding of digital marketing principles and the ability to adapt to rapidly changing digital landscapes (Bharati Rathore, 2019).

Despite the apparent benefits, the integration of digital marketing technologies in high-tech sectors is fraught with challenges. Issues such as data privacy concerns, the digital divide, and the need for constant technological upskilling pose significant barriers to fully realizing these technologies' potential growth points (Ustik T. et al., 2023). Addressing these challenges is critical for ensuring that high-tech projects can sustainably leverage digital marketing technologies to achieve their growth objectives.

This article contributes to the burgeoning body of literature on digital marketing and high-tech sector synergy by identifying key growth points and examining strategies to overcome the associated challenges. Through a comprehensive review of current literature and analysis of case studies within the sector, this study aims to offer actionable insights and recommendations for practitioners and scholars alike.

In doing so, this research not only highlights the critical role of digital marketing technologies in driving high-tech sector growth but also addresses the practical considerations and ethical implications of their adoption. The findings from this study are poised to inform both future academic inquiries and strategic decision-making processes within the high-tech industry, paving the way for more integrated and effectiveLiterature Review

The integration of digital marketing technologies in high-tech sectors has been identified as a significant driver of growth and innovation. Scholars have explored various dimensions of this integration, focusing on its impact on market reach, customer engagement, innovation, and competitive advantage.

Impact on Growth and Market Reach: Digital marketing technologies, including social media, search engine optimization (SEO), and email marketing, have been shown to significantly enhance the visibility and market reach of high-tech projects. According to Muhammad N. et al., (2023), these technologies enable targeted marketing strategies that are more efficient and cost-effective than traditional marketing approaches. Similarly, Islam Md. Aminul (2023) highlights the role of analytics and big data in understanding market trends and customer preferences, which can inform strategic decisions and foster growth.

Challenges in Adoption: Despite their potential, the adoption of digital marketing technologies poses several challenges. Shee-Mun Yong (2023) discusses the technical and organizational hurdles companies face, such as the need for skilled personnel and the integration of new technologies into existing business processes. Moreover, concerns related to data privacy and security are prominent, as noted by Quach, S. at al., (2022), who argue that these concerns can significantly impact customer trust and, by extension, the effectiveness of digital marketing strategies. Strategies for Effective Integration: The literature suggests several strategies for overcoming the challenges associated with digital marketing technologies. Attaran M. et al., (2019) emphasize the importance of continuous learning and adaptation to keep pace with technological advancements. Furthermore, Ologunebi J., (2023) advocates for a holistic approach to digital marketing, wherein strategies are fully integrated into the business model and aligned with the company's overall objectives. use of digital marketing technologies. While existing studies have provided valuable insights, there are noticeable gaps in the literature. There is a need for more empirical research on the long-term effects of digital marketing technologies on high-tech sector growth, as well as studies that explore the impact of emerging technologies such as artificial intelligence (AI) and blockchain on digital marketing strategies.

The literature review underscores the critical role of digital marketing technologies in driving growth within high-tech project sectors. While these technologies offer significant advantages in terms of market reach and customer engagement, their adoption is not without challenges. Effective integration requires strategic planning, skilled personnel, and a commitment to continuous learning and adaptation. Future research should address the existing gaps by focusing on empirical studies and exploring the potential of emerging technologies.

Methodology

This study used mixed research methods to comprehensively explore growth points in high-tech project sectors using digital marketing technologies. This approach combined quantitative data analysis to identify trends and patterns with quantitative analysis to understand the nuances and complexities of digital marketing strategies in a high-tech environment. This approach has contributed to a more holistic understanding of how digital marketing technologies contribute to the growth and development of high-tech projects.

Quantitative data was collected using the collection of secondary database data and previously completed online surveys. The secondary data collected by the online survey method

included points about digital marketing strategies, tools used, performance indicators and estimated effectiveness to stimulate the growth of the project. Quantitative data were analyzed using statistical software for descriptive analytics to identify the relationship between digital marketing practices and project growth, as well as the effect of social media use on digital marketing technology.

Result and discussion

An analysis of the statistics on the use of digital marketing technologies shows that we are all dependent on social networks, which are also digital marketing technologies. To better understand how addicted users are, let's look at social media usage statistics.

Below is a brief overview of how the demographics of social media are changing and their use, which networks are winning and how consumers are attached to social media.

In 2024, there are estimated to be 5.17 billion total social media users worldwide.

The average person uses 6.7 different social networks per month.

The amount of time internet users spend on social media declined slightly to 143 minutes per day.

TikTok is the fastest-growing platform with a staggering 100% user growth rate between 2020 and 2022. And between Q3 2022 and Q3 2023, TikTok's monthly active users grew 13%.

The number of social media users worldwide grew by 320 million people from January 2023 to January 2024 (Social Media Statistic, 2024).

Growth may seem slow, but this is due to the huge number of people who are already using digital marketing tools such as social media. This means that social media offers huge opportunities for marketers and advertisers.

However, since users are distributed across multiple platforms, it is more important than ever for projects to use a multi-channel approach. Don't forget to use new platforms like TikTok to reach a new audience and stand out from the competition.

Advertising statistics in digital marketing tools are more accurate in social networks. As organic reach declines on almost all platforms, paid social media advertising is becoming a must-have strategy to reach the target audience. If you look at more advertising statistics in digital marketing tools, you can develop your strategy.

Total spending on social media advertising is projected to reach $219.8 billion in 2024.

It's now projected that $255.8 billion of total social media ad spending will be generated through mobile by 2028.

Total ad spend growth is anticipated at 6.1% in 2024.

Social media ads account for 28.8% of all digital advertising spend.

Businesses put around 8.7% of their total revenue towards their ads budget (Social Media Statistic, 2024).

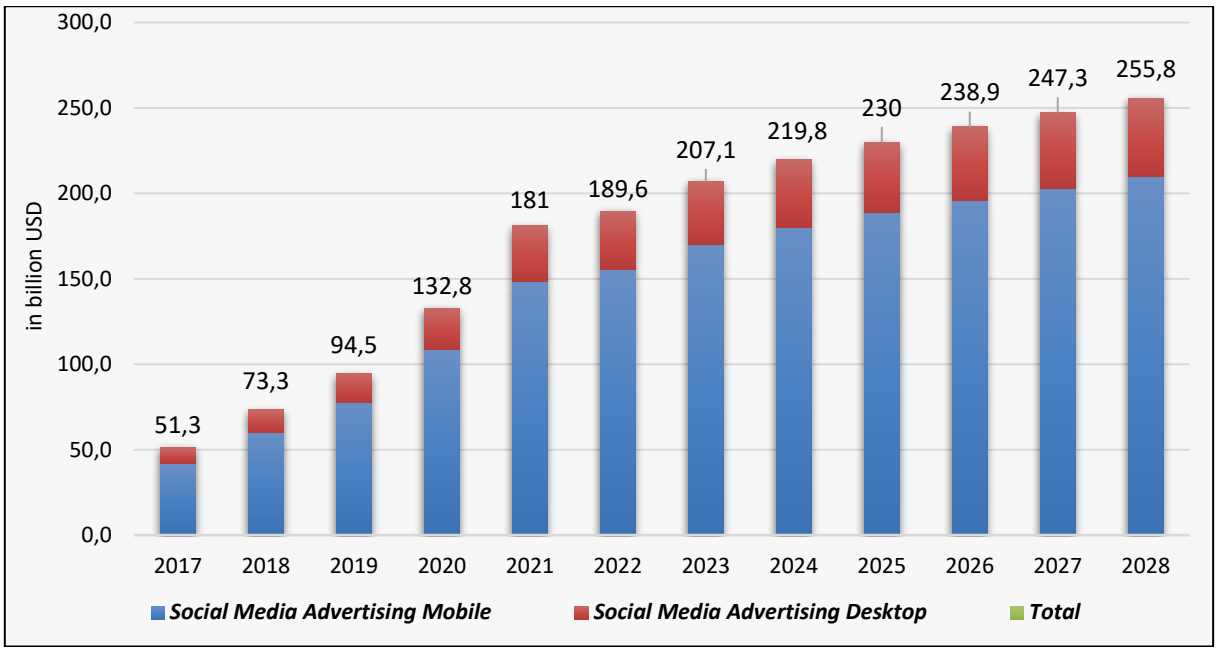

Figure 1. Using social media marketing by phone and computer (The figure was compiled by the authors on Statista Market Insight)

According to Figure 1, the cost of advertising on social networks is steadily increasing. As more and more marketers invest in advertising, projects and brands should be prepared to allocate large budgets to paid marketing strategies to compete.

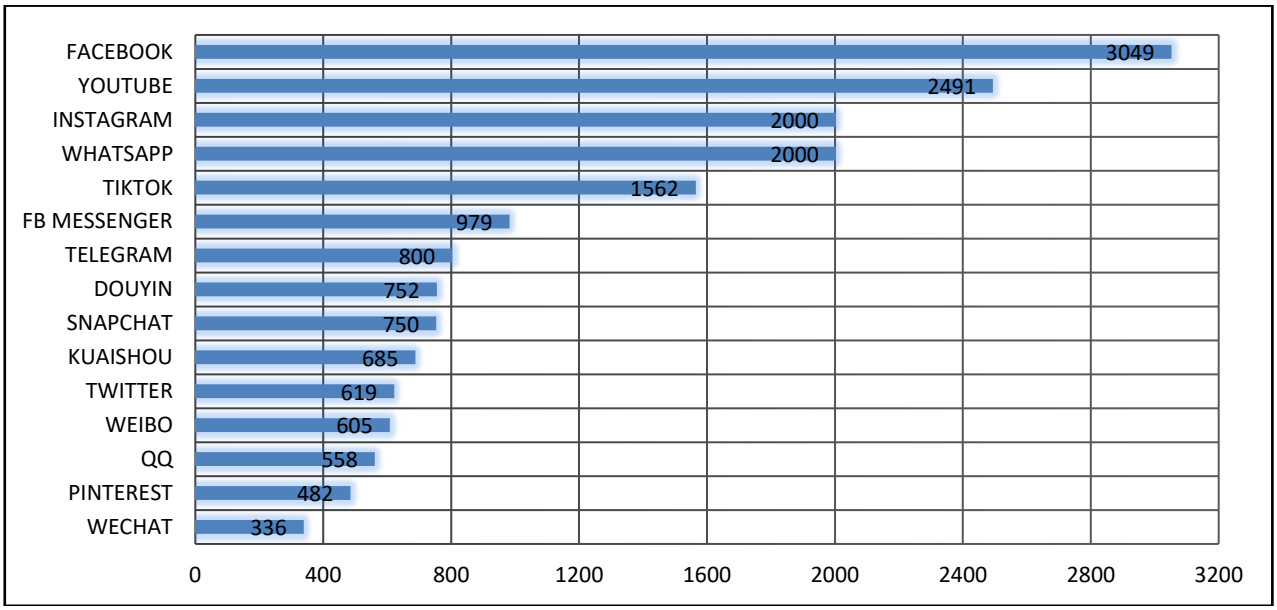

Figure 2. The world`s most used social platforms (Datareportal, 2024)

As can be noted by the world ranking of used social networks in Graphic 2, the top five also include everyday used applications, which are also tools of digital marketing technology.

Facebook, Instagram, LinkedIn, Pinterest, TikTok, YouTube and other marketing influencers can be separately mentioned among digital marketing tools.

Facebook remains a powerful advertising hub. Whether Facebook is worth targeting high-tech projects and brands is a difficult question, which depends on Facebook's metrics. The statistics applied can influence the choice of marketing strategies.

Facebook is the most-used platform by marketers worldwide (89%). Instagram sits in second place (80%).

As of Q3 2023, Facebook is the largest online social network in the world with roughly 3.05 billion monthly active users.

The average American spends about 31 minutes per day on Facebook.

56.3% of Facebook users are male and 43.7% are female (based on available gender data).

For example, almost a quarter of Facebook users in the US are between the ages of 25-34 (Social Media Statistic, 2024).

Facebook remains a favourite among marketers. This is not surprising, given the wide reach offered by the platform. In addition, an increase in the average age means that more and more users are occupying high-level management positions in their careers.

Instagram's figures mark 2 billion monthly active users, and yet projects or brands using digital marketing technologies are still trying to attract more Instagram subscribers. The following are the main statistics on Instagram social networks.

This tool joins forces with Facebook in creating a social media platform with the highest return on investment.

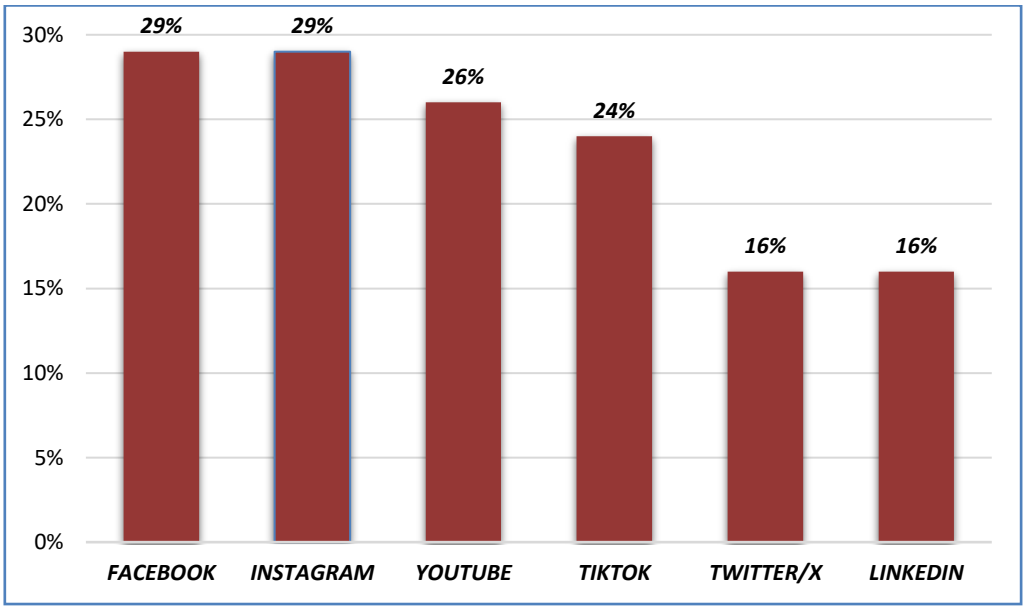

Figure 3. Which social media platform offers marketers the highest ROI? (Hubsport Blog Research, Marketing Trends Report, 2023)

27.4% of US Instagram users are between 25 and 34 years old.

61.1% of total Instagram users worldwide are between the ages of 18 and 34 and mostly identify as male.

Instagram Reels generate more likes and saves, but fewer comments than regular posts.

Instagram’s engagement rates are four times higher than Facebook's (0.60% to 0.15%), but engagement has become more competitive each year.

In 2023, 43% of marketers plan to increase their investment in Instagram (Social Media Statistic, 2024).

Instagram, which was once a popular social platform for influencers, is facing competition from TikTok. Nevertheless, relatively high engagement rates, new e-commerce opportunities and high advertising costs indicate that Instagram still has a bright future.

One of the social media tools of digital marketing technology is LinkedIn, which has done a brilliant job of conquering its niche as a network for professionals. This platform is a potential gold mine for B2B brands, and the rapid growth of their advertising platform speaks for itself. Here are some LinkedIn statistics that you should know.

There are more than more than 1 billion members across 200 countries on LinkedIn.

The United States has the highest user rate in the world on LinkedIn with an audience reach of over 214 million users.

There are over 67 million company profiles on LinkedIn.

60% of worldwide users are between ages 25 and 34 years old, far exceeding any other age group (Social Media Statistic, 2024).

Due to the career changes that have occurred in recent years, the platform will not stop developing shortly.

The YouTube tool is more used as a tool for promoting and describing visualization projects to compete with such developing platforms as TikTok. The world's second-largest search engine is making major changes. Here are the main YouTube statistics worth knowing about.

As of January 2023, YouTube has nearly 2.5 billion users worldwide.

YouTube Shorts has 2 billion monthly active users.

YouTube's biggest gender segments are males aged between 25-34 (12.2%), and males aged between 35-44 (9.6%) (based on available gender data).

YouTube users spend an average of 28 hours, and 5 minutes on the Android app each month.

Nearly 90% of all visits to YouTube come from a mobile device (Social Media Statistic, 2024).

Despite the platforms in the market, YouTube is still users' go-to video-sharing and video-consumption platform. With more people accessing the app on mobile, marketers would benefit from posting more short-form, vertical content (i.e. Shorts) on the platform.

Video can be used in all digital marketing tools. Video is still one of the most popular types of content. It is versatile, and attractive and provides excellent return on investment for marketers around the world, as well as applications in the implementation of high-tech projects. Many high-tech projects are considered and discussed in various platforms before implementation, which are used to familiarize the population with the form of a webinar and other types of video podcasts. According to the latest statistics, 45% of people prefer to learn about a new product or service through short video content. 87% of marketers believe that video marketing directly increases sales. Short videos provide marketers with the highest return on investment of all social media marketing strategies: 30-60 videos are the most successful.

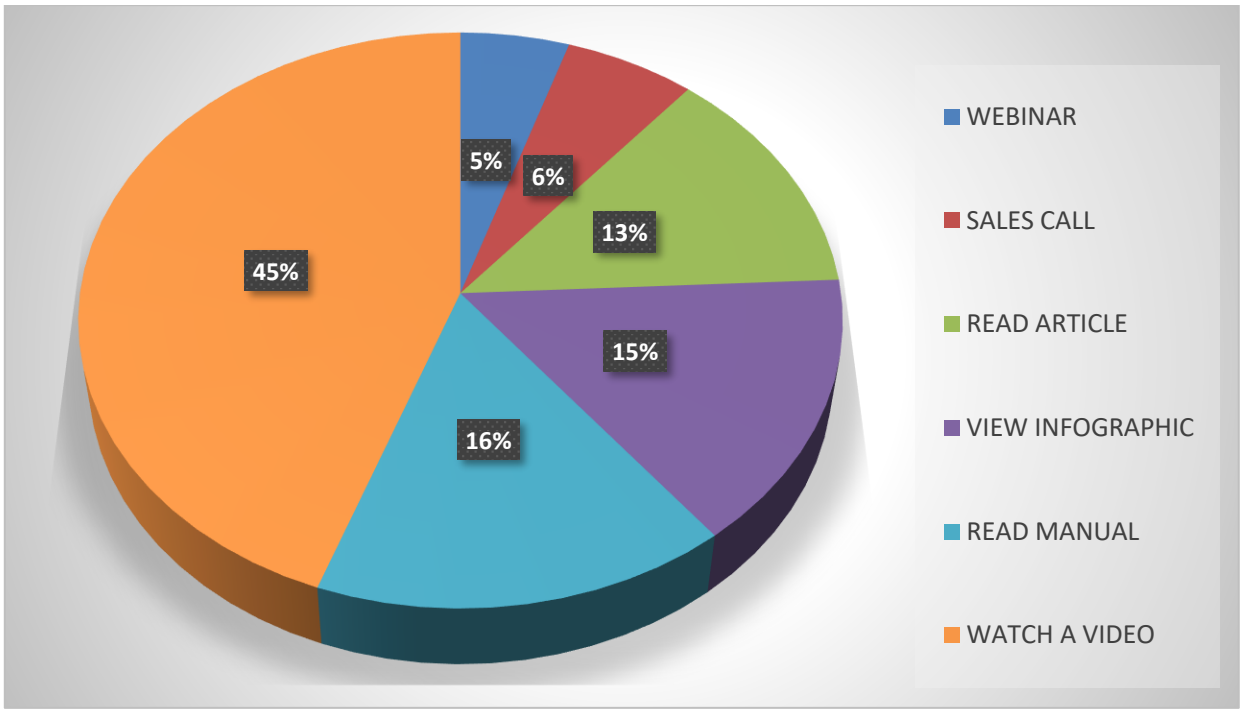

Figure 4. How would projects like to learn about a product or service (Social Media Statistic, 2024)

The video finds its application in all types of marketing strategies in almost every industry. However, its shape is changing. Brands can expect better results from short video content that is primarily entertaining and/or funny.

The conclusion by the result is digital marketing technologies offer significant growth opportunities for high-tech sectors. By strategically integrating these technologies and focusing on

innovation and adaptability, high-tech companies can enhance their market presence, revenue, and engagement with customers. However, the rapid pace of digital evolution presents both a challenge and an opportunity for ongoing growth and competitiveness.

Conclusion

This study has explored the pivotal growth points in high-tech project sectors, with a specific focus on the integration and leverage of digital marketing technologies. Our analysis has uncovered that high-tech projects significantly benefit from adopting advanced digital marketing strategies, which not only enhance visibility but also foster engagement with a broader audience base. The integration of AI and machine learning algorithms for data-driven marketing decisions has emerged as a particularly influential growth point, enabling high-tech projects to predict market trends and customer behaviour with unprecedented accuracy.

Furthermore, our research has highlighted the importance of omnichannel marketing strategies in maximizing the reach and impact of high-tech projects. By leveraging a combination of social media, email marketing, SEO, and content marketing, high-tech projects can effectively communicate their value proposition and build a loyal customer base. The role of analytics in refining marketing strategies has also been underscored, with data analytics tools providing deep insights into customer preferences and behavior, thus allowing for more targeted and personalized marketing efforts.

The implications of these findings are profound for practitioners and theorists alike. For practitioners, the study offers concrete strategies to harness digital marketing technologies for enhancing the growth and sustainability of high-tech projects. For theorists, it provides a foundation for further exploration into the dynamic interplay between technology innovation and marketing strategies in the high-tech sector.

Future research should aim to explore the long-term impacts of these digital marketing technologies on the growth trajectories of high-tech projects. Additionally, there is a need for comparative studies that investigate how different high-tech sectors respond to and benefit from specific digital marketing strategies. Such studies could significantly enrich our understanding of the critical success factors for high-tech projects in the digital age.

By embracing the growth points identified in this study, high-tech projects can navigate the complexities of the digital marketplace more effectively and secure a competitive edge in their respective sectors. It is through the continual innovation and strategic application of digital marketing technologies that high-tech projects can achieve sustained growth and success.

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Internet portal by analysing all of the data and making a report via link https://datareportal.com/social-media-users

CUSTOMS LOGISTICS IN KAZAKHSTAN: DEVELOPMENT AND PROSPECTS

Kenzhebay Zhanetta Zhanabaykyzy*
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: zhanetta.kenzhebay@mail.ru

Abstract. The objective of the investigation is to conduct an analysis of the contemporary status quo of customs logistics in Kazakhstan, elucidate principal issues and challenges, and proffer recommendations for ameliorating the aforementioned domain. Methodologies employed encompassed literature scrutiny, aggregation and analysis of statistical datasets, qualitative appraisal of extant trends and quandaries, alongside discourse on prospective avenues for addressing identified issues.

Findings delineated the principal predicaments within Kazakhstan's customs logistics as comprising bureaucratic impediments, exorbitant customs levies and tariffs, and a dearth of transparency and predictability in regulatory frameworks. The study's denouement underscores the imperative for systemic overhauls, including the integration of cutting-edge technologies, streamlining of procedures, and augmenting transparency, aimed at fostering an improved commercial milieu and catalyzing economic advancement within the nation.

The research topic remains salient in the contemporary milieu, where customs logistics assumes pivotal significance in global commerce and economic progression. Enhancing customs logistics in Kazakhstan assumes strategic import for the nation's integration into the global economic landscape and fortifying its competitive stance within the international arena.

Keywords. Customs logistics, trade turnover, border security, global economy, the EAEU.
JEL codes: G12, G15, F5

Introduction

Customs logistics is an important aspect of the modern global economy, especially for countries located at the intersection of international trade routes. In the context of Kazakhstan, which holds a strategically important geographical position at the crossroads of Europe and Asia, the development of customs logistics is of particular significance for stimulating economic growth and integration into the global economic system. This article examines the theoretical aspects of customs logistics in Kazakhstan, including its definition, key components, influencing factors, and development prospects.

Customs logistics plays a critical role in Kazakhstan's modern economy, ensuring the efficient functioning of international trade and the exchange of goods. According to data from the National Statistical Committee of the Republic of Kazakhstan, the country's foreign trade amounted to over $139,833 million USD in 2020, highlighting the importance of international trade relations for economic development. Additionally, according to the report of the Ministry of Industry and Infrastructure Development of the Republic of Kazakhstan, transit cargo turnover through the country's territory exceeded 20 million tons in 2021, demonstrating Kazakhstan's importance as a key transportation hub in the region.

Currently, Kazakhstan is actively developing its customs infrastructure and modernizing regulatory systems to facilitate the flow of goods and services across its borders. According to a report from the Ministry of Finance of the Republic of Kazakhstan, investments in improving customs infrastructure exceeded 5 billion tenge in 2022, including the modernization of customs checkpoints and the implementation of advanced technologies to optimize customs procedures (Искалиев, 2023).This article aims to analyze the current state of customs logistics in Kazakhstan, identify the main problems and challenges faced by entrepreneurs and investors, and discuss the prospects for the development of this important sector in the future.

In the context of customs logistics in Kazakhstan, actions related to the transportation of goods across customs borders include their clearance and payment of relevant taxes and duties.

Lack of knowledge about the existing legislative specifics can lead to difficulties in the customs clearance process, which is why many businessmen prefer to turn to brokers who successfully represent the interests of their clients at various stages of clearance.

Currently, there are several main procedures to which goods may be subjected when passing through customs in Kazakhstan:

1. Import - the importation of goods into the customs territory of the country from beyond its borders for use or sale.
2. Reimport - the importation of previously exported goods back into the customs territory of the country.
3. Utilization or processing - procedures related to the utilization or processing of goods within the customs territory.
4. Storage in a warehouse complex - placing goods in a customs warehouse for temporary storage or further processing.
5. Export or re-export - the exportation of goods beyond the customs territory of the country or their re-export after importation into the customs territory.
6. Transit - the movement of goods through the customs territory of Kazakhstan for delivery to a third country («Особенноститаможенногооформлениягрузоввказахстане», 2022).

Actors in the transport market, while interacting with customs authorities, have to take into account customs legislation requirements and road transport complex operational characteristics, since noncompliance with them will cause a number of delays due to the need for corrective actions and will also entail a number of penalties (Luzhanska et al., 2019).

In this context, the study of customs logistics in Kazakhstan becomes particularly relevant. Based on the analysis of the current state and prospects of customs logistics development, effective strategies can be identified to reduce customs barriers, stimulate export-import operations, and support sustainable economic growth in the country. This article examines the theoretical aspects of customs logistics and presents practical recommendations for optimizing customs strategy and enhancing the country's competitiveness on the global stage.

In light of the dynamically evolving global economy and increasing competition on the world stage, customs logistics plays a vital role for Kazakhstan. It is not only a key factor in ensuring the efficient movement of goods through its territory but also a means of stimulating economic growth and improving business competitiveness in the country. In the context of an active strategy for attracting investments and developing trade relations, the development of customs logistics remains a priority for Kazakhstan in the near future.

Customs logistics is becoming an increasingly significant aspect of economic development in Kazakhstan, particularly in the context of its membership in the Eurasian Economic Union (EAEU). This strategic partnership with Russia, Belarus, Armenia, and Kyrgyzstan presents unique opportunities and challenges for customs logistics in the country. Based on the analysis of recent news and statistical data, this introduction aims to discuss the substantial role of customs logistics in the context of Kazakhstan's membership in the EAEU and its impact on the country's economic development.

Literature review

The delineation of customs logistics as a subject of scientific inquiry is methodologically warranted by its characterization as an independent and distinct domain within logistics. Its operations, functions, and processes are governed by both international and national legislation pertaining to customs, international trade, international business, and international cooperation. Moreover, the entities and objects involved in customs logistics activities are subject to oversight, including customs supervision, inspections, and other regulatory actions by relevant authorities.

This regulatory framework establishes the autonomy of customs logistics, as it pertains specifically to activities involving flows of goods and resources under customs supervision. Unlike other domains within logistics such as transportation, warehousing, sports, or warfare, customs logistics uniquely encompasses activities subject to customs oversight and may only be conducted within this regulatory framework (Jablonskis et al., 2019).

Customs logistics represents an indispensable component of the modern economy, particularly for countries actively engaged in international trade. In the context of economic development and the aspiration for integration into the global economy, the role of customs logistics in Kazakhstan is becoming increasingly significant. This literature review conducts an analysis of contemporary research and publications dedicated to customs logistics in Kazakhstan, aiming to identify key challenges, issues, and development prospects within this crucial sector of the economy.

Key aspects addressed in the literature review include bureaucratic obstacles and complexities in customs clearance procedures, opacity and variability of customs regulations, high customs duties and taxes, as well as prospects for modernization and automation of customs processes. Drawing upon the analysis of existing research and the experiences of various countries, conclusions are drawn regarding the importance of further efforts to enhance customs logistics in Kazakhstan. Possible directions for future research and practical actions in this field are also identified.

Kapustina and Labkovich highlight the main challenges that countries face in developing customs logistics. As an example, they point out that bureaucratic procedures can lead to significant delays in the delivery of goods, subsequently increasing logistics costs and reducing the competitiveness of companies in the global market. They emphasize the necessity of reforming the customs system to facilitate international trade and economic development (Капустина&Лабкович, 2010).

In Ukin's work, the experience of Kazakhstan in the field of customs procedures and their impact on the country's integration into the global economy is examined. He refers to data indicating that the reduction of time and simplification of customs clearance procedures in Kazakhstan have made a significant contribution to increasing the volume of international trade and attracting foreign investments. This example confirms the importance of reforming customs logistics for successful integration into the global economy (Ukin, 2021).

In his work, Bohdan analyzes the role of customs logistics in the economic development of a country. He references studies indicating that countries with efficient customs systems experience higher levels of economic growth and are more attractive to investors. This underscores the importance of developing customs logistics as a factor contributing to economic prosperity (Bohdan, 2013)

In his research, Shkurkin et al., explore the potential for innovation implementation in Kazakhstan's customs logistics and their impact on the efficiency of customs processes. They cite examples from other countries where the adoption of modern technologies and automated systems has led to significant reductions in customs clearance times and lowered costs for businesses. This indicates that innovation could serve as a key factor in improving customs logistics in Kazakhstan (Shkurkin et al., 2016).

Nessipbay et al., draw attention to the correlation between customs procedures and the investment climate in Kazakhstan. They point out that simplifying customs procedures and reducing customs duties can make the country more attractive to foreign investors. This underscores the necessity of reforming the customs system as part of a comprehensive set of measures to enhance the investment climate (Nessipbay et al., 2022).

Methodology

This scientific article suggests employing a comprehensive set of methods and methodology, including literature review, collection of current data, qualitative and comparative analysis, as well as systemic analysis. Conducting a literature review will provide an extensive understanding of the topic of customs logistics in Kazakhstan and identify key aspects for analysis. Data collection on customs procedures, international trade volumes, and other parameters will ensure the accuracy of analysis and conclusions. Qualitative data analysis will help identify major trends and issues in the field of customs logistics, while comparative analysis will juxtapose Kazakhstan's indicators with similar data from other countries. Systemic analysis, in turn, will help understand the interrelationships between various aspects of customs logistics and identify critical areas for

improvement. Such a comprehensive approach will ensure a thorough examination of the current state of customs logistics in Kazakhstan and identify possible directions for its development and enhancement.

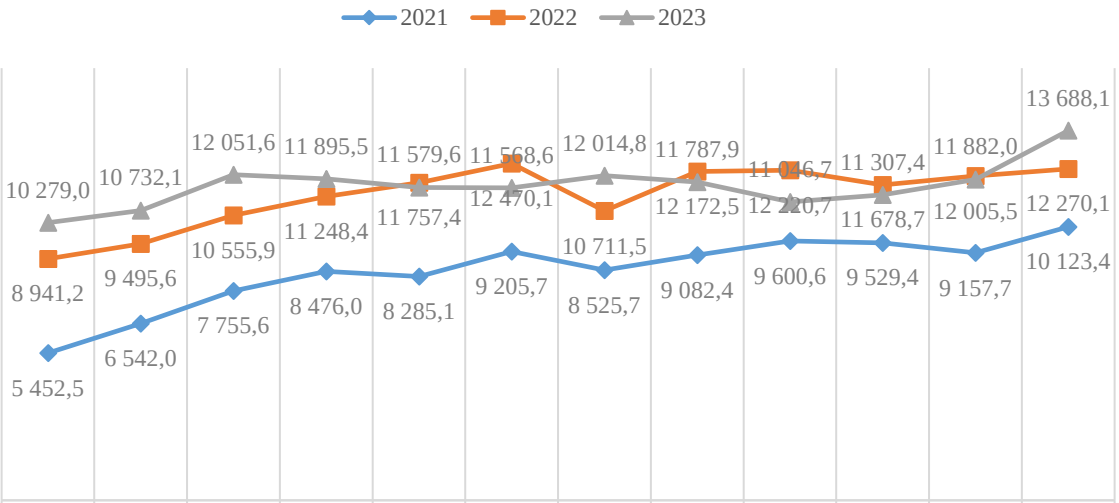
Results and Discussion

During the period from 2020 to 2023in figure 1, Kazakhstan's foreign trade turnover demonstrated stable growth, starting at 81,261.3 billion tenge in 2020 and reaching 134,379.6 billion tenge in 2023. This positive trend indicates a gradual increase in the country's trade volume with foreign partners.

Customs services play a crucial role in ensuring border security and controlling the movement of goods. Amidst active foreign trade turnover, these services continue to effectively carry out their functions. They conduct customs procedures, collect customs duties, and ensure compliance with customs regulations.

The activities of customs services are of significant importance for the development of the economy and maintenance of order in the sphere of foreign trade. Conducting efficient customs procedures contributes to reducing time and costs for crossing the border, facilitating faster and more efficient trade. Moreover, compliance with customs regulations helps prevent illegal circulation of goods and protects the interests of the national economy.

Thus, customs services play a key role in maintaining stability and developing Kazakhstan's foreign trade relations, ensuring security and efficiency in the movement of goods across the border.



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2021	5 452,5	6 542,0	7 755,6	8 476,0	8 285,1	9 205,7	8 525,7	9 082,4	9 600,6	9 529,4	9 157,7	10 123,4
2022	8 941,2	9 495,6	10 555,9	11 248,4	11 757,4	12 470,1	10 711,5	12 172,5	12 220,7	11 678,7	12 005,5	12 270,1
2023	10 279,0	10 732,1	12 051,6	11 895,5	11 579,6	11 568,6	12 014,8	11 787,9	11 046,7	11 307,4	11 882,0	13 688,1

Figure 1 - Foreign trade turnover in Kazakhstan
compiled by the authors based on the source (Statistical data, 2023)

Kazakhstan's foreign trade turnover encompasses both exports and imports of goods and services. Customs authorities play a key role in controlling the movement of goods across the country's borders, ensuring compliance with customs rules, and collecting relevant customs duties and taxes. The effective operation of customs services is considered an important element for ensuring state security, preventing smuggling, and combating tax evasion.

Analyzing foreign trade turnover and the role of customs services allows for the assessment of Kazakhstan's economic development, its integration into the global economy, as well as the effectiveness of measures for managing foreign trade activities and border control.

Customs activities also play a significant role in the country's budget. For instance, customs duties constitute 35% of the republican budget, with their share in the state budget reaching 18%. These payments serve as a substantial source of revenue for the state budget and contribute to

financing various sectors of the economy and social programs («30 лет таможенной службе Казахстана», 2021).

In 2023, Kazakhstan's budget received over 4 trillion tenge in customs duties and taxes, representing an 18% increase compared to the previous year. These figures were announced by the Committee of State Revenues. Specialists note a positive trend over the past two years.

The increase in customs duties and taxes indicates a growth in foreign trade activity and an increase in the turnover of goods across Kazakhstan's customs borders. This may be attributed to various factors such as increasing volumes of exports and imports, changes in customs legislation, as well as overall economic activity in the country and the region.

This growth makes a significant contribution to the country's budget, allowing for the financing of various state programs and social projects, thus contributing to economic stability and development («Более 4 трлн таможенных платежей и налогов поступило в бюджет в 2023 году», 2024).

The Russo-Ukrainian conflict has had a significant impact on the trade map of Eurasia. By the end of 2022, imports to Russia and Belarus decreased by 17%, while growth was observed in Kyrgyzstan and Kazakhstan. According to official data from statistical agencies, the total import to the member countries of the Eurasian Economic Union, including Russia, Kazakhstan, Kyrgyzstan, Belarus, and Armenia, amounted to $285.9 billion. This is compared to $318.5 billion in the previous year. Due to the onset of the military conflict in Ukraine, Russia closed its foreign trade statistics, and the Eurasian Economic Commission ceased to publish aggregated data.

Nevertheless, comparing foreign trade statistics from third countries shows that imports to Russia and Belarus decreased by 17%. Specifically, Russian imports decreased from $271.7 billion to $224.5 billion, while Belarusian imports decreased from $17.9 billion to $16.3 billion. These figures are supported by official data. Imports of goods to Kazakhstan increased by half, from $22.6 billion to $32.4 billion.

The increase in imports in Kyrgyzstan and Armenia, noted from $2.9 billion to $6.5 billion and from $3.3 billion to $6.1 billion respectively, can be attributed to parallel import shipments to Russia. Recently, the United States imposed sanctions against some companies from Kyrgyzstan for supplying prohibited technologies to the Russian Federation.

According to 2023 in table 1, the total turnover of goods of the Republic of Kazakhstan with the countries of the Eurasian Economic Union amounted to $25,741.4 million USD, which is 3% less than in the same period of the previous year.

During the same period, exports of goods from the Republic of Kazakhstan amounted to $9,904.6 million USD, which is 10% more, while imports decreased to $15,836.8 million USD, which is 9.7% less.

The Russian Federation continues to account for the main share of the foreign trade turnover of the Republic of Kazakhstan with the Eurasian Economic Union - 91.6%, followed by Kyrgyzstan – 5%, Belarus – 3.3%, and Armenia – 0.2%.

Table 1 - Trade turnover of Kazakhstan with the countries of the EAEU (million dollars USA)

	Export		Import	
	2022	2023	2022	2023
Russia	8097,0	8926,2	16276,3	14650,0
Kyrgyzstan	721,4	810,3	415,8	464,2
Armenia	159,6	136,0	833,7	705,2
Belarus	26,4	32,1	12,4	17,4
total	9004,4	9904,6	17538,2	15836,8
compiled by the authors based on the source(Исин, 2023)				

Armenia's shares in the union imports have increased to 2.3%, 11.4%, and 2.1%, respectively. Meanwhile, the shares of Russia and Belarus amounted to 78.5% and 5.7%,

respectively. This indicates changes in the structure of trade turnover within the Eurasian Economic Union.

According to the EAEU agreement on the distribution of import customs duties, the member countries have the following shares: Russia (85.065%), Kazakhstan (6.955%), Belarus (4.86%), Kyrgyzstan (1.9%), and Armenia (1.22%). These shares reflect the distribution of import customs duties among the member countries of the union and serve as one of the mechanisms for cooperation within the EAEU (Исин, 2023).

Such changes in the structure of imports and the shares of import customs duties may reflect changes in the trade policies of member countries as well as external factors such as military conflicts and changes in the global economy.

In Kazakhstan, changes in customs legislation are periodically introduced, which can significantly impact import and export processes. The discrepancy in statistics between exports from China to Kazakhstan and imports to Kazakhstan has decreased by almost half since 2017, from 59.4% to 32.7% by the end of 2022. According to data from the Committee of State Revenues (CSR), during the period from 2017 to 2022, this indicator was 59.4%, 52.5%, 47%, 45.5%, and 40.5%, respectively.

According to Kazakhstan's customs statistics for 2022, the volume of mutual trade with China amounted to $24.15 billion, while according to the customs authorities of China, the trade volume with Kazakhstan for the previous year reached a historical record of $31.2 billion. The discrepancies in customs statistics reached $7 billion. In 2019, this figure was $6 billion, but due to a smaller trade volume, the relative size of discrepancies was higher (Медеубаева, 2023).

Such discrepancies in customs statistics can significantly affect supply chain management since the accuracy and reliability of trade data are crucial for planning and forecasting deliveries and the timing of goods delivery. Therefore, regulating this aspect at the legislative level can be an important step in ensuring transparency and reliability in foreign trade operations.

Within customs procedures, violations are often observed, such as insufficient vehicle inspection, evasion of taxes and duties, and passing through customs control without queuing, which creates a number of problems in the customs control system. Discrepancies in mirror statistics between the customs authorities of Kazakhstan and China reach significant sums in billions of dollars, indicating serious problems in the collection and analysis of customs data.

Furthermore, there are authorized operators within the customs control system who, possessing a special status, often enjoy privileges and bypass necessary procedures, leading to violations of customs rules and encroachment on the interests of other market participants.

As a result of such violations, the state loses significant amounts in terms of missed tax revenues, which adversely affects budget policy and economic development in the country. These shortcomings in the customs control system require immediate intervention and reform at the legislative and enforcement practice levels to ensure the effective functioning of the customs system and protection of the state's interests (Xie et al., 2021).

Customs services play a crucial role in ensuring border security and controlling the movement of goods. However, the lack of transparency in customs rules and procedures poses a significant problem for businesses in Kazakhstan. According to reports from the International Monetary Fund and the World Bank (Aslett, 2023), frequent changes in legislation and unclear interpretations of rules can create uncertainty and risk for entrepreneurs. For example, in 2021, changes in currency legislation led to certain difficulties for businesses interacting with foreign partners. The business community expresses the need for clearer and more consistent application of customs norms and rules to minimize risks and ensure predictability in their operations.

Thus, despite positive trends in the development of foreign trade activities in Kazakhstan, improving the transparency of customs rules and procedures is necessary to ensure stable and progressive economic growth.

Analysis of comparative data on the level of customs duties and taxes allows for identifying the influence of these factors on foreign trade activities and logistics in Kazakhstan. According to World Bank data on Doing Business indicators, in 2020, Kazakhstan had an average level of customs duties, amounting to approximately 6.4% of the value of imported goods. In comparison,

the average global level of customs duties was 6.8%. However, despite the comparable level of average customs duties, the cost of imported goods in Kazakhstan may significantly increase due to additional taxes and fees.

For example, compared to other Eurasian Economic Union countries such as Russia and Kyrgyzstan, Kazakhstan has higher customs duties and taxes. According to analytical reports of the Eurasian Economic Commission, the average level of customs duties and taxes on imported goods in Russia and Kyrgyzstan is approximately 5.5% and 5.8% respectively(Aslett, 2023).

Thus, high customs duties and taxes in Kazakhstan can have a negative impact on trade and logistics by increasing the cost of imported goods and reducing their competitiveness in global markets. To stimulate international trade and attract investment, Kazakhstan should strive to reduce customs barriers and duties.

To address many of the aforementioned issues, it is necessary to modernize and automate customs processes in Kazakhstan. The implementation of modern information technologies, such as electronic goods declaration and automated accounting and control systems, can significantly reduce time and financial costs for customs clearance and expedite border crossing processes.

Overall, customs logistics in Kazakhstan faces its challenges and problems, but it also has the potential for development and improvement. The country should continue its efforts towards simplifying customs procedures, enhancing transparency of regulations, and stimulating innovation in this area to ensure its economic growth and successful integration into the global economy.

Conclusions

An analysis of the current state of customs logistics in Kazakhstan has identified several key trends and issues that significantly impact the country's economy.

Bureaucratic obstacles and delays represent a serious problem. According to World Bank reports, the average time required to complete customs procedures in Kazakhstan exceeds 100 hours, which is substantially higher than the average level for middle-income countries. This indicates the presence of significant bureaucratic hurdles capable of causing supply delays and increasing costs for businesses.

High customs duties and taxes also have a significant impact on the country's economy. Statistics from the Ministry of Finance of the Republic of Kazakhstan show that customs duties and taxes constitute a significant portion of the total cost of imported goods. These high customs barriers can restrict access for Kazakhstani enterprises to global markets and increase the cost of imports, thereby reducing their competitiveness.

Insufficient transparency and predictability of rules are also serious issues. According to the National Institute for Modern Business Development, the lack of transparency and predictability in customs procedures can be a significant obstacle for businesses. Unclear interpretations of rules and frequent legislative changes create uncertainty and risk for entrepreneurs and investors.

The need for modernization of customs processes is also confirmed by research from the Customs Service of the Republic of Kazakhstan. The implementation of modern technologies and automated systems can significantly improve the efficiency of customs processes and reduce the time required for their completion. This, in turn, contributes to improving the business environment and stimulating economic growth.

Discussion of these results emphasizes the need for systemic reforms in the field of customs logistics in Kazakhstan. Eliminating bureaucratic obstacles, reducing customs duties and taxes, increasing transparency and predictability of rules, as well as implementing modern technologies and automated systems, will be key steps towards improving customs logistics and stimulating economic growth in the country.

In conclusion, the results of the analysis of the current state of customs logistics in Kazakhstan clearly indicate the need for systemic changes in this area. Identified problems, such as bureaucratic obstacles, high customs duties, insufficient transparency and predictability of rules, require a comprehensive approach and specific measures to address them. The implementation of modern technologies and automated systems in customs processes, simplification of procedures and reduction of customs barriers, as well as improvement of legislation and increased transparency in

the activities of customs authorities, are all key steps towards improving the business environment and stimulating economic growth in Kazakhstan. The prospects for the development of customs logistics in the country depend on the effective implementation of the proposed recommendations and cooperation of all interested parties - the government, businesses, and the academic community. Only through joint efforts can a favorable and progressive customs system be created, contributing to sustainable economic development and integration of Kazakhstan into the global economy.

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WORKFORCE PLANNING: A LITERATURE REVIEW

Narsymbat Salimgereyev*, Bulat Mukhamediyev
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: narsymbat@mail.ru

Abstract

Background: Workforce planning considers the long-term concerns of staffing an enterprise, allowing it to better prepare for the future and deal with unanticipated changes in the external environment.

Methods: We examined academic and practical articles on workforce planning to assess practices, problems, and scientific and methodological approaches to workforce planning. This article also seeks to comprehend the background of workforce planning, including its history and strategic importance to modern enterprises.

Results: We've categorized workforce planning techniques. We went into additional detail about the workload assessment technique as well as the primary challenges with obtaining reliable data on task workloads and how to address them. A literature search and analysis revealed a distinct category of subjective workload assessment techniques utilized in workforce planning.

Conclusion: Workforce planning is strategic in nature. It requires estimating workforce supply and demand while taking into account changes in the organization's internal and external environments. Workforce planning applies various techniques for determining workload and staffing needs.

Keywords: Workforce planning, Human resource management, Strategic planning

JEL Codes: J21, J22, J23

1. Introduction

Personnel planning is a process that results in determining the required number, professional profile, and deployment of personnel (Censeo Consulting, 2020). Workforce planning is an integral part of the strategic planning process within an organization (Vernez et al., 2007; Nataraj et al., 2014). Although workforce planning was first researched in the 1960s, it has grown in importance since the late 1990s as a result of rapid technological advancement and growing worldwide rivalry (Sinclair, 2004).

In the post-Soviet space, the concept of workforce planning has appeared recently. The Republic of Kazakhstan employs the concept of work measurement instead of workforce planning. We inherited the practice of work measurement from the socialist past. According to the Labor Code of the Republic of Kazakhstan, work measurement includes the development of staffing standards used for personnel planning.

The USSR economy placed great importance on work measurement due to its close connection to the implementation of laws promoting planned, proportional development of the national economy and labor-based distribution. In the USSR, work measurement played a key role in centralized production planning and labor productivity advancement and served as the basis for the remuneration system. State bodies strictly monitored the compliance of labor standards in force with the current level of technology and labor organization at enterprises and organizations. Thus, reasonable labor standards were the basis for planning and determining the level of labor productivity.

The Republic of Kazakhstan's current legislation mandates the development and updating of labor standards only for organizations whose services (goods or work) are subject to state tariff regulation. Therefore, natural monopoly subjects, government organizations, and enterprises that provide paid services primarily develop labor standards in Kazakhstan. The Republic of Kazakhstan's public sector develops labor standards in the defense, law enforcement, and judicial

spheres, healthcare, social security, and education sectors. These standards are applied for the purposes of workforce planning, justification of allocated budget funds, ensuring law and order, and providing quality public services. The legislation of the Republic of Kazakhstan does not oblige other organizations and enterprises that do not fall into these categories to develop their own labor standards (Labor Code of the Republic of Kazakhstan, 2015; Order of the Ministry of Labor and Social Protection No. 1036, 2015; Order of the Ministry of Labor and Social Protection No. 1037, 2015).

The decline in interest in work measurement in the post-Soviet space has had a negative impact on the development of work measurement and personnel planning methods and techniques. Meanwhile, from the early 1990s to the present day, workforce planning methods and techniques covered in English-language academic and practical literature have evolved from deterministic approaches to the use of sophisticated mathematical and computer modeling (Safarishahrbijari, 2018; Borba et al., 2019; Turan et al., 2021; Bastian et al., 2020; Qureshi et al., 2019).

An analysis of English-language literature shows that in industrialized countries, the concepts of work measurement and workforce planning are not interchangeable. The English-language literature primarily applies the concept of work measurement and study to enhance labor productivity in industrial settings (BS 3138, 1992; Institute of Industrial and Systems Engineers, n.d.). At the same time, workforce planning is strategic in nature. It covers all types of workers and entails forecasting workforce supply and demand in light of changes in the organization's internal and external environments (Sinclair, 2004).

We examined academic and practical articles on workforce planning to assess practices, problems, and scientific and methodological approaches to workforce planning. This article also discusses the backdrop of workforce planning, including its history and strategic importance to modern enterprises.

2. Method

The scholarly literature on workforce planning is scarce. Much of the published information is based on practice rather than credible study findings. However, the daily experiences of practitioners provide vital information from which lessons can be learned (Sinclair, 2004). After searching for credible articles for our literature study, we chose four Internet sources:

1) ScienceDirect – a scientific publications website;

2) The United States National Library of Medicine;

3) RAND Corporation - an American non-profit research organization that provides services to government agencies in the United States, Europe, the Middle East, and Asia;

4) National Research Council - an operating division of the National Academies of Sciences, Engineering, and Medicine of the United States.

ScienceDirect and the US National Library of Medicine publish scientific articles on workforce planning. The websites of the RAND Corporation and the National Research Council publish scientific and practical literature about the experience of developing and implementing workforce planning systems in various sectors of the US public sector.

3. Results and Discussion

3.1 The difference between work measurement and workforce planning concepts as per English-language literature

In accordance with the British standard BS 3138, “Glossary of Terms Used in Management Services," the general term “work study” is used for the concepts of "method study" and "work measurement," which are used in the study of work in all its contexts and lead to a systematic study of all factors influencing the efficiency and economy of work processes with the aim of improving them (Table 1). In other words, in the English-language literature, the concept of work

measurement is considered only as an integral element of the search for the most efficient ways of doing work.

Table 1. Definitions of work study components according to BS 3138

Work study	
Method study	**Work measurement**
Method study is the systematic recording and critical examination or existing and proposed ways or doing work as a means or developing and applying easier and more effective methods and reducing cost	Application of techniques designed to establish the time for a qualified worker to carry out a specified job at a defined level of performance

A search of English-language literature with the keywords “work study,” “method study,” and “work measurement” yielded only a limited number of results related to outdated textbooks for university students. The analysis of this literature revealed that these terms apply to productivity issues within industrial settings. In developed countries, work study is an integral part of applied science called “Industrial Engineering” (Eastern Mediterranean University, n.d.; Industrial Engineering, 2024). Industrial engineering is a branch of engineering management concerned with improving processes in the production of industrial or consumer products. Issues addressed by this discipline include improving efficiency, reducing production costs, improving quality control, ensuring employee health and safety, protecting the environment, and complying with regulations (Sharma et al., 2021).

3.2 Workforce planning objectives

Table 2 shows definitions of the concept of workforce planning from various sources. Based on these definitions, we may deduce that the objectives of personnel planning are as follows (Vernez et al., 2007):

1) establishing the number and professional qualifications of personnel required to accomplish the organization's strategic goals;

2) creating a comprehensive action plan that will guarantee sufficient personnel are accessible when needed;

3) business case for HR policies and initiatives required to meet the organization's strategic objectives.

Table 2. Workforce planning definitions

Source	Definition
National Institute of Health (n.d.)	Workforce planning is the process of analyzing, forecasting, and planning for labor supply and demand, assessing gaps, and identifying targeted talent management activities to ensure an organization has the right people—with the right skills—in the right place at the right time—to achieve its mission and strategic objectives
Emmerichs (2004)	Workforce planning is an organizational activity that ensures that human capital investments result in the organization's ability to carry out its strategic goals on time and effectively
Vernez et al. (2007)	Human resource planning and development, often known as workforce planning, is concerned with ensuring that the proper number of people with the right set of skills and competencies are in the right places at the right times

3.3 The history of workforce planning

Workforce planning emerged as an autonomous field in developed countries throughout the 1960s and early 1970s, when the economy was expanding, and unemployment was low (Reilly, 1996). Initially, the term "manpower planning" was used. However, over time, the phrase "workforce planning" began to be employed to neutralize gender inequalities (Sinclair, 2004). Workforce planning was necessary to meet the growing demand for products and services with a qualified workforce, as well as to ensure an increase in labor productivity. However, the economic downturn of the 1980s led to a loss of interest in workforce planning (Sinclair, 2004). In the face of worsening economic conditions, corporations made changes to their organizational structures that conflicted with workforce planning practices, leading to a backlash against centralized corporate power (Reilly, 1996). As a result, corporations moved away from centralized workforce planning and transferred more authority to local units, and this led to the loss of accumulated experience and knowledge in personnel planning (Castley, 1996). Workforce planning grew more mechanical and unsophisticated. Furthermore, HR policies have shifted from a quantitative approach centered on numbers to a more qualitative approach that considers the capabilities that employees offer firms (Reilly, 1996).

In the second half of the 1990s, workforce planning made a comeback on the HR agenda. Organizations have grown conscious of the need to nurture talent in an environment that demands adaptability rather than stability (Sinclair, 2004). It was widely understood that employees' contributions should be strengthened by making greater use of their potential. There was an appreciation of the importance of setting employee goals within the context of corporate strategies and increasing complexity to achieve ongoing business improvement. Organizations needed to plan for their own survival because they had to deal with such market phenomena as: (1) increasing competition both domestically and abroad; (2) changes in the labor market, recruitment, and retention of personnel; (3) the increasing speed of the emergence and dissemination of information; (4) the globalization of economic activity; and (5) consumerism and the desire for quality at an affordable price (Reilly, 1996). The cost of a mistake could be a loss of market share (Sinclair, 2004). Organizations had to be able to handle any ups and downs.

3.4 The workforce planning process

Personnel planning entails not just assessing the demand for labor but also forecasting its supply (Figure 1). Forecasting demands in the workforce is a formal depiction of the processes that determine the need for staff. If the staffing model's algorithms accurately characterize production and business processes and the relevant workload drivers are entered into the model, the output will be the level of personnel required to accomplish production targets (National Research Council, 2006). Forecasting the workforce supply involves determining the number and professional composition of personnel at a specific time or period, considering personnel training, retirement, promotion, or demotion (Safarishahrbijari, 2018).

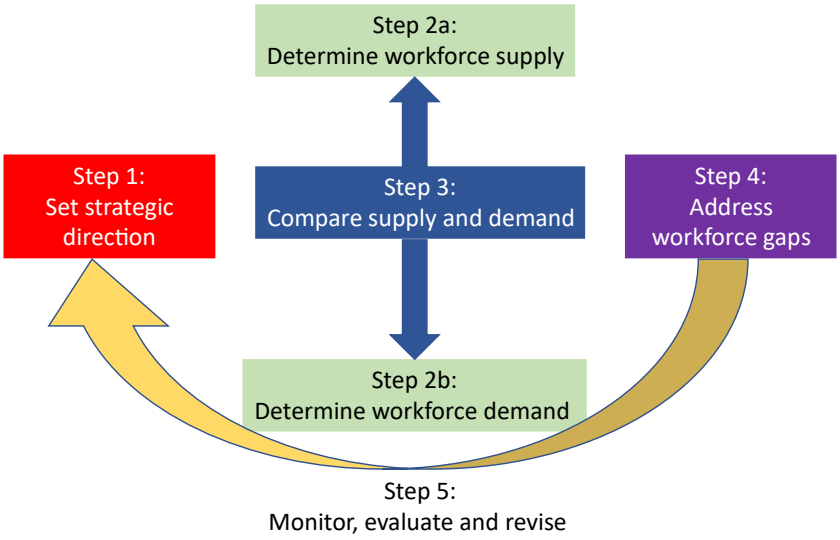

Figure 1. Workforce planning process. *Source: Adapted from Nataraj et al. (2014)*

A staffing model or a single-point analysis can be used to determine an organization's personnel needs. A single-point analysis provides a static perspective of the headcount required to meet an organization's objectives in the current operating environment. A staffing model is a dynamic tool that allows organizations to plan their workforce in a changing environment. This requires defining unique workload drivers for each functional area of the organization. These workload drivers are inputs (independent variables) to the staffing model (Censeo Consulting, 2020).

Because of the quick rate of change in the external world and the natural focus on short-term tasks to meet deadlines, companies are inclined to neglect the future since short-term thinking tends to trump long-term thinking (Sinclair, 2004). Furthermore, the specifics of day-to-day activity can obscure the overall picture. Workforce planning considers the long-term concerns of staffing a company, allowing it to better prepare for the future and deal with unanticipated changes in the external environment. The formal workforce planning process coordinates the efforts of many organizational units to achieve common corporate goals. The workforce planning process must result in a comprehensive awareness of the organization's long-term environment, overall business strategy, and restrictions in resources. Workforce planning also includes formulating corporate policies to help operating units plan their human resources in a systematic manner. This will eliminate short-term thinking and prevent corporate anarchy in terms of staffing.

3.5 Workforce planning techniques

There are numerous techniques utilized in workforce planning. From a technical standpoint, these methods can be classified as (i) qualitative, (ii) mathematical and computer modeling, (iii) workload assessment, and (iv) other quantitative methods (Safarishahrbijari, 2018; Saville et al., 2019; Nataraj et al., 2014; Bryant et al., 1973). Qualitative methods of workforce planning involve the use of expert assessments. Mathematical and computer modeling involves optimization methods, statistics and probability, and simulation. In workload assessment, the workload of each work element is calculated, and the required number of personnel is determined based on the total workload. Workload assessment for each element of the work process can be carried out using qualitative methods (interviews, surveys, expert groups), direct observations, and workload measurement tools. Other quantitative methods involve simpler approaches, such as comparative and ratio analysis.

The use of expert assessments is part of qualitative workforce planning techniques. These approaches collect and analyze the individual evaluations of managers and subject-matter experts. Qualitative techniques include direct managerial interviewing (Ward, 1996), the Delphi method

(Dalkey and Helmer-Hirschberg, 1962), the nominal group method (Delbecq and Van de Ven, 1971), and scenario analysis. The Delphi method is an iterative process in which experts evaluate each other's judgments to reach consensus. Unlike the Delphi method, in which experts give their assessments independently, the nominal group method involves live communication and the exchange of opinions between experts. Scenario analysis is a strategic management technique in which decision makers generate several discrete future states of a business, each of which depends on assumptions about the organization's internal and external environment in the future.

Optimization techniques involve finding solutions by minimizing costs or maximizing outputs given existing limiting factors. Optimization also involves comparing potential options and choosing the most suitable one. Traditionally, linear programming, goal programming, mixed integer linear programming, dynamic programming, and data envelopment analysis are used for optimization. Alternatively, the literature mentions applications of computational intelligence (e.g., fuzzy logic and evolutionary computing), queuing models, stochastic programming, and robust optimization (Souto Anido et al., 2018; Turan et al., 2021; Liu et al., 2019; Bastian et al., 2020).

It is not always possible to select mathematical methodologies for business problems with clear analytical solutions. Simulation modeling can be used in these instances. Simulation modeling employs computers to simulate the behavior of real-world business processes in a simplified manner. Simulation modeling imitates the key components of business systems as well as the reasoning behind their interaction. The most prevalent strategy for planning labor supply is system dynamics (Safarishahrbijari, 2018). In system dynamics, business processes are modeled using three types of elements (inventory, flow, and information) that can interact with each other through feedback loops and allow time delays between inputs and outputs (Wang, 2007).

Statistics and probability are the categories of approaches that entail using mathematical tools to find patterns, forecast outcomes, and test hypotheses. Time series analysis is also included in this area. The fundamental principle behind time series analysis is to extrapolate previous trends into the future while taking into account underlying trends, cyclicality, seasonality, and other recurring and continuous patterns. Box-Jenkins, exponential smoothing, vector error correction, and Markov modeling are examples of time series analysis techniques (Wong et al., 2005; Hsu et al., 2012; Wong et al., 2007; Belhaj and Tkiouat, 2013).

Statistics and probability also include regression analysis. Regression approximates the analytical relationship between a dependent variable and independent variables. In workforce demand planning, the dependent variable is the number of workers required, and the independent variables can be various workload drivers. Plant-specific, industry-specific, or microeconomic performance indicators can be used as workload drivers (Meehan and Ahmed, 1990; U.S. Department of health and Human Services, 2008).

In workforce planning, simpler quantitative methods are also used. For example, Nataraj et al. (2014), in addition to the above-mentioned quantitative approaches, described the use of benchmarking and ratio analysis methods. Benchmarking in the context of workforce planning refers to identifying staffing needs based on best practices or adapting successful examples from other organizations. Ratio analysis means determining the need for personnel in one category as a percentage of another category of personnel. As an example, the ratio to production personnel can be used to determine the number of administrative personnel.

3.6 Workload assessment techniques

The "bottom-up" approach is used when determining the staffing needs of administrative, professional, and technical (APT) personnel (Schulker et al., 2020). It combines quantitative and qualitative methods. Determining the staffing needs for this category of personnel using only mathematical modeling is hardly possible. APT personnel have complex workflows. Their work is not routine, as it requires analysis and decision-making. Therefore, determining the staffing needs of APT personnel requires a detailed study of work processes. Schulker et al. (2020) identify a "bottom-up" approach as most appropriate for identifying APT staffing needs. It involves assessing

the workload for each job element and determining the required staffing level based on the total workload.

There is rationalization potential in the bottom-up approach, and it is more objective than methods dependent simply on mathematical modeling when it comes to assessing staffing needs. The bottom-up approach is natural since it makes work processes more transparent for decision-makers. An in-depth analysis of current procedures might shed light on their inefficiencies, prompting the quest for better alternatives. In addition to revealing inefficient use of time at work, this method can also reveal areas of vital work where productivity is low due to staffing issues or an uneven distribution of tasks, both of which have a detrimental impact on overall productivity (Birkinshaw and Cohen, 2013; Schulker et al., 2020).

Schulker et al. (2020) is the latest published study on determining staffing needs using a bottom-up approach. The authors discussed the most essential features of employing a bottom-up approach in a study to evaluate the staffing needs of the United States Secret Service's administrative, professional, and technical employees. With this case study in mind, we will outline the key methods of the bottom-up approach.

A detailed description of work processes forms the basis of a bottom-up approach. Detailed work processes are referred to as process maps by Schulker et al. (2020). Studying work processes and interviewing people who perform them are the two main ways process maps are created. It is extremely important to document all work processes and their most important elements.

The average workload of a work element is defined as the product of the average frequency and the average duration of its execution. The total workload of the work process is determined by calculating the labor intensity of each element. This is perhaps the most important and complex process of the bottom-up approach, since the quality of the staffing model depends on how accurately the workload is estimated.

Nonetheless, there are major problems with the bottom-up approach as well (Schulker et al., 2020). The bottom-up approach requires a large amount of data on the workloads of work elements, which is difficult to collect. This is particularly the case when dealing with mental labor that is not visible to the outside world. Due to the lack of reliable data, this approach may rely heavily on subjective data that is difficult to verify (Teter, 2014; Roy et al., 2013; Roy and Christenfeld, 2008, 2007; Goswami and Urminsky, 2014). As a result, this may adversely affect the adequacy of the staffing model. On the other hand, the need for detailed calculations makes this approach complex and time-consuming.

3.7 Workload measurement tools

Developing workforce models requires a large amount of systematic data on the duration and frequency of work elements, which are rarely available. To compensate for the lack of data, organizations combine quantitative and qualitative data collection methods. Nataraj et al. (2014) suggest conducting interviews, surveys, and creating expert panels when direct observations are not possible. But on the other hand, qualitative approaches are expensive and suffer from validity problems. Nataraj et al. (2014) and Schulker et al. (2020) suggested that employees self-record the time required to complete their tasks when data on critical work elements is missing. Healthcare settings widely use workload measurement tools for nursing staff planning. GRASP and SCNWMT are two examples of approaches that take a piecemeal approach to studying the time taken to execute work tasks.

In 1980, researchers developed the GRASP workload measurement system. This system is used by many hospitals in the US, Canada, and the UK. This is software that collects data on actual working hours and analyzes the workload of nurses. Nurses manually complete electronic forms in GRASP at the end of each shift for all patients in their care. Nurses provide information about the health care services provided (nursing tasks) and the time spent providing these services. GRASP helps determine patient care costs, optimal patient-to-nurse ratios, and time standards for each element of the patient care process. This helps identify human and financial resources to meet patients' health care needs (Stilos et al., 2020; Qureshi et al., 2019).

The SCNWMT was developed in Scotland in May 2013 as part of the national nursing and midwifery workload planning program. The goal is to measure nursing workload and determine the required number of nurses to meet patient needs. Unlike GRASP, this tool is used intermittently (10-day periods) rather than on an ongoing basis. Nurses track their actual workload by recording time spent on six categories of activities: (1) face-to-face (caring for patients with their direct involvement), (2) non-face-to-face (caring for patients without their direct involvement), (3) home visits and scheduled sessions, (4) related workload (administrative work, meetings, and training), (5) movement (including walking, waiting, and parking), and (6) unexpected time expenditure (rare and unusual events that are difficult to predict). Nurses rate the level of intervention in each patient interaction on a scale from "direct" to "difficult" (Grafen and Mackenzie, 2015).

Information systems that track the actual time it takes to perform work tasks can also provide information about the workloads of labor process elements (National Research Council, 2006, 2013). Examples of such systems are employee registration systems, remote monitoring systems, work task distribution systems, and workflow management systems. The National Research Council (2020) also describes the use of modern technological advances (such as wearable and mobile devices for location tracking) to complement expert assessments with actual data on work time costs. But using historical data from information systems that track the actual time or location of work tasks also has limitations. The main purpose of these information systems is to control costs (production processes, quality) or automate work processes rather than track the time spent completing tasks. Moreover, enterprises may lack the discipline to complete such systems in a timely and appropriate manner (National Research Council, 2006, 2013). Factors unrelated to the execution of the work processes under study may influence the accuracy of location tracking device data. Additionally, these data collection practices must be ethically transparent (National Research Council, 2020).

Data quality is critical to developing workforce models that align with an organization's strategic goals. Often, there is a lack of reliable data on workloads of work process elements, so developers should carefully design combinations of data collection approaches (National Research Council, 2013). Obtaining objective data on the workloads of labor process elements is the most important and difficult part of developing any workforce model. Due to the nature of knowledge work, this process becomes even more complex when determining staffing needs for APT personnel (Schulker et al., 2020). All available data sources or data collection methods have significant limitations. Thus, the National Research Council (2013), in assessing the workforce needs of systems specialists in aviation, stated the need for specialized systems and methods for collecting data in a simple and cost-effective manner.

3.8 Subjective workload assessment techniques

The general classification of workforce planning techniques does not include subjective workload assessment, and literature reviews (Safarishahrbijari, 2018; Nataraj et al., 2014; Bryant et al., 1973; Sinclair, 2004) do not cover these methods. However, they serve not only in workforce planning but also in evaluating the anticipated workload of complex equipment operators such as pilots and dispatchers, as well as other aspects of productivity. Subjective workload assessment techniques are methods that rely on workers' self-reports to assess their perceived mental workload (the amount of cognitive resources required to complete a task). Subjective workload assessment methods can take into account the psychological and emotional aspects of workload (Rusnock et al., 2015).

RAFAELA is an example of a multifactorial indicator approach in which experts assess the nursing workload associated with caring for patients in health care settings (Fagerström et al., 2014; Junttila et al., 2016). Finland developed the RAFAELA system in the 1990s for the daily assessment of patient care intensity and nursing staff allocation. Finland, along with other countries in Europe and Asia, utilize this system. This system, unlike GRASP and SCNWMT, bases its evaluation of patient care intensity on the professional judgment of nursing staff rather than the study of factual time spent on work tasks. Each day, an expert assesses the intensity of care for each

patient using six indicators: (1) planning and coordination of nursing care; (2) respiration, circulation, and disease symptoms; (3) nutrition and drug therapy; (4) personal hygiene and secretions; (5) activity, sleep, and rest; (6) patient education, hospital and aftercare guidance, and emotional support. The rating is on a scale of 1 to 4, with 4 being the maximum rating for the intensity of patient care. Thus, 6 will correspond to the minimum, and 24 will correspond to the maximum intensity of patient care. The aggregate scores for each hospital department are determined by combining the scores of all patients. The ratio of the aggregate score to the number of nurses registered per shift in a given hospital department determines the workload. Research has confirmed that the optimal workload for a nurse should be 16.5 (Fagerström et al., 2014). Research also shows a direct relationship between nursing workload and patient mortality in Finnish hospitals (Junttila et al., 2016).

Two of the most common ways to measure perceived workload are the NASA TLX (National Aeronautics and Space Administration Task Load Index) and SWAT (Subjective Workload Assessment Techniques) (Hart and Staveland, 1988; Reid and Nygren, 1988). These techniques are utilized in human factors and ergonomics studies to design systems where people interact with machines. The NASA TLX measures perceived workload using six dimensions: mental workload, physical workload, time pressure, productivity, effort, and stress. SWAT assesses perceived workloads using three dimensions: mental workload, time pressure, and psychological stress. A subjective weight is assigned to each of the indicators of perceived workload. Therefore, the overall score is calculated as a weighted average. Although subjective workload assessment methods such as NASA TLX and SWAT are not explicitly used to determine staffing levels, they can be used as an indicator of the overall level of worker workload when testing staffing models.

4. Conclusions

An analysis of English-language literature has shown that work measurement and workforce planning are not interchangeable concepts. In the English-language literature, the concept of work measurement is considered an integral part of a set of measures to increase labor productivity in industry. Workforce planning considers the issues of determining staffing needs and workforce supply (determining the number and qualification composition of personnel at a certain time or period, taking into consideration personnel training, retirement, promotion, or demotion). The workforce planning process has a strategic context as it develops a coherent and detailed view of the organization's long-term future and overall business strategy.

There is limited academic literature on workforce planning, but there is practical literature in official sources that describes useful expertise through concrete cases. Specifically, the English-language literature covers the experience of developing workforce models in the US public sector and medicine (National Research Council, 2006, 2013, 2020; Emmerichs et al., 2004; Nataraj et al., 2014; Schulker et al., 2020; Vernez et al., 2007). The academic literature on workforce planning focuses mostly on the novel use of current advancements in mathematical and computer modeling.

We categorized workforce planning techniques as qualitative, mathematical and computer modeling, workload assessment, and other quantitative techniques. We put more emphasis on the workload assessment technique because it is considered the most objective and has rationalization potential. We also discussed the critical issues that workforce model developers encounter in acquiring trustworthy workload data and how to address them. A search and study of the English-language literature showed a distinct category of techniques for subjective workload assessment.

Although workforce planning dates back to the 1960s in industrialized countries, it became an integral part of the strategic planning of organizations in the late 1990s due to the rapid development of technology and increased global competition. Organizations have become aware of the importance of developing human resources in an environment that requires adaptability. In the process of personnel planning, various structural divisions of the organization come together to form a vision of the future of the organization and possible scenarios for the development of internal and external ones, which allows the organization to be more prepared for the future and to withstand unexpected changes. With the accelerating technological revolution and the pace of

industrial change, workforce planning has become even more important as organizations face high turnover of skilled workers, competition for talent, uncertainty about what knowledge and skills will be in demand in the future, and the digital transformation of the workplace.

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INNOVATIVE DEVELOPMENT STRATEGY TO STRENGTHEN THE COMPETITIVENESS OF THE ECONOMY

Aitnazarov Temur*
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: ait_t1@mail.ru

Abstract. Implementing stimulative economic policies is always relevant, particularly when aimed at fortifying the economy's competitive position within the context of a developmental innovation strategy. The examination of an innovation strategy is motivated by our country's significant emphasis on digitalization and innovation implementation. Despite Kazakhstan's leading position in e-commerce development, it is imperative to increase the share of innovative product and service production. Consequently, enhancing the country's innovation potential through research and development (R&D) activities enables the economy to cultivate intellectual technologies and methods, serving as a driving force in ensuring competitive positioning among companies and enterprises domestically and on the international stage. In line with this, the research aims to conduct an analysis and determine the predominant characteristics of the innovation strategy as a vital direction in enhancing the country's economic potential and ensuring competitiveness. To achieve this, main theoretical principles in the field of innovation strategy were presented, along with tools and models for constructing innovation policies, reflecting general characteristics and stages of innovation development in organizations, as well as the annual growth in innovation utilization in the Republic of Kazakhstan, based on methods such as content analysis, synthesis, induction, and graphical methods. The hypothesis was confirmed as a result. Transitioning to an innovative approach to economic development will enable the adoption of new production forms, thereby increasing efficiency and economic benefits, consequently ensuring economic diversification.

Keywords: innovation strategy, economic development, competitiveness, manufacture, technology.
JEL codes:F01, O10, O32,P21

1 Introduction

The implementation of an innovative development strategy contributes significantly to ensuring economic growth and unlocking its potential opportunities. This strategy aims not only to enhance the overall economic well-being of the country but also to boost the competitiveness of the economy. Kazakhstan views innovation and digitalization as strategically important tasks. In his Address to the Nation on September 1, 2023, the President of Kazakhstan emphasized the increased focus on digitalization and innovation. The country ranks among the global leaders in the e-government development index and fintech. The export volume of the domestic IT industry increased fivefold in 2022 alone, and by the end of 2023, this figure may reach $500 million. Consequently, the Government's goal is to raise IT service exports to $1 billion by 2026. It is worth noting that special attention is required for the use of artificial intelligence. It is forecasted that over the next few years, over $1 trillion will be invested worldwide in this sector. The development of this sector has the potential to significantly increase the GDP of individual countries, including Kazakhstan(TokayevK.-Zh., 2023).

Due to ongoing shifts in technological and socioeconomic paradigms, governmental industrial and innovation policies must enhance their efficacy and adaptability to rapidly changing conditions. This entails a significant amplification of the roles of industrial and innovation development and their impact on ensuring sustainable economic growth (Mamin A., 2019).

Experience from technologically advanced countries confirms that an integrated structure represents the most efficient entity for strategic innovation activities. Within the characteristics of the innovation process, an integrated structure is regarded as a comprehensive system encompassing innovation development and implementation infrastructure. Consequently, the innovation structure

constitutes a cluster of economic entities interconnected through a network system of financial and economic relations aimed at enhancing the efficiency of participants' innovation activities through resource optimization (Seisenbayeva Zh. M., Nurasheva K. K., Isatayeva G. B., 2023).

2 Literature review

Innovation, as an economic concept, encompasses matters relating to novel combinations of production factors, including alterations in enterprise development. These alterations are delineated as follows: adoption of novel equipment, technological processes, or fresh market provisions for production; introduction of products with new attributes; utilization of new raw materials; modifications in production organization and its material-technical support; emergence of new sales markets (Emami L. F., 2021).The economic landscape undergoes rapid transformations, characterized by phenomena such as globalization, evolving customer and investor demands, and continuously escalating market competition. Individuals comprising the organization, termed human resources, are regarded as one of the most crucial assets of contemporary firms (Maier A., et al., 2013).

Startups, being nascent entities, face constraints due to their small size and lack of experience when entering market competition. Research has indicated that establishing relationships with other organizations could serve as a means to mitigate such constraints. While some studies underscore the importance of relationships between startups and large organizations within the innovation ecosystem, few have examined the relevance of cooperative relationships among startups themselves. Cooperative relationships entail a "hybrid activity" involving both collaboration and competition among firms, with primary emphasis on value creation within the innovation ecosystem (Primario S.et al., 2024).As global experience demonstrates, achieving this is only possible through transitioning the economy towards innovative development, as domestic companies currently face intensified competition from international markets. Thus, only innovation-driven companies and corporations are capable of capitalizing on the opportunities provided by integration into the global economy (Khamitov N.N., 2012).Despite its abundant natural resources, Kazakhstan continues to grapple with the challenges of transitioning to a knowledge-based economy. Kazakhstan's strategic course towards industrial-innovative development provides the necessary conditions for the development and implementation of new scientific ideas and technologies (Danabayeva R.I., Shedenov U.K., 2013).

Collectively, organizations using different technologies, firms belonging to different industries, demonstrate different structures in their innovation activities, especially when comparing between countries. This diversity and disparity in the activities of companies may be the most significant characteristic defining the innovation process at the firm level. For example, it has been demonstrated that in technologically advanced sectors, the threat of new market entrants stimulates innovation, whereas in technologically lagging sectors it hinders innovation. In some industries, the entry of new firms into the market has a positive effect on productivity growth in the industry, while in others it suppresses it. In addition, it was found that innovation activity tends to be "persistent," which means that firms with past experience in innovation are more likely to continue to innovate. There is also evidence that the intensity of innovation activity largely depends on factors such as participation in export activities, the level of managerial training and skills, network connections between firms, research and development (R&D) capabilities, as well as the size of the firm (Dobrinsky R., 2008). The formation of public-private partnerships plays a crucial role in the development of an innovative economy. This tool, representing cooperation between the government and business on a long-term basis to address societal issues, allows for achieving concrete results in the shortest possible time through the use of innovation and modernization in both sectors. Pooling efforts ensures maximum efficiency. With the increase in international integration processes, analyzing market structure becomes particularly important, aiming not only to enhance its competitiveness but also to strengthen the country's position globally. Modernizing the real sector of the economy becomes one of the priority tasks, requiring comprehensive methods based on an innovative approach for its resolution. Special attention is given to innovative quality

assurance of products and services, which plays a leading role in utilizing favorable competitiveness factors and transforming a company's potential into tangible resources (Semchenko A.A.).

3Methodology

This study was conducted in order to determine the advantages and benefits of an innovative strategy for economic development and ensuring its competitiveness. The main research methods include content analysis, synthesis, induction method and graphical method.

The content analysis method is aimed at analyzing the content of text, graphic, and tabular material. It provides a toolkit for analyzing large amounts of data to highlight key topics in an innovative development strategy, patterns or characteristics in the content under study. Synthesis is the process of processing, combining and integrating information from different sources. The end result of using this method is to systematically map the directions and areas of research for the development of general concepts and models based on existing theoretical concepts in innovative strategies. The induction method is used to form general statements based on the analysis of individual scientific facts and characteristics. The graphical method is used to visually display data on the number of innovations used and on the level of innovation activity among enterprises in Kazakhstan.

Therefore, the research methodology answers such questions:

What is an innovative strategy for economic development?

What stages of development does the innovation strategy cover to ensure the competitiveness of the economy?

Research hypothesis: an increase in innovation in organizations can ensure diversification in the economy.

4 ResultsandDiscussion

In modern times, the concept of innovative activity encompasses various types of work, including research, development, production organization, and other aspects. Its goal is to obtain and utilize the results of intellectual activity to create and apply new methods, devices, approaches, materials, or to apply existing approaches for new purposes.

Innovative orientation in ensuring the quality of products and services is a key factor that effectively leads to the utilization of favorable external and internal competitiveness conditions, and transforms the company's potential into actionable resources. For example, one can consider the concept of marketing relationships. This concept is based on the following principles (Gugelev A.V., Semchenko A.A., 2015):

— **attracting customers by focusing on solving their problems;**

— **ensuring full interaction with customers for maximum adaptation of offerings to their needs;**

— **creating a product that maximally meets the needs of specific customers;**

— **continuous monitoring of satisfaction among current customers, addressing emerging issues, and maintaining trustful relationships.**

This innovative approach to customer engagement enables companies to reduce marketing research expenses, as well as conduct analysis, segmentation, and positioning of products and services, formulate pricing strategies, promote products and services in the market, and improve the company's strategy.

Information assets and digital control systems often emerge as a result of integration that transcends the boundaries of individual companies. The emergence of phenomena such as the "open business model" and related concepts, such as networks or platforms (Zott C., Amit R., Massa L., 2011), change the perception of where a company ends. Traditional relationships between seller and buyer are being redefined: they are now perceived as part of a larger system, where value is collaboratively created and extracted within partnerships. As a result, new enterprise management tools emerge.

Table 1. Digital models of production and management of enterprises.

Tools
Software applications for planning and regulating production stages (for example, enterprise resource planningsystems, ERP)
Automation and management systems for internal logistics (RFID radio frequency identification technologies, etc.)
Solutions in the field of product and service development
Product lifecycle management tools (product-lifecycle-management, PLM)
Mobile (wireless) devices for programming and operating machines and equipment
Digital means of production (tablets, smartphones, etc.)

Note: used by the authors based on the source (Götz M., Jankowska B., 2020)

The following table provides a general description of the changes caused by Industry 4.0 in the activities of the companies in question.

Table. 2. General characteristics of changes in the activities of companies caused by Industry 4.0

Aspect	Description
The level of development of Industry 4.0	The introduction of new technologies (as a rule, it is heterogeneous, gradual, fragmented, but common to all players), which can change the way staff andadministration use resources and thereby affect the competitive advantages of companies.
Expected effects/benefits	The development of new products and processes, leading to increased efficiency, generating new / more significant competitive advantages (optimization of resource allocationand use).
Risks and challenges	Awareness of the need for capital investments and staff training to improve management efficiency in order to strengthen competitiveness based on available resources in the context of Industry 4.0
Changing the industry landscape	Unpredictability of the behavior of industry partners due to Industry 4.0, awareness of both opportunities and barriers, uncertainty about how appropriate it is to copy the strategy of partners in relation to Industry 4.0.
Relations with industry partners	The uncertainty of the prospects for government support, active pressure from partners to move along the value chain and intensify interconnections.
Restructuring of the global value chain and new opportunities for international expansion thanks to Industry 4.0	Pluralism of opinions about the initiators of digital transformation, awareness of the potential of Industry 4.0 to optimize international business

Note: used by the authors based on the source (Götz M., Jankowska B, 2020)

The sustainable advancement within the Industry 4.0 sector relies on knowledge and innovation. Companies are required to update their current models of interaction with suppliers and clients. The full potential of Industry 4.0 technologies is realized when business relationships are considered at every stage of value creation — from research and development to sales, marketing, and post-sales service. The implementation of integrated information systems is necessary while maintaining the role of employees possessing the necessary skills in managing, producing, and servicing Industry 4.0 systems, including expertise in Internet of Things, robotics, blockchain, and manufacturing technologies (Gërvalla, Ternai, 2019). Industry 4.0 is characterized by profound digital transformation in production and business processes, where an innovative strategy plays a pivotal role.

An innovative strategy is a set of plans and methods aimed at developing and implementing new ideas, products, services, or processes with the aim of improving the organization's performance or gaining a competitive advantage in the market. Within this strategy, a model is considered that defines and justifies the choice of the enterprise development path with a focus on enhancing its competitiveness (Shamil M. V., Almaz Kh. Kh., 2015).

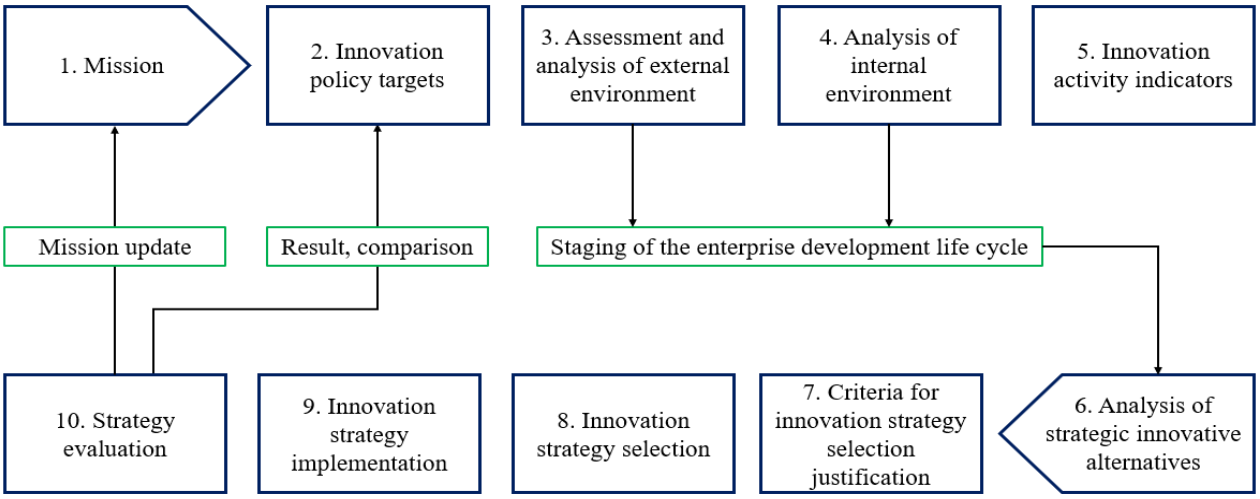

Figure 1. The proposed model for building an innovative strategy of an industrial enterprise. Note: compiled by the author based on the source (Shamil M. V., Almaz Kh. Kh., 2015)

When establishing goals for the enterprise's innovation policy, it's essential to consider factors determined by the stage of the enterprise's life cycle. Typically, four stages are recognized: introduction, growth, maturity, and decline. It is believed that each of these stages comprises specific phases, which are not strictly defined and can be identified based on the dynamics of key economic indicators that characterize the enterprise's efficiency, financial condition, and market stability. Within the growth stage, rapid and slow growth stages can be distinguished. The rapid growth stage, for instance, unlike other stages, is marked by clear, positive, and highly active dynamics of key indicators (revenue, profit, profitability, etc.). In the subsequent stages, their dynamics slows down somewhat, although it remains positive (Shamil M. V., Almaz Kh. Kh., 2015).

Since a successful innovation process requires the creation and market introduction of a competitive innovative product, the innovation strategy involves the use of a product strategy based on a modified or entirely new product. These product strategies can be applied in both offensive and defensive innovation strategies. An overview matrix of product strategies is provided in Table 3.

Table 3. Matrix of innovative product strategies

Product Strategy	Innovative strategy	
	Offensive	Defensive
Modernization	The release of improved products, partially new to the market, in order to surpass competitors.	The launch of improved products, partly new to the market, in order to keep up with competitors.
Product development	Launch of completely new products for the market	Not applicable
Geographical modification	Launch of improved products to a new regional market in order to identify competitors.	Not applicable
Geographic product development	Launch of products specially designed for the new regional market	Not applicable
Segment modification	The launch of products specifically improved for a specific segment to occupy the vacant niche.	Not applicable
Diversification	Acquisition of firms with significant intangible assets (technologies and developments for business management, human resources). The result is the creation of a new enterprise and the expansion of the market.	Acquisition of competitors who may pose a serious threat in the future. As a result, the company is enriched with the ideas of competitors and the threat of a prospective loss of market share is reduced.

Note: used by the authors based on the source (Shamil M. V., Almaz Kh. Kh., 2015)

The effective management of innovative potential necessitates substantial investments of time and effort. Given the interconnectedness of innovative potential with human resources upon implementation, it becomes imperative to formalize and oversee this process. Consequently, fostering the notion that continuous change is a natural state of organizational development becomes crucial.

Enterprises and various organizations leverage innovations to construct more flexible, dynamic, and adaptive business and organizational models. Consequently, digital nomadism, as a novel form of lifestyle mobility, presents fresh opportunities for both core and peripheral avenues. The propagation of innovation theory underscores that innovative concepts can disseminate through channels. Nevertheless, the pace at which individuals and entities respond to innovations may vary (RogersE.M., Singhal A., & Quinlan M.M., 2019).

The new way of life associated with the use of digital technologies in travel and work has been termed "digital nomadism." Cities and established tourist destinations have been the first to adapt to the needs of digital nomads, utilizing existing infrastructure (Lingxu Zh., et al., 2024).

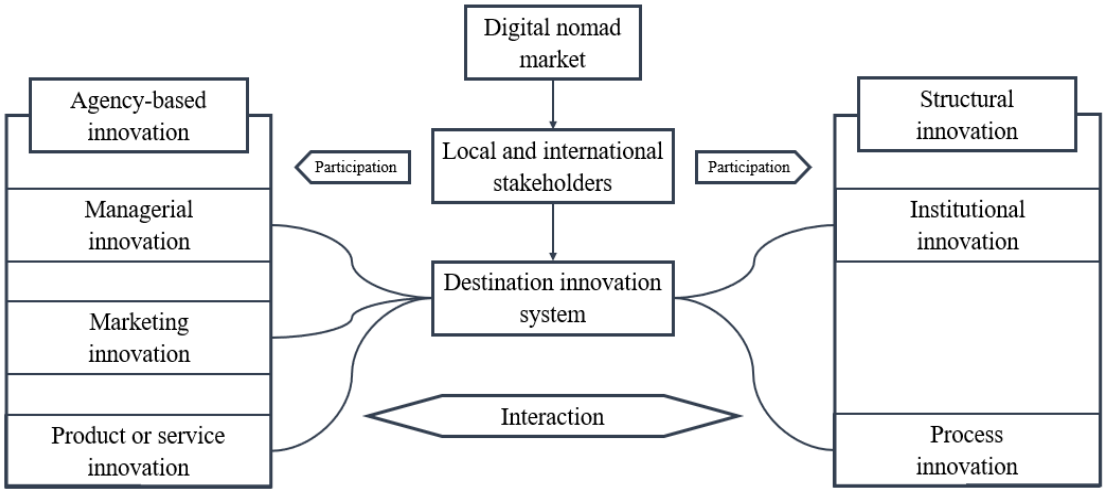

Figure 2. An innovative system for directing digital nomads.
Note: compiled by the author based on the source (LingxuZhouet al., 2024)

The application of innovative parameters in tourist destinations (Hjalager, 2010) within the framework of digital nomadism contributes to the formation of the destination's innovative structure (see Figure 2) and defines innovations in products or services, managerial changes, and marketing novelties. The destination's innovation system encompasses organizational changes and structural modifications. Local and international stakeholders can actively participate in this process of innovation. Arrows in the figure denote physical and informational connections, as well as interactions. At the agency level, innovations are implemented by independent and individual participants striving to enhance their potential. Structural changes in the form of process and institutional innovations contribute to the enhancement of the competitiveness of the tourist destination.

Although widespread adherence to the digital nomadic lifestyle is unfeasible for everyone, there is a surge of young individuals opting for a balance between personal and professional life. Consequently, the scope and number of digital nomadic communities worldwide continue to expand (MBO Partners, 2023). Remote work opportunities serve as the foundation of digital nomadism. The trend towards remote work is likely to persist alongside the advancement of information technologies and tools for managing remote employees. As remote work becomes increasingly prevalent, cybersecurity and employee monitoring issues become topics of discussion to mitigate risks associated with remote work (Statista Research Department, 2023).

It is important to note that technological, manufacturing, energy, and other sector innovations can contribute to sustainable development. The demand for sustainable development entails a shift in values and priorities, a change in the direction of modern society's development, which is associated with the spiritual elevation of human needs. Sustainable development goals serve as a kind of call to action aimed at efforts to increase economic growth and address a range of issues in education, healthcare, social welfare, and employment, as well as combating climate change and protecting the environment (ZhangirovaR.N., 2020)

Amidst the innovative development of the Kazakhstani economy, various challenges arise, such as fostering economic growth, conducting structural restructuring, addressing unemployment, ensuring global market competitiveness, and others. However, these issues may find resolution through the activation of innovative activities, which, in turn, necessitates investment attraction. The subsequent increase in investments prompts the establishment of an efficient system of government regulation, amalgamating scientific, technical, production, managerial, and financial initiatives (YdyrisC.C., 2010).

The desire to increase the level of innovation activity within the country of Kazakhstan is due to the importance of ensuring the security of information and developing technological support for the market using local innovations.

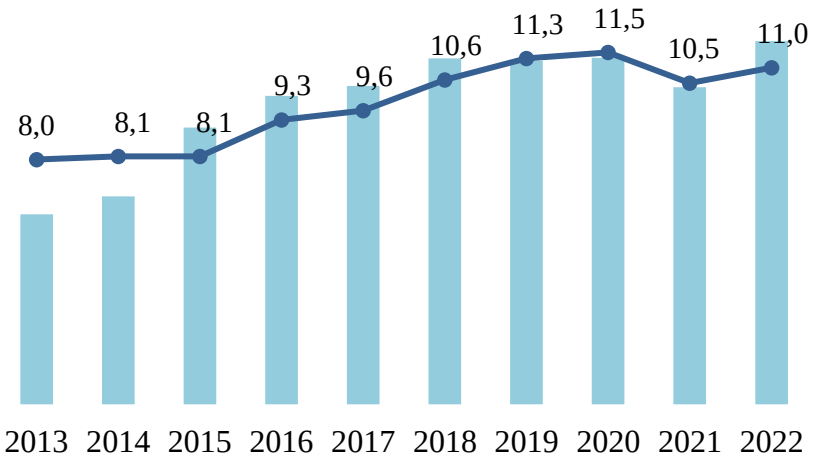

Figure 3. Dynamics of changes in innovative activity of enterprises in the Republic of Kazakhstan. Note: compiled by the author based on the source (The Bureau of National Statistics of the Republic of Kazakhstan., 2022)

Figure 3 illustrates the annual growth in demand for innovative products and equipment among Kazakhstani enterprises for their activities. These statistics also reflect the level of activity of commercial organizations, with active purchases of innovations increasing by an average of 1.1 percent each year. The further increase in the level of innovation activity in the domestic market (including the information technology market) indicates the need to study the key conditions for the development of commercial success among international companies. Based on international experience, the private sector can not only initiate the creation of innovations, but also their production and subsequent implementation on the market. To solve this problem, back in 2017, plans were developed to create an international technopark of IT startups based on EXPO, which subsequently served as a platform for the development of market innovations in this sector. However, as startups develop, it becomes necessary to switch to the production of high-tech products that are in demand on the market. This applies to the field of high-tech enterprises (Kozhamkulova Zh.T., 2018).

5 Conclusions

After analyzing numerous scientific works by foreign and Kazakhstani authors in the field of innovative strategic development, it was concluded that an innovative orientation is indeed crucial for ensuring the quality of products and services. Essentially, it serves as a driving force, leveraging favorable external and internal factors of competitiveness and transforming a company's reserves into tangible resources. It was found that innovation implementation allows enterprises to reduce marketing research costs, conduct market analysis, segmentation, and positioning of goods and services, implement price incentives, promote products and services in the market, and rectify deficiencies in the company's strategy.

Among the primary tools in enterprise management are software applications for planning and regulating production stages (e.g., enterprise resource planning systems, ERP), automation systems, and internal logistics management (radio frequency identification RFID technologies), product lifecycle management tools (PLM), as well as digital manufacturing assets (tablets, smartphones, etc.).

The common characteristics in the implementation process of innovative measures enable companies to alter the use of resources by staff and administration, thus influencing companies' competitive advantages; embrace new products and processes leading to efficiency growth; recognize the need for capital investment and staff training to enhance management efficiency; understand both opportunities and barriers in the innovation field, etc. Therefore, an innovative development strategy can be positioned as both an offensive and defensive strategy, with stages such as modernization, product development, geographical modification and geographical product development, segment modification, and diversification.

Thus, the innovative development strategy encompasses several crucial directions, which may vary depending on the specific conditions and priorities of a country or region. Investing in innovation enables a country's economy to expand and modify production sectors, assortment, and volume of output, types of services provided, and adopt new forms of production while increasing efficiency and economic benefits. Therefore, the hypothesis of diversifying the economy through increased innovation is confirmed.

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THE SPECIAL ROLE OF MARKETING IN THE DEVELOPMENT OF THE CREATIVE INDUSTRY

Bolatbek Eldos Alimzhanuly*[1], Nietalina Gauhar Kudaibergenovna[2]
1Al-Farabi Kazakh National University, Almaty, Kazakhstan.
2Turan University, Almaty, Kazakhstan.
*E-mail: galyandin_vladislav1@live.kaznu.kz

Annotation

The purpose of the studyis to reveal the economic essence and features of the development of the creative economy in the world and Kazakhstan practice, and to propose areas of support for the creative sector in Kazakhstan.

Methodology. The scientific work uses the desk method, the statistical method of economic research, institutional analysis, comparative analysis, generalization.

Originality/value of the research: the relationship of the creative economy with innovation, marketing, innovation economy and knowledge economy is revealed; and foreign experience in the development of the creative economy in the context of its borrowing by Kazakhstan is studied.

Research results: the concept of "creative economy" has been clarified/deepened, and an author's approach to the development of the creative sector in Kazakhstan has been proposed.

Keywords: creative economy, creative industry, creative goods and services, innovation, marketing, trade.

Introduction

Currently, innovation is becoming an important factor in the development of the economy, initiating the spread of a new technological style. The current stage of development of the economy of Kazakhstan is characterized by increasing interest and a gradual focus towards an innovative development path. A new technological order is gradually penetrating our country. Innovation processes are inextricably linked to the concept of the creative economy. The creative industry is an important sector of the economy, which has been actively developing in recent years. It usually includes industries that profit from the creation of creative products. In other words, these are goods and services that were created as a result of a creative process and have economic and cultural value. In developed countries, the creative economy makes a significant contribution to the country's GDP. This stimulates the development of innovation, knowledge transfer and is a critically important sector of the economy for comprehensive development. In turn, the development of the creative economy would be impossible without the use of new innovative marketing technologies, including technologies for the creation and promotion of goods. The creative economy, deepening interaction between diverse social groups of people, progress in the development of culture and society as a whole, is an income-generating branch of the economy, provides additional jobs. The research is conducted in order to reveal the economic essence and features of the development of the creative industry in the world and Kazakhstan practice, to determine the relationship of the concept of "creative economy" with other economic categories, as well as to identify promising areas for the development of the creative economy in Kazakhstan on the principles of marketing.

The main part of the study

What is the creative economy? This term increasingly refers to all economic activities that depend on individual human creativity, the result of which carries a certain economic value, regardless of whether the result has a cultural element or not. It should be noted here that individual creativity, acting as the main resource of value, generates creativity, creative economy.

The concept of "creative economy" cannot be described by just one definition. This is a whole concept that is built on the interaction of human creativity, ideas and intellectual property,

knowledge and technology. In essence, the creative economy is an economic activity, the foundation of which is a set of creative ideas, new ideas and knowledge.

Literature review.

The works of many scientists are devoted to the study of the creative economy as a socio-economic phenomenon. The basis of the creative economy is the use of humanity's creative imagination in order to bring a certain value to an idea. John Hawkins created the theory of creative economics in 2001 to describe a system in which value is determined by originality and creativity, but not by production resources such as labor, land, and capital. As a definition of the creative economy, D. Hawkins identified a set of creative industries that produce copyrighted works in the form of patents, copyrights, trademarks and original designs [1]. The works of the American economist and sociologist Richard Florida are also devoted to the creative economy: he considers the creative economy as the basis for the development of society, and its center is the "creative class" – people of creative professions. The concept of "creativity" according to R. Florida is "knowledge–based creation of practical new forms", and the foundation for the development of the creative economy is the "3 T": technology, talent and tolerance [2]. Also, World Bank expert Charles Landry in his work "Creative City" describes the progress of modern urban agglomerations and concludes that the first place in improving the urban environment is occupied by human abilities, motivation, substitute infrastructure, natural resources, etc. [3].

It is worth noting that the holistic approach existing in the theoretical and methodological framework to understanding the essence of the creative economy, according to which its essence is reduced to a holistic understanding of the complex set of interrelations between culture, economics and technology in the context of globalization and the acceleration of scientific and technological progress. In this way, this approach emphasizes the complex economic nature of the essence of the creative economy, integrating diverse factors and derivative forces of the innovative and creative economy [4].

The opposite point of view, on the contrary, does not focus so much on the criticality of the creative economy in integrating culture, economics, and technology and assures that this is only a tribute to the fashionable mainstream.

Against this background, the creative economy has become an urgent issue in the field of economics and development, requiring the adoption of sound policy measures in post-industrial and developing countries. Thus, the established definition of the concept of "creative economy" can be said not to be fixed and it can be argued that the conceptual foundations of the creative economy are in the process of formation.

Today, the creative industry includes fields of activity based on the development and application of intellectual property. Theater, visual arts, cinema, television, radio, music, publishing, video games, multimedia, architecture, art design, fashion and marketing promotion are all part of the creative industry.

Based on the fact that all the above-mentioned creative types of production belong to the creative industry, there is a difficulty in the methodological part of conducting an assessment of the creative economy. So, to assess the degree of creativity of the economic system, indicators of production volumes, consumer spending, trade and employment indicators are used, that is, estimated indicators, as in any other branch of the economy.

At the enterprise level, it is possible to resort to indicators of the cost of creating product value chains, prices, and transaction costs associated with the creation of creative products.

Another approach is related to the use of methods for assessing intellectual property, with appropriate indicators for measuring such complex intangible assets as author's ideas and design solutions, and the development of branded products. As noted above, this introduces certain difficulties as it is associated with the valuation of intangible and non-financial assets, and the valuation is complicated by this specificity. An overview of the methodological foundations for evaluating the creative economy is presented in [5; 6].

The relationship between the creative economy, innovation and marketing. The development of the creative economy would be impossible without the development of marketing

and innovation. At the beginning of the 20th century, innovation began to be regarded as the most important and acceptable way to overcome recurring crises. Innovation was no longer an object of management, which was limited exclusively to the sphere of scientific development. This began to affect not only technological processes, but also management tools, field market research processes, etc., which forces us to reconsider the use of the creative potential of enterprises. Innovations based on creativity become a necessary condition for the survival of the enterprise.

Any innovation begins with the development of a creative product. A creative marketing approach leaves its mark on the created product, giving it unique features. These features include the following:

1. Novelty of the product – a sign of the creative idea underlying the product may be an innovative production technology, replacement of the constituent elements or configuration of the product itself.

2. Non - standard products - this feature is responsible for changing the established standards. Periodically, its use manifests itself in a combination of "mutually exclusive" elements.

3. The possibility of use – there are many products on the market that surprise with their combinations (for example, a button for users of personal computers who are unstable under stressful conditions). Such products are undoubtedly new and non-standard, but they do not always bring specific benefits to customers.

4. Development – the formation and development of a product based on the creative component should be aimed at the future progress of the enterprise (attracting investments, improving image, brand awareness, etc.) [7].

A relevant condition is the establishment of a relationship between the application of the creative marketing paradigm and the appropriate outcome of the process – innovation. Ultimately, the result of the application of creative marketing will be manifested in economic coefficients, not in communicative ones. The practical expression of a creative marketing approach will prevail over the creative component of the process or result, since the effectiveness of creative thought will be assessed not so much by the level of its originality as by the level of innovation and economic efficiency. However, the results of creative marketing affect not only the perception of the company's brand and the product itself, but also the ability to transform into economic benefits, which creates prerequisites for effective market promotion of this brand.

It should be noted that the feature that distinguishes the creative economy from the traditional economic concept is that the main tool in it is knowledge, the resource is information, and the product is innovation. Thus, in the creative economy, concepts such as "information economy", "knowledge economy" and "innovation economy" can be combined [8].

The concept of "information economy" or "digital economy" has many definitions and approaches to its interpretation. Most often, an economy is understood based on the introduction and use of modern information technologies in reproduction processes in order to increase the productivity of enterprises and the consumer value of goods and services produced [9].

For the transfer of the national economy to the rails of an innovative type of development and growth, it is considered important not so much increased spending on the social well-being of society, capital accumulation, budget surplus, as the cultivation and support of the private sector and the innovative economy.

In contrast to the traditional point of view, the basis of an innovative economy should be an inefficient allocation of resources, and the stimulation and transfer of new technologies, the development of innovations.

The knowledge economy (or knowledge-based economy) is the highest form of development of a post-industrial society or an innovative economy. We call the knowledge economy a system where the production of goods is based mainly on knowledge-intensive activities that contribute to the rapid development of technical and scientific innovations, as well as their accelerated obsolescence.

In this regard, human resources are certainly considered a source of innovations, a generator of innovative and creative solutions, developments and products, and it is the development of

human capital that becomes the basis for the development of objects and objects of intellectual property, extracting benefits from an array of information and developing new technologies.

The task of business entities and entrepreneurs is to be able to apply human capital and knowledge to modern business processes in the production of products. The economy based on new knowledge, on the application of this knowledge in production processes, belongs to the so-called knowledge economy, the economy of producing creative intangible assets.

So, the knowledge economy is a type of economic system that constantly generates innovation, i.e. provides a continuous process of continuous transformation of new knowledge into new products. This is not just a process to ensure the growth of pure knowledge as a result of the activities of a developed scientific and educational system. Although knowledge is also important and necessary, the defining feature of the knowledge economy is its ability to create new value based on knowledge, ensure welfare growth based on it, and thereby make knowledge the main factor of economic growth and ensuring the competitiveness of the economy. This is ensured only through the transformation of knowledge into innovation, provided a high level of human capital development, the availability of a national innovation system and the focus of the state's internal economic policy on strengthening national innovation potential [10].

The creative economy (sometimes also called the "creative economy") represents economic and cultural value. The adoption of such a dual value has prompted the leadership of many countries of the world to promote the expansion and development of the national creative industry. Within the framework of information technology, creative industries have contributed to an increase in profits through trade and intellectual labor. The volume of the global creative goods market has more than doubled in recent years – from 208 billion US dollars in 2002 to 509 billion US dollars in 2015 [11].

The dynamically developing sector of the global economy at the moment is the creative industry. According to the reports provided by Ernst & Young, the creative industry accounts for approximately 3% of global GDP. In some industrialized economies, this figure reaches 10%. One of the recognized leaders of the creative industry is the United Kingdom, where this branch of the economy was developed back in the 1990s, and during the global economic collapse of 2008, the creative industry showed an upswing, not stagnation. In 2016, the creative industries contributed 91.8 billion pounds to the UK economy. The largest profit is provided by IT, software, video and computer games [13]. According to estimates by the UK Department of Digital Technology, Culture, Media and Sport (DCMS), the creative industries contributed 115.9 billion pounds to the UK in 2019, accounting for 5.9% of the UK economy. The ministry noted that the gross value added (GVA) of creative industries increased by 5.6% in the period from 2018 to 2019 and by 43.6% in the period from 2010 to 2019. Since 2011, the GVA of creative industries has been growing faster than the UK economy [14]. In 2019, more than 2.1 million people were employed in the creative industries sector, which is 3% more than in 2018.

Global trade in creative goods. The structure of world trade in creative goods is dominated by the following areas of development of creative fields: design, fashion, and the film industry. The leading category of designer goods in the turnover of the global creative industries market includes creative products of handicraft production, audiovisual products, media content, products of performing arts, printing and fine arts, products of the fashion industry, interior design, jewelry products. This category of designer goods accounts for about 54% of creative goods exports globally.

Geographically, the fashion designer clothing industry is growing in Asia (China, Hong Kong, Thailand, Japan, South Korea), Latin America (Argentina, Brazil, Chile), Africa, where the high-end and designer fashion industry is growing rapidly.

The markets of developing countries are also ahead in terms of exports of fine arts. Items such as antiques, paintings and the work of photographers, book publishing and media products account for 45% of the total export of creative goods.

The countries of Central and Eastern Europe, represented by the Russian Federation, Romania, Poland, Serbia, and Bulgaria, are becoming leading players in the global trade in creative goods and services in the field of IT development (video games, applications, animation

development). In general, the countries of this region began to compete with the world leaders in technological innovation in the Asian and Western world – China and the United States.

Thus, China is by far the largest exporter and importer of creative industry goods and services on the world stage, having conquered a significant part of the global market.

During 2002-2015, trade deals in creative goods and services in China grew only in a positive trend, with an average increase of 14% per year. If in 2002 Chinese creators and traders made a turnover of 32 billion US dollars, then in 2015 it was already worth 168.5 billion US dollars, with a maximum of 191.4 billion US dollars in sales in 2014, According to UNCTAD data [11] China's exports of creative products were four times ahead of their exports to the United States.

Government measures to support the development of the creative industry and the export of innovative products have played an important role in this leadership. For example, in South Korea, a special government agency for creative content KOCCA was created, responsible for promoting the creative industry, which made it possible to bring Korean creative products to the international market in 2009-2017. Thus, in 2016, exports of goods from the creative economy of South Korea amounted to more than 6 billion US dollars [15].

In general, the USA, France, Italy, Great Britain, Germany, Switzerland, the Netherlands, Poland, Belgium and Japan make up the top 10 exporting countries of creative goods in the world. However, as the survey of world trade in creative goods showed, the countries of the Asian macroregion do not lag behind and even outstrip all other regions of the world in trade in creative goods and services.

In total, the countries of Southeast Asia and China export creative products to world markets in the order of 228 billion US dollars, which is twice as much as Europe exports.

The Asian group of ten is opposed to the European top ten world exporters of creative products: China, Hong Kong, India, Singapore, Taiwan, Turkey, Thailand, Malaysia, Mexico and the Philippines [11].

At the 74th United Nations General Assembly, 2021 was declared the "International Year of the Creative Economy for Sustainable Development." This is especially true during the coronavirus pandemic, as the creative sector of the global economy was particularly affected during this period. International organizations assume that creative industries will receive a new round of development with the support of the governments of the participating countries. According to experts, the creative industry is the future of the global economy, since more than 30 million people around the world, aged between 18 and 25, work in this sector [16].

Trade in creative services. The service sector at the present stage of the development of the world economy is a very dynamically developing sector, in this aspect creative services are certainly recognized as very, very promising for the development of the digital economy. The objective reasons for such dynamics are the stability of creative services to market fluctuations, the development of e-commerce, business digitalization, trade and marketing.

The other side of this trend boils down to the fact that, as we noted earlier, further theoretical and methodological research of methods for measuring and evaluating creative services is required. It should also be noted that there is a lack of official statistical data on the reproductive services sector in many countries of the world. According to UNCTAD, about 38 developed countries in the world provide more or less complete data on creative services [11].

According to the latest data, trade in creative services in these developed countries has been steadily growing in a positive direction for 5 years from 2011 to 2015. It is characteristic that the share of trade transactions for the purchase and sale of creative services in comparison with all types of other services is more than doubled, with the prevailing average annual growth rate of 4.3%. So, if we compare, in 2011 the growth rate of trade in creative services was 17.3% of the total volume of trade in services in general, then in 2015 this figure was 18.9%. This trend indicates the growth of service areas of the creative economy.

In general, the picture of the prospects for trade in creative services is obvious both at the level of developed countries of the world and on a global scale.

The results obtained (conclusions)

The world today cannot rely on guarantees to ensure compliance with trade agreements between countries, inter–country agreements, and uncertainty is the current scenario for the overall development of the global economy. In conditions of turbulence and instability, forecasts of the development of the world economy and politics are difficult to predict situations, even the spheres of creativity and culture are subject to all kinds of fluctuations.

In these difficult conditions, as we can see, the foundations of the creative economy are emerging as a new feature of the global economy, along with the development of digital technologies, an economy based on knowledge, innovation and technology.

In all countries, cretan industries are developing, becoming the initiator of progressive changes in the structure of national economies, in the structure of world trade in goods and services, in society itself, in the worldview, cultural perception of the values of modern consumers.

The accelerated development of the innovative economy in Kazakhstan, the modernization of industry based on new progressive technologies, production diversification strategies will contribute to the expansion of various creative activities in our society.

As a small review of the global trade in creative goods and services has shown, this trade sector is growing and will only gain momentum in the future. The synegretic effect of the interaction of digital technologies and the creative industry will become a powerful, growing economic force pushing the development of the world economy, including Kazakhstan, forward.

One should not lose sight of the real need of the current situation of all countries of the world to implement the concept of sustainable development. It is the sustainable development of the economy, as the need to preserve existing natural and anthropogenic resources for the future generation without compromising the current one, that will encourage the growth of a critical mass of creativity in the minds of people and the younger generation of Kazakhstanis.

The growth potential of the creative economy is the basis for transformative changes at various levels: political, economic, spiritual, cultural, technological, social, etc.

Of course, the complexity of the very nature of the creative economy suggests that this area requires deeper further research, the development of assessment and measurement techniques, and the improvement of the statistical base.

Recognizing that the creative economy is a dynamically developing branch of the global economy, it is worth noting during its development the "blurring" of boundaries between different sectors of the economy, areas of employment, tools and channels for marketing creative goods and services. There is an integration and complex interweaving of ideas, the material sphere with the intangible, traditional media and new media capabilities of the Internet.

The creative economy is making changes to the employment structure of the population, changing the architecture of skills and competencies of future professions. Within the framework of the creative economy, new economic models, new types of social relations and new cultural paradigms are being formed.

The main product of the creative economy is a new idea, new knowledge. Marketing is used to create and market creative products. The creative economy is a sector of the economy in which goods and services are produced, distributed and consumed in connection with creative activities. Creativity and innovation in socio-economic phenomena are a kind of guarantee of high competitiveness in various types of activities. In traditional goods and services, a growing percentage of value creation consists of original innovations. We are talking about adding a creative component to the appearance of new products, which will allow companies to position themselves as the most prosperous and productive both on the national and global markets.

Marketing is a necessary tool for the innovative development of the creative industry. According to the practical results of recent years of using marketing tools in the economy, the importance of having methods and tools in all areas of marketing based on creative components is growing rapidly. The well-established management of creative potential in the marketing of the company should become a system-forming and guiding vector for the development of the effective creative potential of the entire enterprise as a whole. And hence the expediency of the primary study of a creative resource in marketing in relation to other functions of the enterprise, such as financial, production, etc.

Conclusion

In order to develop the creative sector in Kazakhstan, it is necessary to create an agency that will carry out activities on planning and implementing a long-term strategy similar to the above experience of South Korea.

In our opinion, support for the creative sector in Kazakhstan should be reduced to the synchronous development of the following components:

− development of a national strategy for the development of the innovative economy and the creative industry, interaction of various industry and professional associations;

− consolidation of organizational potential and human capital, including through special education and lifelong learning, the formation of a "creative class";

− launch of incubators and accelerators for the creation, commercialization, marketing of innovations;

− establishment of technology clusters and hubs of creative industries as knowledge centers;

− emphasis on the development of creative industries in order to increase the attractiveness of the region as a tourist destination;

− internationalization – orientation to the global market and the global creative industry.

An infrastructure pillar of this kind will ensure the sustainable development and permanence of the sector.

Thus, it can be noted that Kazakhstan has a certain potential for the development of a creative economy, but it is insufficiently realized. There are opportunities to reduce imports of creative goods and services and ensure their production by domestic producers, and in the field of decorative and applied arts, folk crafts, cinematography and animation, there are export opportunities with access to world markets. World experience shows that creative industries have great economic potential, which must be used in time. In general, investing in the development of the creative economy will lead in the future to the development of innovative entrepreneurship, including technological, as well as the knowledge economy, and will ensure the sustainable development of the Kazakh economy in the regional context.

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MANAGEMENT OF LOGISTICS PROCESSES IN THE FREIGHT TRANSPORTATION SYSTEM

Elesheva Zhanna Bolatovna, Akhmetkaliyeva Sandygul Kusmanovna*,
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: sandygula@yandex.ru

Abstract. Among the priority directions for the development of the transport complex, along with the development of technical means of transport, the need to update it at a qualitatively new level, the introduction of new progressive logistics technologies, the informatization of the transportation process, the problems of ensuring coordination of various modes of transport based on the implementation of a logistics approach are of particular importance. Obviously, the organization of such transportation has its own characteristics that affect their organization and rationalization. The problem of interaction of adjacent modes of transport was previously solved on the basis of continuous planning of the work of transport hub enterprises. Hence, the urgency of solving the problem of creating an effective, economically feasible and mutually beneficial structure for managing cargo flows using two or more modes of transport, formed on the basis of a logistics transportation management system, for all participants in the transport chain. The purpose of this study is to clarify and develop theoretical and methodological provisions and practical recommendations in the field of management of logistics processes in the interaction of various modes of transport. Including an overview of the main management models and approaches to the study of logistics processes in the freight transportation system using the principles and tools of digitalization.

Keywords. Logistics processes, freight transportation, system, digital technologies, transport industry, management, logistics flows, transport logistics, transport process.

Introduction.

The relevance of the logistics approach is justified by the development of logistics concepts, in connection with the improvement of technologies in various fields. Traditional functional areas of logistics are integrated into a single process, combining various types of activities: transportation, information component, inventory management, warehousing, cargo handling and packaging, in order to create consumer value with the lowest total costs.

The main tasks of logistics are to ensure the availability and competitiveness of services, eliminate imbalances, comprehensive infrastructure development, increase capacity, create an integrated system of logistics centers and create information support.

Integration in the management of logistics processes is expressed in bringing together the interests and actions of all participants in the reproduction process into a resource-conducting system operating in a single information environment. The interaction of all participants in such a system is aimed at meeting the needs of the consumer, ensuring the performance of logistics operations and control in the logistics system (supply, production, distribution) to complete the process at the lowest cost, in the optimal time for each consumer and with the provision of the maximum possible services.

Cargo traffic management is an important component of efficient and high–quality transport services for the country's economy. Transportation is a service provided by a transport company, in other words, it is a commercial activity with the conclusion of a contract between the parties [11].

Cargo transportation and logistics refers to the transportation of goods on the domestic and international markets by various modes of transport, including air, rail and road transport.

Kazakhstan's freight and logistics services market is segmented by functions (freight transportation, forwarding, warehousing, value-added services, cold chain logistics, last mile logistics, return logistics and other developing areas) and end users (construction, oil and gas industry). and quarry development, agriculture, fisheries and forestry, manufacturing and automotive industries, wholesale trade, telecommunications and other end users).

The growth in traffic volumes, an increase in the number of directions of cargo flows, an expansion of the range of goods, increased requirements for their safety and compliance with

delivery deadlines to consignees significantly strengthens the role of the logistics center in the development and implementation of rational cargo movement schemes in the transport system [4].

The main function of freight transport logistics is transportation in the global freight market, which consists in moving products by vehicle or means, using a certain technology in the supply chain and consists, in turn, of logistics operations and functions, including forwarding, cargo handling, packaging, transfer of ownership rights, risk insurance, customs procedures, etc. [3, p. 59].

The logistics process is a sequence of logistics operations organized in time, which allows achieving the goals of the logistics system set for the planned period [1]. The components of the logistics system include:

 Planning processes (Plan);
 Procurement processes (Source);
 Production processes (Make);
 processes of product delivery to customers (Deliver);

Return logistics processes;

 providing management processes (Enable) [1].

Scientific and technological progress has given rise to many types of transport and related types of transportation: road, rail, air, sea and river. Multimodal transportation is also distinguished – it is transportation that is carried out by various modes of transport, but within the framework of one contract, the type of transport does not matter – it can be rail, water, road, and so on (Figure 1).

Figure 1. – The main types of freight transportation [1]

A separate type of transportation is pipeline transport, in which not the vehicle itself moves, but only the object of transportation: oil, gas or water, bulk materials.

Kazakhstan's freight and logistics market is fragmented, with both international and local players present. There are a large number of players on the market, such as JSC KTZ – Freight Transportation, Panalpina (DSV), Agility Logistics, CJ Logistics, Rhenus, etc. Increasing investments in the country's infrastructure and railways creates an opportunity for companies to invest in the market. Local and regional players occupy a significant market share, but increased opportunities open up opportunities for international players as well.

In recent years, a set of provisions and measures to ensure the logistical management of material flows have been steadily developed on foreign railways. In particular, information logistics systems are being created to optimize information chains within one's own organization (railway company) when external networks are turned on in such a way that it becomes possible to correspond with the information and computing resources of all partners who participate in the transport process.

Logistics is playing an increasingly important role in Kazakhstan. Transit transportation or transportation in the west-east directions are among the priorities in government plans or strategies. Logistics is one of the important industries that the Government should assist. However, knowledge, administrative institutions and business management regarding logistics in Kazakhstan have not reached the world's advanced level. Apparently, the "Just in Time" and "Supply Chain Management" systems are hardly used in Kazakhstan. It is obvious that the application of these advanced logistics systems requires the appropriate requirements of people, business and technology. However, the globalization of the economy and technology is developing at a rapid pace and Kazakhstan also needs to be prepared for this.

Today, logistics departments are tasked with operating various modes of transport more efficiently, using both their own resources and third-party service providers. "In the current conditions, we need to recall the old saying that the customer is the king, who, coming for the goods, chooses the price and delivery time."

Abroad, just in time is one of the most common logistics concepts. The idea is this: if the production is debugged and works like clockwork, then it should be supplied with everything necessary according to a schedule. That is, it is necessary to organize the movement of cargo flows in such a way that all materials arrive for assembly and sale at a strictly defined time. This allows you to optimize storage costs and get rid of the problem of maintaining insurance stocks. Just-in-time deliveries are particularly in demand in the aviation and automotive industries, where timely delivery is the main criterion, taking into account the cost of funds.

In the practice of our country, there has long been a conversation about the expediency of developing the just in time segment. However, this means the development and implementation of complex multi-stage logistics schemes at the highest level. And in our "fat" years, as evidenced by the data of numerous surveys, even delivery on time by one type of transport was a problem. However, under the pressure of external factors, the situation is beginning to change. Suppliers of transport and logistics services are trying to be more flexiblerespond to customer requests. And representatives of various industries are increasingly resorting to "scheduled" work schemes.

Transport is not just one of the elements of logistics, but the main means by which logistics, regardless of its scale, is expressed in life.

Shippers resort to the services of transport structures when a certain need arises. At the same time, the management of micro– and macrological processes assumes that transportation should also be planned as well as production.

One of the features of transport logistics is the integrated use of rolling stock by all three participants in the promotion of material flows.

The general function of transport logistics is the management of material flows along the entire length of logistics channels, from the source of generation to the destination.

Literarure review.

The theoretical and methodological basis of the work was the results of fundamental and applied research by Russian and foreign scientists and specialists in the field of logistics and supply chain management, regulation of flow processes, transport logistics, economics, organization and operation of transport, business planning, investment design and project management, design and construction of transport and logistics infrastructure.

The works of many Kazakhstani, Russian and foreign scientists and specialists are devoted to various scientific, methodological and practical aspects of logistics: Aidarova A.B., Asylbekova G.D., Akhmetkalieva S.K., Akhmetov Zh.B., Baymukhanbetova E.E., Beisenova B.H., Biyatova Zh., Zhatkanbaeva E.B., Ilyasova G.A., Ismailova R.T., Kenzhalina Zh.Sh., Mukash S., Nurtayeva Zh. Sh., T.V. Alesinskaya, B.A. Anikin, A.S.Balalaeva, D. J. Bauersox, E.V. Budrina, A.M. Gadzhinsky, A.A. Gaidaenko, R. Stock James, D.V. Johnson, S.Y.Eliseev, V.N. Klochkova, E.A. Koroleva, M. Christopher, V.N. Kryuchkova, P.V.Kurenkova, B.C. Lukinsky, L.B. Mirotina, Yu.M. Nerusha, V.M.Nikolashina, D.T. Novikova, T.A.Prokofieva, V.G. Sankova, C.B. Sarkisova, V.I. Sergeeva, L.A. Sosunova, V.N. Tregubova, S.A. Uvarova, E.Yu. Shekhovtseva, V.V. Shcherbakova et al.

For example, Glushchenko A.A. in his writings examines the transport process, cargo classification, types of rolling stock, cargo turnover and cargo flows, indicators of the use of vehicles, loading and unloading facilities and their productivity, planning, accounting system and machine operation management[11].

In his research on logistics, Professor K. Kurpayanidi studies issues such as: logistics of production processes, organization of material flows in production, transport logistics, organization of logistics management.

To date, E.S. Barabanova, B.F. Bezrodny, V.N. Bogumil, S.P. Vakulenko, V.M. Vlasov, A.M. Golubchik, D.B. Efimenko, S.V. Zhankaziev, A.A. Barabanova, B.F. Bezrodny, V.N. Bogumil, S.P. Vakulenko, V.M. Vlasov, A.M. Golubchik, D.B. Efimenko, S.V. Zhankaziev, A.A.

Barabanova have made a great contribution to the research of the organization and management of automated systems in international transport, its digitalization and implementation in international cargo transportation.M. Ivakhnenko, V.G. Kocherga, P.V. Kurenkov, M.I. Malyshev, S.M. Rezer, A.V. Rezer, S.A. Filatov, N.A. Filippova, etc.

An analysis of the works of domestic and foreign scientists has shown that currently there is a process of accumulation and implementation of private solutions to reduce the negative burden of logistics transport systems on the environment, approaches to assessing logistics flows from the perspective of the concept of sustainable development, as well as models and methods for choosing the most effective ones, have not been sufficiently studied"green" solutions that take into account many factors of the external and internal environment of the functioning of logistics chains of cargo flows. Research is needed on the systematization of this knowledge and the formation of scientific and technical solutions for the sustainable development of logistics chains in conditions of changing characteristics of cargo flows and increasing the greening of transport and logistics processes.

A., Kristofferson, I., Mattson, B. Rojas, C. Bolanos, Salazar-Cabrera, Ryan, M, Melander, L., Du bois, A., Hedvall, K., Link, F., Fritschy, C., Spinler, S. and othershave made huge contributions to the study of telecommunications and innovative technologies in the transport industry and logistics. The works of these authors are relevant today [12-17].

Methodology

The bulk of freight and passenger transportation is carried out with the participation of 2 or more modes of transport. Thus, 80% of the cargo arriving at ports is transferred to the railway (50% on the river). Almost all oil from pipelines is transferred to other modes of transport, and the car interacts with all types of transport, its weight is especially high for passenger transportation. (http://storage.mstuca.ru/bitstream.pdf)

The points of interaction are transport hubs. Previously, transport hubs, due to their historical development, departments, private ownership, geography, topography, were built without taking into account the rapid transfer of goods from one type to another.

The transit passenger bought new documents for cargo transportation and travel. The cargo was overloaded at these points. It was only with the introduction of mixed direct communication that the owners of the cargo were freed from the worry of overloading their goods.

In the interaction of various modes of transport, the ETC (unified transport system) should be revived.

When choosing the type of transport for transportation, it is important to take into account the advantages and disadvantages of each of them noted above. This can be achieved not only by competition, but also by partnerships between modes of transport. This includes coordination and coordination of work in the field of transportation planning and distribution, rational use of technical means, development and implementation of unified technological processes of stations, access roads of enterprises, ports, marinas, coordination of schedules and timetables for trains, buses, airplanes, ships, etc. The most important form of interaction is the organization of transportation in combined (mixed) communications.

Improving the forms and methods of interaction accelerates the processing and delivery of goods to consumers and improves the use of warehouse space and loading and unloading mechanisms. About 1/3 of all cargo transported by sea is overloaded using the direct option (bypassing warehouses) "ship-wagon", "wagon-ship". The cooperative use of ways and means of mechanization by different modes of transport is practiced. Rivermen transfer some of the machinery and warehouses to railway workers in winter. Overloading according to the direct variant "wagon-car", "car-wagon" has been introduced into practice. Currently, the system of combined rail and road transportation is increasingly used on the principle of door-to-door without overload [4].

All applicable principles of interaction should be based on the characteristics of all modes of transport. Each type of transport has its own specifics regarding its use for the transportation of goods.

Road transport is used to transport goods mainly over short distances. For these purposes, cars, tractor-trailers, trailers and semi-trailers are used. Special rolling stock is used to perform non-transportation work. Transport rolling stock is distinguished by different criteria. In particular,

general purpose vehicles are distinguished, which includes cars and trailers with universal open bodies and folding sides, as well as specialized ones. The latter includes cars and trailers with bodies adapted for the transportation of special goods.

Most authors divide all types of vehicles by load capacity into the following five groups: up to 1 ton; from 1-3 tons; from 3-5 tons; from 5-8 tons; more than 8 tons.

Cars of the first three groups are most often used in trade.

Features of road transport:

– the ability to deliver goods according to the "door-to-door" option;

– ensuring high safety of goods;

– greater mobility and speed of transportation;

– cost-effectiveness when transporting goods over a short distance;

– the use of motor transport removes the need to accumulate cargo, allows you to make shipments rhythmic.

At the same time, road transport is characterized by its limited use over long distances, for the transportation of significant shipments, especially mass shipments. Motor transport largely depends on the road network and is an expensive mode of transport [6].

Effective freight management has been a critical component of business success ever since the first smart merchant loaded goods into a cart and mapped out the shortest and safest routes to neighboring villages. Today, cargo transportation management is a more complex process, but it is no less important for the success of many enterprises.

Transport logistics is unthinkable without the active use of information technology. It is difficult to imagine the formation and organization of the delivery of goods without an intensive operational exchange of information between participants in the transport process, without the ability to quickly respond to the needs of the freight market [5].

To assess the efficiency of the use and functioning of trucks, indicators are usually used that directly determine the delivery parameters: cargo turnover, stock turnover rate, delivery time and distance, rhythm and reliability of deliveries, delivery costs, etc. In absolute terms, these indicators provide information about the efficiency of the transport process only at a single link, and not throughout the entire supply chain. The impact of the transport process on the supply chain is manifested in changes in indicators that, at first glance, have nothing to do with it (for example, the effectiveness of intermediate technological processes depends on the human factor).

Modern cargo transportation is difficult to manage without the help of reliable information and software. It is generally recognized that information technology functions as the nervous system of the freight transportation process and brings organizations many advantages, providing real-time visibility, efficient data exchange and better flexibility to respond to unexpected changes during shipment [7].

Currently, KTZ is actively using digital technologies to automate the business processes of freight transportation using paperless technology for processing transportation documents. Today, all shippers have access to electronic registration of transportation documents in the intra-republican message. Customers can submit their application online, conclude transportation contracts, submit electronic applications for plans, arrange and credit transportation, apply for cargo forwarding and access the functionality of electronic messaging. Paperless technologies help to minimize direct customer contact with the station staff, which reduces customer complaints and eliminates the human factor, the procedure has become transparent.

The introduction of information systems has led to significant optimization of business processes and improved customer service. Due to the automation of the process, the time for approving applications for shippers has been reduced by 15 times (from 11 hours to 5 minutes) and the deadline for submitting applications for forwarding has been reduced from two days to one hour. In addition, customers can now receive transportation documents and information about the status of their transportation in real time.

The main task of KTZ is to monetize the transit potential of Kazakhstan by attracting additional customers and cargo. The development of a digital transport corridor and the expansion of cooperation with international logistics companies should contribute to solving this problem.

The development of the digital corridor means the creation of an effective system for attracting new goods, increasing the recognition and accessibility of Kazakhstan's transport corridors for international customers, and integrating our country into global logistics chains. This not only concerns transit flows, but will also contribute to increasing the export opportunities of Kazakhstani companies. Cooperation with PSA in this direction will allow us to use the company's experience in developing innovative solutions for the logistics industry [10].

Results and discussions.

Geopolitical realities

The volume of cargo transportation in Kazakhstan is growing every year, by the end of 2023, freight transportation by all modes of transport (excluding pipeline) amounted to 4.5 billion tons. The average growth rate over the past 5 years has been 1.4% CAGR, despite the pandemic, supported by the development of electronic commerce and the country's transit potential. Revenues from transportation by all modes of transport (excluding pipeline) in the Republic of Kazakhstan by the end of 2023 amounted to 1.8 trillion tenge, of which 1.6 trillion (78%) was received through the transportation of goods.

From the point of view of the structure of domestic cargo transportation by mode of transport, the lion's share (83%) falls on road transport, including due to the rapid development of online commerce and delivery services and the growing demand for 3PL services.

The consequences of the military actions in Ukraine turned the logistics chains of the entire region upside down: the sanctions imposed against Russia and Belarus and the refusal of a number of large logistics operators such as Maersk, DSV and DB Schenker from transportation to and from Russia, the blocking of railway and sea routes — all this led to the fact that the first and second of the listed the routes were blocked.

An additional factor in the growing attractiveness of the Kazakh logistics sector is the expectations for the relocation of a number of companies from Russia and Belarus to Kazakhstan. We expect that some of them will import goods not included in the sanctions lists to Kazakhstan with subsequent export to Russia, which will solve the logistical difficulties arising from direct transportation to Russia. In addition, the withdrawal of large consumer companies from the Russian market provides opportunities for intermediaries who can import the same products purchased in other countries to meet the demand of the Russian market [8]

The volume of Kazakhstan's freight and logistics services market is estimated at USD 11.36 billion in 2024 and is expected to reach USD 14.80 billion by 2029, with an average annual growth rate of 5.44% during the forecast period (2024-2029).

The driving force of the market is the movement of companies and routes from the territory of Russia to the territory of Kazakhstan. In addition, the market is being stimulated by the growth of e-commerce and cross-border rail freight.

Modern geopolitical realities are changing the logistics map of Eurasia and the direction of cargo flows. The Central Asian countries have already begun to use Azerbaijan's transit potential to gain access to world markets. Azerbaijan is chosen as a transit route by large cargo owners and logistics companies from the above-mentioned countries. Cargo from Kazakhstan is transported via two routes: the Caspian Sea and the Samur-Yalama border crossing. According to ADY Express LLC, a subsidiary of Azerbaijan Railways CJSC, from January to October 2022, rail freight traffic between Azerbaijan and Kazakhstan amounted to 950 thousand tons (an eight-fold increase), while transit traffic amounted to 96%. It is expected that these volumes will continue to grow. Legal and diplomatic efforts are being made to establish a joint venture through the railway administrations of Azerbaijan, Georgia and Kazakhstan [9].

The dynamics of economic development requires a corresponding evolution of a transport system capable of efficiently servicing logistical needs. It should be understood that today there are a number of problems in the industry related to infrastructure development, technology development, information support, creation of a single information space, further improvement of corridors for transit cargo flows, organization and development of optimal conditions and infrastructure for incoming and outgoing cargo flows, followed by local distribution to final destinations.

Conclusions. The analysis of logistics processes in transport allowed us to conclude that logistics processes are considered at two levels: informational and material. In the process of substantiating the classification according to the information level, it is based on the need to manage traffic flows, and the effectiveness of decisions depends on the information on which they are based

and on its reliability, therefore, a clear structuring of information processes in transport is necessary according to various criteria. Classifications of the transport process according to a wider list of features and its structuring allow us to explore the process of managing operational activities in the interaction of various modes of transport. In order to realize the prospects for the development of transport, to ensure the transportation of bulk goods, including exports, and to improve the quality of transport services for cargo owners, it is recommended to logistics cargo flows in order to ensure efficient logistics chains of goods movement.

From the above, it can be concluded that the further development of the logistics infrastructure of the Republic of Kazakhstan requires the development and implementation of promising logistics methods for economic support and management of the transport complex as a whole and modern transport companies, taking into account the specifics of each type of transport. The achievements of logistics, as the science of effective management of various kinds of flows designed to ensure the best implementation of the requirements of the end user, are used in the study as the basis for the development of methods of economic support and management of integrated transport and logistics systems of freight companies. This article also provides an overview of ways to improve the process of cargo transportation management through the introduction of information technology. However, it did not address the specific IT that currently exists due to their large number and diversity. In the next study, I will explore the issues of IT implementation, which will help improve the operation of transport and freight management. It is also recommended to conduct research that will allow you to analyze the most successful world experience.

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USING ANT COLONY ALGORITHM IN «LAST MILE DELIVERY» OPTIMIZATION

Galyandin V.E.[1] Kegenbekov Z.K.[2]
1Kazakh National University named after. Al-Farabi
2Kazakh-German University
*E-mail: gniyetalina@gmail.com

Abstract: This article presents a comprehensive study of the effectiveness of using the ant algorithm in optimizing the delivery process at the last stage. It takes a detailed look at the current challenges facing logistics and delivery companies, such as inefficient use of resources and suboptimal planning of delivery routes. The paper proposes an innovative approach based on the ant algorithm to solve these problems. The method of applying the algorithm is based on the behavioral principles of ants when searching for food sources, which makes it possible to find optimal delivery routes. The study confirms a significant improvement in the efficiency of this approach compared to traditional optimization methods. The results obtained represent an important contribution to the development of logistics systems and delivery, helping to reduce costs and improve customer service. By analyzing these results, it is possible to predict the prospects for using the ant algorithm in a wide range of logistics problems, which can lead to new discoveries and innovations in this area.

Keywords: last mile delivery, biomimicry, ant algorithm, optimization of transport costs, e-commerce.

Modern retail trade is a complex and dynamic industry that requires effective organization of logistics supply chains. With rapid advances in technology, changing consumer preferences and increased competition, companies are faced with the need to continually improve their logistics processes to ensure a reliable supply of goods and meet customer needs.

This is especially true for last-mile delivery. Last mile delivery is an important element of the logistics supply chain in the wholesale and retail industry. This stage of the delivery process represents the last part of the journey that the product must take to reach the final consumer. Effective last-mile delivery plays a critical role in satisfying customer needs, providing superior service, and creating a competitive advantage for companies in the wholesale and retail trade.

When organizing the delivery of orders to customers of an online store, there are many options that can be used in combination with each other, taking into account the characteristics and geography. Some companies, despite the high cost, can purchase and use their own transport fleet, as well as use the services of third-party companies. This allows you to diversify delivery methods and provide a more flexible and efficient order delivery system.

Online trading is the main supplier of goods for express delivery services. However, according to experts, even with such companies with an extensive network and professional couriers, online retail does not receive a comprehensive solution for its logistics needs. Express delivery provides many services, but cannot always fully satisfy the requirements of online stores regarding logistics and order support.

In the context of optimizing delivery times, managing costs and increasing service flexibility, e-commerce companies must consider the balance between price and quality. Providing a sufficient number of vehicles to complete deliveries does not always equate to the number of orders. With limited resources and time, companies are realizing the importance of optimizing delivery routes to customers. Effective use of vehicle loading allows you to combine orders from several customers on one route, which reduces delivery time and reduces transportation costs.

According to expert forecasts, the problem of last-mile delivery is the main limitation for the development of online commerce. Today's consumers strive for fast and accurate delivery, preferring to minimize wait time. However, many are not willing to pay additional fees for this level of service. Recent studies have shown that expanding the delivery time window from 3 to 6 hours can reduce transportation costs by up to 24%, and by increasing the window to 24 hours, savings of up to 60% can be achieved. However, to realize this flexibility, it is important to use automated delivery systems that do not require the presence of the recipient.

Thus, in the modern sphere of online trading, it becomes obvious that the competitive advantage belongs not only to those who produce goods, but also to those who ensure their fast and efficient delivery. The quality of goods and services provided remains important, but in the modern world less attention is paid.

To overcome the complexities associated with late-stage delivery, many innovative approaches have been proposed, often based on innovative algorithms and models. However, in the search for the most effective solutions, it is necessary to consider sources in other areas of science and technology. This study focuses on the application of bionics techniques in the context of customer delivery in e-commerce. This opens up the prospect of using principles and ideas inspired by natural systems to develop new and more efficient delivery models.

One of the main directions in the development of last-mile delivery is route optimization. However, given the large number of individual consumers, this becomes a challenging task. For example, when delivering goods to 52 customers, there are approximately 3.6 quadrillion possible route combinations.

And with centralized delivery of orders to 56 customers, the number of options exceeds 86 quadrillion. The exponential growth in the number of combinations significantly increases the time required to find the optimal route.

The last mile optimal route problem is similar to the famous traveling salesman problem. Its main goal is to find the shortest closed route that passes through all cities (or points) only once and returns to the starting point, forming a so-called Hamiltonian cycle.

This problem is an NP-complete discrete optimization problem, which means it is highly computationally complex. Algorithms capable of solving this problem require exponential runtime with increasing dimensionality, that is, the number of cities or waypoints (Aggarwal, 2024).

Practically used algorithms for the “traveling salesman problem” are usually effective only for small dimensions, when the number of cities does not exceed, for example, 20.

But in online retail trade, situations arise when it is necessary to build an optimal route through hundreds and even thousands of points. This is typical for last-mile delivery operators.

In such cases, using traditional methods of trying all possible solutions becomes impractical due to the exponential increase in time complexity.

It is expected that delivery requirements will be even higher in the future, given the overall trend. The shift of consumers to mobile devices and online shopping will increase the share of impulse purchases and raise expectations for speed and quality of delivery. This will require the development and application of innovative logistics solutions such as route optimization, process automation and the development of new delivery models to meet the increasing needs and expectations of consumers.

This means that standard algorithms that work efficiently for small dimensions cannot provide fast and optimal results at this scale of the problem.

However, striving for optimal results at any cost is not always necessary or reasonable. In many cases, it is enough to obtain an approximate (quasi-optimal) solution with much less time.

To do this, you can use combinatorial algorithms that are based on heuristic methods. Interestingly, in nature one can find many examples of heuristic strategies that are successfully used to solve complex problems.

Currently, the task of building a delivery route has become very urgent. At the current pace and customer requirements, without automation of processes and solutions in logistics, it is impossible to cope with the challenges of this area. Despite the fact that bionics and logistics, sciences that were formed relatively recently, are just beginning their interactions, already at the moment there is a development and service that has integrated logistics and such a bionics tool as the «ant algorithm».

Ant Colony Optimization (ACO) is a metaheuristic algorithm used to solve optimization problems, in particular the traveling salesman problem. It is based on the behavior of ants when searching for food and building anthills.

The algorithm is based on modeling the behavior of ants that move between points in search of food. Ants leave pheromones along their path, which serve as path markers and attract other ants

to the same points. The more pheromones on a path, the more likely other ants will choose that path (Feng, 2020).

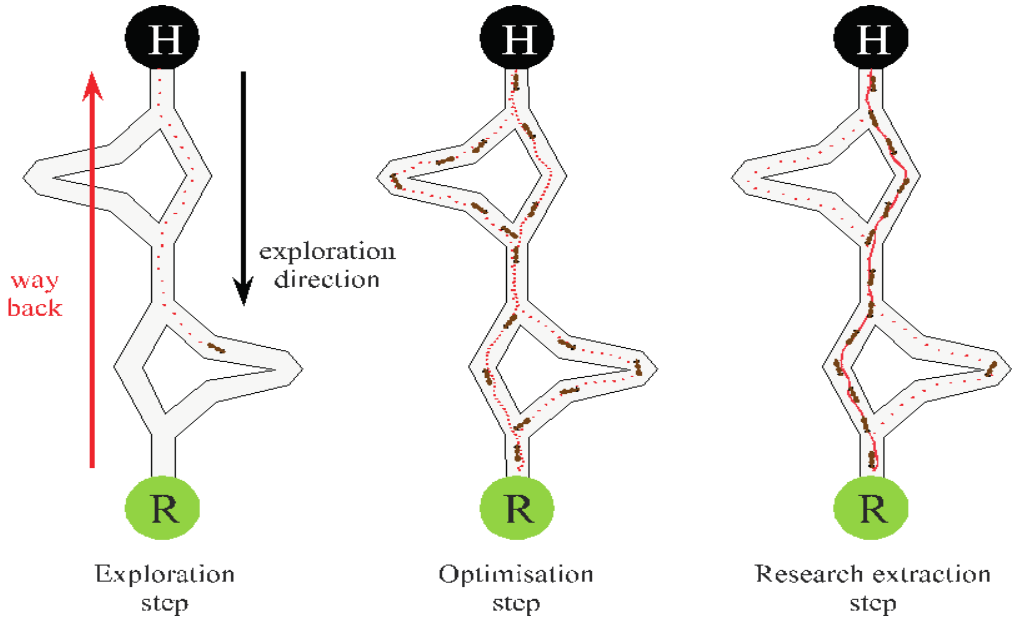

Figure 1. Behavior of a swarm of ants, as again for finding the shortest path

The ant algorithm for solving the traveling salesman problem works as follows:

1. Initialization: creating an initial population of ants and setting initial pheromone values on all possible routes.

2. Route selection: Each ant chooses the next city based on a probability function that depends on the amount of pheromone along the path and the distance to the city.

3. Pheromone update: after the ant passes the entire route, it leaves a trace in the form of a pheromone along the way. Pheromone renewal occurs in such a way that the amount of pheromone is proportional to the length of the route. Also, over time, the amount of pheromone along all paths decreases with the pheromone evaporation rate.

4. Selecting the best route: after all the ants have passed, the best route is selected, which contains the largest amount of pheromone.

5. Pheromone update on the best route: the amount of pheromone on the best route is increased by a specified factor.

6. Repetition: The algorithm is repeated a specified number of times or until a certain stopping criterion is reached (Liu, 2020).

Using the ant algorithm in last-mile delivery can improve delivery speed and accuracy, reduce transportation costs, and optimize resource allocation. This is especially true with growing e-commerce and increased demand for goods delivered directly to consumers' doors.

In order to evaluate the effectiveness of using this tool for online trade logistics, we will consider the possibility of using and implementing the algorithm in various ways using the example of a case modeling of the situation that arose in Magnum Go. Orders from clients are received via the Internet, payment is made online, and the goods are delivered either to the company’s order pickup points (dark stores and other stores), or directly to the buyer’s address, depending on the method specified by the client. The company has several vehicles to deliver goods to customers during the working day.

Table 1. Initial data for the task (orders)

Buyer	Quantity (pcs.)	Delivery address	Delivery date	Order status
Customer №1	2	st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	15.05.2024	Ready for shipment
Customer №2	1	st. Gogolya, 194, Almaty	15.05.2024	Ready for shipment
Customer №3	1	st. Baku, 121/24	15.05.2024	Ready for shipment
Customer №4	1 2	st. Merkulova, 6, Almaty	15.05.2024	Ready for shipment
Customer №5	1	st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	15.05.2024	Ready for shipment

It is necessary to fulfill orders on 05/15/2024, having previously built an optimal delivery route using the «ant algorithm».

To calculate the problem, it was established by expert assessment that:

- **coefficients α, β are equal to 1.**
- **pheromone evaporation coefficient is 0.1.**

The distance table is as follows.

Table 2. Initial data for the task (distance table)

	Magnum OPT distribution center	st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	st. Baku, 121/24	st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	st. Merkulova, 6, Almaty	st. Gogolya, 194, Almaty
Magnum OPT distribution center	x	28	19	24	15	9
st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	28	x	21	11	17	25
st. Baku, 121/24	19	21	x	11	18	10
st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	24	11	11	x	13	14
st. Merkulova,	15	17	18	13	x	13

	Magnum OPT distribution center	st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	st. Baku, 121/24	st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	st. Merkulova, 6, Almaty	st. Gogolya, 194, Almaty
6, Almaty						
st. Gogolya, 194, Almaty	9	25	10	14	13	x

The starting point is the distribution center. The initial amount of «pheromone» on each path is equal to one.

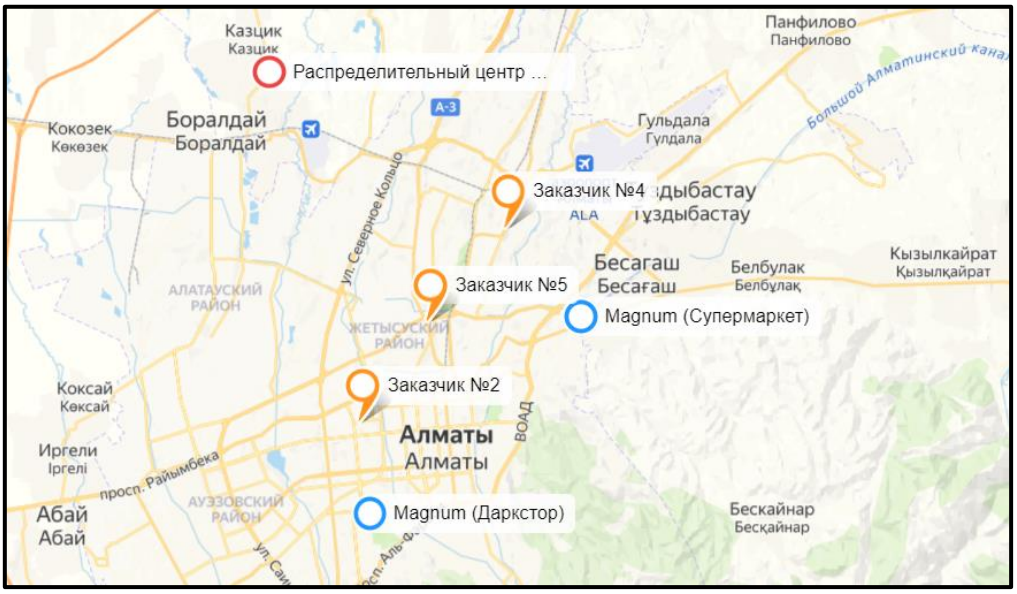

Figure 2. Location of delivery points on the map of Almaty

Addresses:

1. AF No. 55, Ili district, Kazzikovsky village, Kazzik village, st. Berezhinsky Alexander Fedorovich, 50 (Distribution center Magnum OPT);
2. st. Khaliullina, 194, Almaty (Customer No. 1 – Magnum grocery hypermarket)
3. st. Gogolya, 194, Almaty (Customer No. 2 - home delivery);
4. st. Bakinskaya, 121/24, Almaty (Customer No. 3 – home delivery);
5. st. Merkulova, 6, Almaty (Customer No. 4 – home delivery);
6. st. Timiryazeva, 42/2, Almaty (Customer No. 5 – Magnum Darkstore).

Taking into account the company's service policy, it may turn out that one of the main competitive advantages is the guarantee of delivery of goods within the specified interval. Therefore, in this example, it is also advisable to apply a modification of the algorithm taking into account the time and size of the delivery interval.

Due to the fact that the location of the points and the distance between them is already known, it is necessary to determine the speed of movement in each section. It is worth noting that in this calculation example, the difference in speeds at different times of the day will not be taken into account to reduce the estimated time. The table below shows the average speeds of movement between points in the problem.

Table 3. Average speeds of movement between points in the problem

	Magnum OPT distribution center	st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	st. Baku, 121/24	st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	st. Merkulova, 6, Almaty	st. Gogolya, 194, Almaty
Magnum OPT distribution center	x	35	30	40	30	50
st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	35	x	55	40	30	60
st. Baku, 121/24	30	55	x	45	50	40
st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	40	40	45	x	40	35
st. Merkulova, 6, Almaty	30	30	50	40	x	50
st. Gogolya, 194, Almaty	50	60	40	35	50	x

The next step of the problem is to find the time it takes to move from point *i* to point *j*. To do this, you need to divide the distance between points by the speed of movement in this area. Thus, the table shows the time it takes to travel between each delivery point in the problem.

Table 4. Travel time between points in the task

	Magnum OPT distribution center	st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	st. Baku, 121/24	st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	st. Merkulova, 6, Almaty	st. Gogolya, 194, Almaty
Magnum OPT distribution center	x	0,8	0,63	0,6	0,5	0,18
st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	0,8	x	0,38	0,28	0,57	0,42
st. Baku, 121/24	0,63	0,38	x	0,24	0,36	0,25
st. Timiryazeva, 42/2, Almaty	0,6	0,28	0,24	x	0,32	0,4

	Magnum OPT distribution center	st. Khaliullina, 194, Almaty (Magnum grocery hypermarket)	st. Baku, 121/24	st. Timiryazeva, 42/2, Almaty (Magnum Darkstore)	st. Merkulova, 6, Almaty	st. Gogolya, 194, Almaty
(Magnum Darkstore)						
st. Merkulova, 6, Almaty	0,5	0,57	0,36	0,32	x	0,26
st. Gogolya, 194, Almaty	0,18	0,42	0,25	0,4	0,26	x

The work of the "ant algorithm" can also be implemented on a programming platform such as Python, which is able to take into account all the necessary parameters and is able to adapt (with the help of developers) the output data at the customer's request. To implement it, you need to compose a program code, enter input data and run the algorithm.

```
distances = np.array([[np.inf, 28, 19, 24, 15, 9],
                      [28, np.inf, 21, 11, 17, 25],
                      [19, 21, np.inf, 11, 18, 10],
                      [24, 11, 11, np.inf, 13, 14],
                      [15, 17, 18, 13, np.inf, 13],
                      [9, 25, 10, 14, 13, np.inf]])

ant_colony = AntColony(distances, 1, 1, 15, 0.1, alpha = 1, beta = 1)
shortest_path = ant_colony.run()
A = print ("Shortest path: {}".format(shortest_path))
```

Figure 3. Input data for solving the problem in Python

Figure 3 shows the implementation of the algorithm for the existing problem. As part of the input data, the distance matrix distances was specified, the number of ants per colony (n_ants) was 1, the number of iterations (n_iteration) was 15, the pheromone evaporation coefficient (n_decay) was 0.1, and the coefficients α, β were equal to 1.

With this implementation of the algorithm, the shortest path was 73 km (Figure 4).

```
iteration = 0 : ([(0, 2), (2, 5), (5, 4), (4, 1), (1, 3), (3, 0)], 94.0)
iteration = 1 : ([(0, 5), (5, 4), (4, 3), (3, 2), (2, 1), (1, 0)], 95.0)
iteration = 2 : ([(0, 1), (1, 2), (2, 4), (4, 5), (5, 3), (3, 0)], 118.0)
iteration = 3 : ([(0, 5), (5, 4), (4, 3), (3, 2), (2, 1), (1, 0)], 95.0)
iteration = 4 : ([(0, 5), (5, 3), (3, 2), (2, 4), (4, 1), (1, 0)], 97.0)
iteration = 5 : ([(0, 5), (5, 4), (4, 2), (2, 3), (3, 1), (1, 0)], 90.0)
iteration = 6 : ([(0, 5), (5, 2), (2, 3), (3, 1), (1, 4), (4, 0)], 73.0)
iteration = 7 : ([(0, 5), (5, 4), (4, 3), (3, 2), (2, 1), (1, 0)], 95.0)
iteration = 8 : ([(0, 5), (5, 3), (3, 1), (1, 4), (4, 2), (2, 0)], 88.0)
iteration = 9 : ([(0, 5), (5, 2), (2, 3), (3, 1), (1, 4), (4, 0)], 73.0)
iteration = 10 : ([(0, 5), (5, 3), (3, 1), (1, 2), (2, 4), (4, 0)], 88.0)
iteration = 11 : ([(0, 2), (2, 1), (1, 3), (3, 4), (4, 5), (5, 0)], 86.0)
iteration = 12 : ([(0, 5), (5, 4), (4, 1), (1, 3), (3, 2), (2, 0)], 80.0)
iteration = 13 : ([(0, 1), (1, 5), (5, 2), (2, 3), (3, 4), (4, 0)], 102.0)
iteration = 14 : ([(0, 5), (5, 4), (4, 2), (2, 1), (1, 3), (3, 0)], 96.0)
Shortest path: ([(0, 5), (5, 2), (2, 3), (3, 1), (1, 4), (4, 0)], 73.0)
```

Figure 4. Result of the algorithm after 15 iterations

\

The resulting route looks like this: Distribution center - st. Gogol, 194 – st. Bakinskaya, 121/24 – st. Timiryazeva, 42/2 (Magnum Darkstore) – st. Khaliullina, 194 (Magnum grocery

hypermarket) – st. Merkulova, 6 – Distribution center. This route is indeed the shortest, since when implementing the algorithm using the Python programming language, where the number of iterations can be 100, 1000, and 10000, the result will still be 73.

In order to find the fastest route, as well as allocate delivery intervals to each client, it is necessary to carry out many iterations, which can also be implemented using software. As noted earlier, as input data it is necessary to indicate the size of the delivery interval and the courier's working hours.

To test the operation of the algorithm in so-called «real» conditions, that is, instead of randomly calculated data, already valid geographical data of addresses (coordinates and distances between points) of the city of Almaty were used.

Distances and coordinates were previously extracted from the pages of the search and information mapping service Yandex.Maps (Constructor). Below is a screenshot of the site page.

Figure 5 shows delivery addresses in Almaty for the digital model of the «ant algorithm».

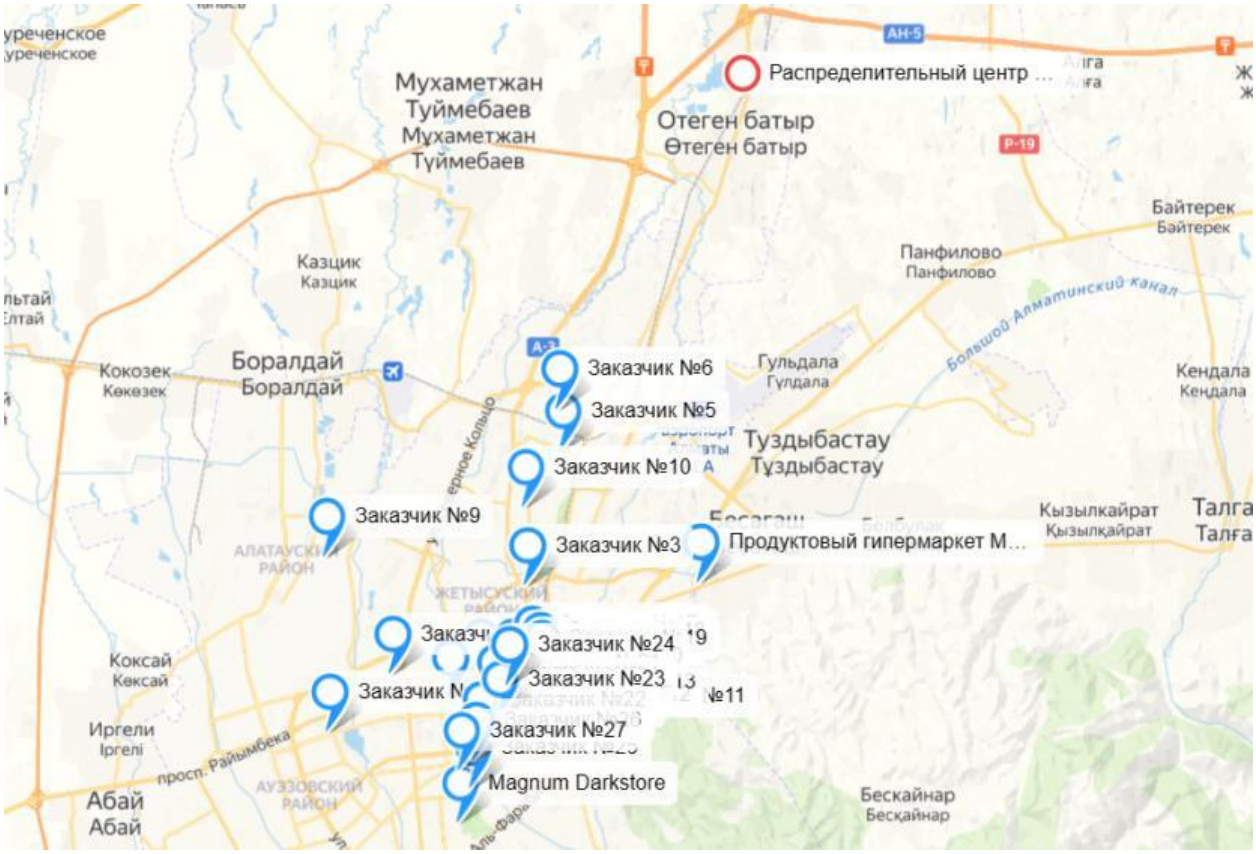

Figure 5. Delivery addresses

The coordinates of the points were also taken from the search and information mapping service Yandex.Maps. The selected addresses and their details are shown in Table 5 below.

Table 5. Delivery coordinates in Almaty

№	Addresses	Coordinates
1	Almaty region, Ili district, Bayserkensky S.O., S. Bayserke, Sultan Beybarys street, Building 1 (Magnum OPT distribution center)	X=43.451197, Y=77.031407
2	Almaty, Raiymbek Batyr street, 167 (Magnum grocery hypermarket)	X=43.292892, Y=77.011168
3	Almaty, Dosmukhamedov street, 117, entrance 4	X=43.241590, Y=76.925226
4	Almaty, Muratbaeva street, 61	X=43.263232, Y=76.917007
5	Almaty, Timiryazev street, 42/3 (Magnum Darkstore)	X=43.217883, Y=76.908688

6	Almaty, Merkulova street, 6	X=43.292111, Y=76.936958
7	Almaty, Gogol street, 194	X=43.256719, Y=76.904385
8	Almaty, Sholokhov street, 8	X=43.333935, Y=76.952436
9	Almaty, Zemnukhova street, 37	X=43.347212, Y=76.950792
10	Almaty, Tole Bi street, 285	X=43.246095, Y=76.853109
11	Almaty, Bokeeva street, 86	X=43.264131, Y=76.879852
12	Almaty, Alatau district, Shanyrak-2 microdistrict, Toishybek Batyr street, 205	X=43.300871, Y=76.851205
13	Almaty, Zhumabaeva street, 54	X=43.316693, Y=76.936734
14	Almaty, Karmysova street, 84	X=43.244709, Y=76.960323
15	Almaty, Shevchenko street, 90	X=43.245339, Y=76.936563
16	Almaty, Kabanbay Batyr street, 93	X=43.249444, Y=76.938925
17	Almaty, Masanchi street, 23	X=43.260428, Y=76.927867
18	Almaty, Zhibek Zholy Avenue, 113	X=43.262037, Y=76.936823
19	Almaty, Makataev street, 127	X=43.263265, Y=76.930894
20	Almaty, Mametova street, 47	X=43.267125, Y=76.939015
21	Almaty, Almaly district, Moldagulova street, 45	X=43.265569, Y=76.942420
22	Almaty, Alimzhanova street, 84	X=43.262588, Y=76.943112
23	Almaty, Aiteke Bi street, 100	X=43.257211, Y=76.933428
24	Almaty, Kazybek Bi street, 125	X=43.255445, Y=76.923429
25	Almaty, Kozhamkulova street, 273	X=43.243514, Y=76.917474
26	Almaty, Baitursynov street, 63	X=43.250409, Y=76.925801
27	Almaty, Amangeldy street, 15	X=43.260579, Y=76.929915
28	Almaty, Gabdullina street, 53	X=43.228834, Y=76.913620
29	Almaty, Baizakova street, 280	X=43.237235, Y=76.915048
30	Almaty, Manas street, 59	X=43.234037, Y=76.909056

The results of the implementation of the ant algorithm are presented in the form of graphs in MATLAB PPP. Figure 6 demonstrates the dynamics of changes in the route when the number of iterations completed changes.

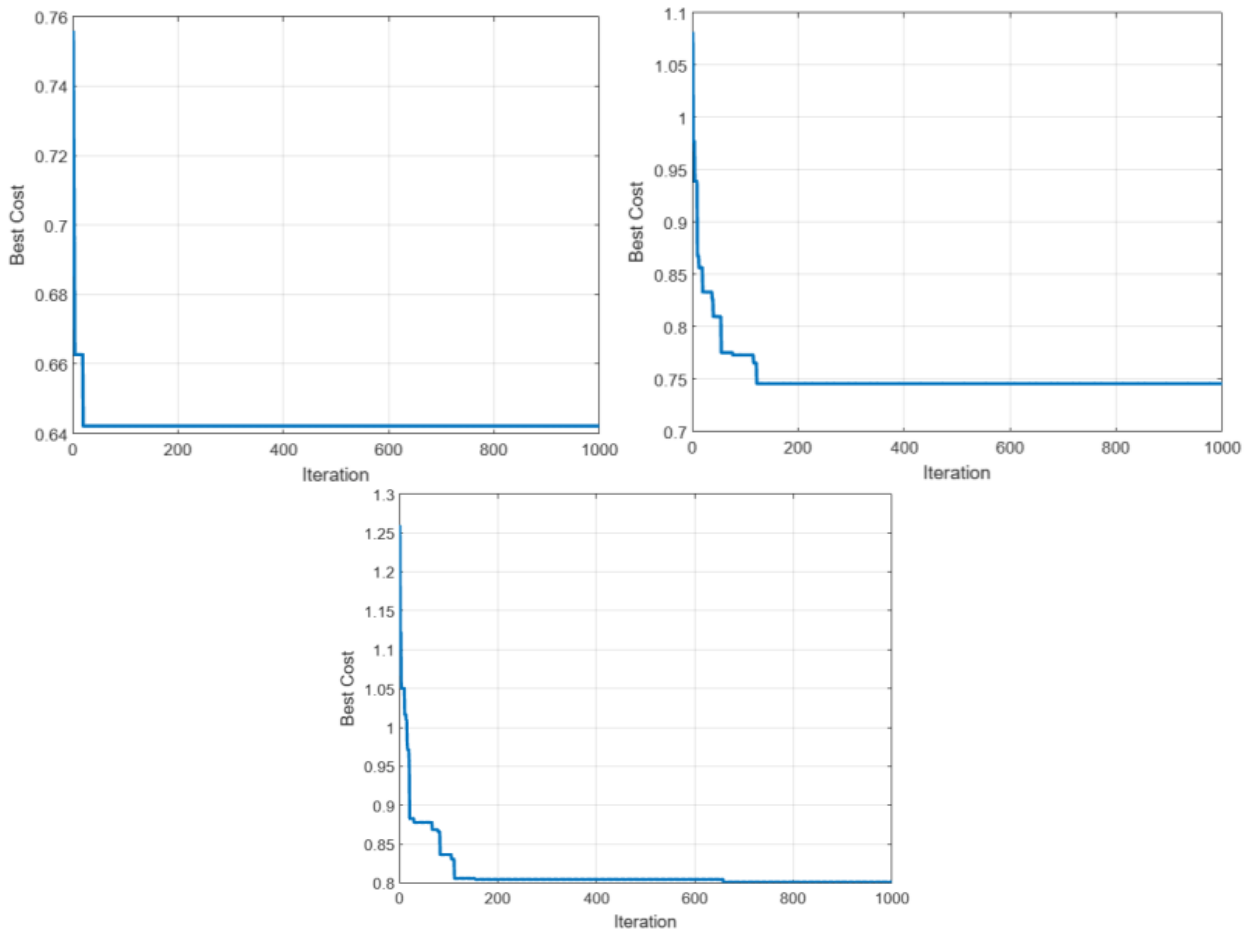

Figure 6. Graphs of the dynamics of route optimization (a – 10 addresses, b – 20 addresses, c – 30 addresses)

From these graphs it can be said that:

1. the optimal route with 10 addresses was found in 20 iterations;
2. the optimal route with 20 addresses was found in 122 iterations;
3. The optimal route with 30 addresses was found in 658 iterations.

A route with 30 addresses requires significantly more iterations than the rest, since the more addresses, the more good options for passing along the circular route.

The figure below shows the optimal best routes in the geographic coordinate system (latitude and longitude), which are plotted in MATLAB PPP.

Below in Figure 7 is a coordinate grid showing a circular route with 10 addresses, 20 addresses and 30 addresses. Next, the routes for all addresses will be more clearly demonstrated using an interactive map.

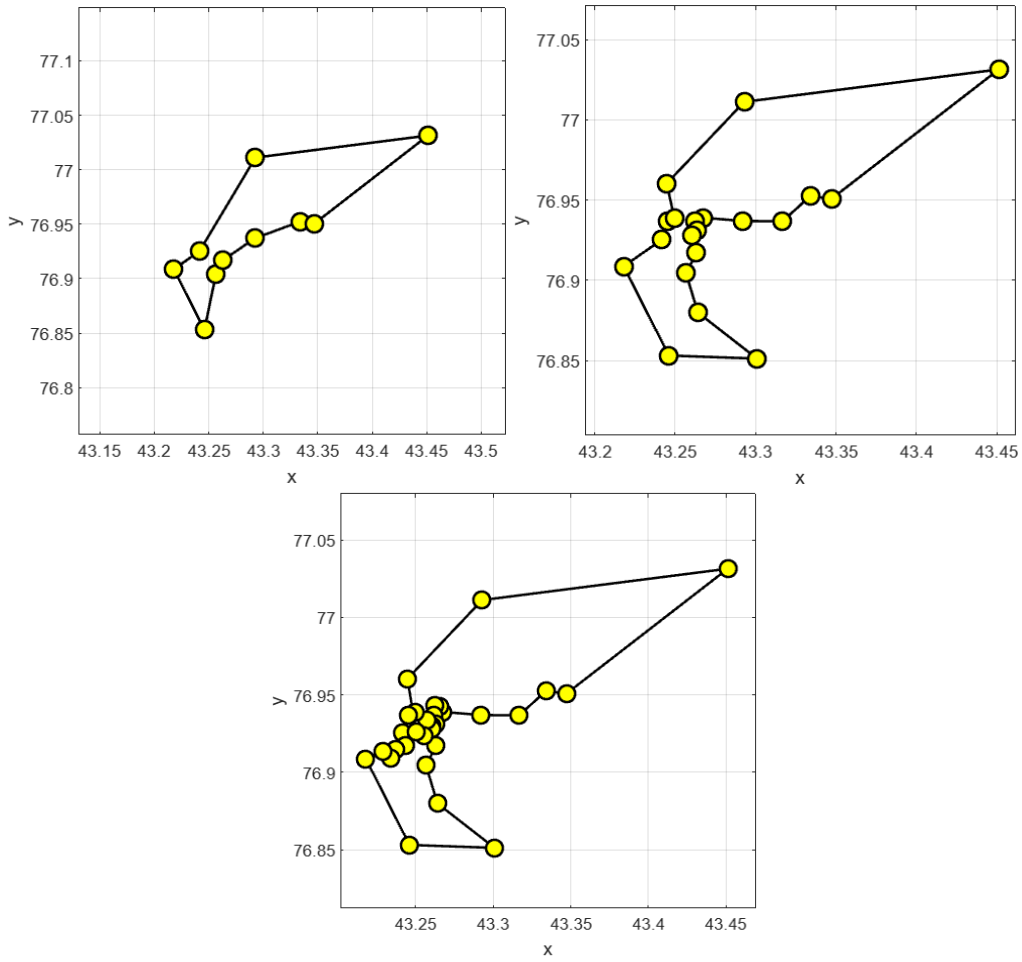

Figure 7. Route graphs in MATLAB PPP (a – 10 addresses, b – 20 addresses, c – 30 addresses)

All information from the console for all points is collected and presented further in Table 6 below.

It is worth noting that the length of one degree of each meridian is 111 km. This data is necessary for optimization dynamics.

Table 6. Data from the MATLAB PPP console

Ant colony algorithm			
Number of addresses	Number of iterations	Route address order	Dynamics of optimization, km
10	20	5→3→2→8→9→1→4→10→7→6	83,916->71,276
20	122	3→11→10→12→20→17→6→13→8→14→4→16→7→15→1→2→9→18→19→5	120,058->82,759
30	658	16→29→18→23→17→10→5→22→14→30→28→11→1→9→12→13→27→21→19→26→24→4→7→15→20→8→25→3→6→2	139,882->88,925

The main advantage of the ant algorithm in searching for the global optimum: with an infinite number of iterations, the probability of finding the global best tends to one. The calculations carried out in MATLAB PPP show that the ant algorithm finds optimal traveling salesman routes faster than exact combinatorial optimization methods.

So, the ant algorithm is a bionic tool for finding the optimal route in the traveling salesman problem. This algorithm allows you to solve a problem with a large number of delivery points, optimizing this process and controlling the level of pheromone along the way. Currently, the online trading market requires special knowledge and new IT systems, and therefore competition in this area is not yet too high.

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TRANSITION TO GREEN ENERGY IN KAZAKHSTAN: CHALLENGES AND PERSPECTIVES

Anarkhan A. K.*, Sartova R. B.
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: aizhan2790@gmail.com

Abstract. In the face of global climate change and the imperative to reduce reliance on fossil fuels, the transition to green energy emerges as a pivotal imperative for numerous nations, including Kazakhstan. This article delves into the primary challenges and future prospects associated with this transition within Kazakhstan's energy landscape.

The study's objective is to assess the current status and future trajectory of renewable energy development in the Republic of Kazakhstan. Findings reveal a notable surge in installed capacity of renewable energy facilities and their escalating contribution to overall electricity production. Particularly promising are solar and small hydropower stations.

Methodologically, the research employed statistical analysis, comparative assessments of Kazakhstan's renewable energy sector against global trends, and legislative scrutiny.

The advancement of renewable energy promises to bolster energy security, mitigate environmental hazards, spur economic growth, and diversify the nation's energy portfolio, underscoring its critical role in Kazakhstan's sustainable development.

Keywords: renewable energy, Kazakhstan, energy transition, sustainability, electricity production, green energy, economic growth.

JEL codes:Q2

Introduction

Emerging technologies for generating electricity from renewable sources (RES) have been developed for less than half a century. The adoption of these technologies contributed to the rise of "green" energy in the 1970s, aligning with the burgeoning environmental movement. However, it wasn't until the early 21st century that significant strides were made in this sector, potentially paving the way for RES to supplant fossil fuels (coal, oil, and natural gas) as the primary energy source (The 5 different kinds, 2020).

Our nation holds abundant reservoirs of energy assets encompassing oil, coal, gas, uranium, and renewable sources. Energy plays a pivotal role within Kazakhstan's infrastructure. The country boasts substantial capabilities in both electricity generation and distribution. Given the expansive expanse of Kazakhstan's territory, there is an imperative for the establishment of a commensurate electrical grid. The collective span of power transmission lines in Kazakhstan totals around 460 thousand kilometers. The expansive distribution of electrical power over such vast distances incurs notable power losses, estimated at approximately 15-20%, contingent upon the final destination (Sansyzbayeva et al., 2020).

Incorporated within "green" energy technologies is the conversion of organic waste, which serves to minimize environmental degradation. Thus, the foundation of "green" energy hinges on the utilization of alternative sources in contrast to fossil fuels those that are either renewable or inexhaustible resulting in considerably reduced environmental impact, including diminished emission of greenhouse gases and other harmful substances. S. Orlando asserts that the disparity between "green" and conventional energy becomes most pronounced beyond residential settings. Companies reliant on fossil fuels are compelled to continually seek out new reserves as existing ones become depleted. Collectively, facilities burning fossil fuels for electricity and heat generation, alongside various modes of transportation, represent the primary contributors to atmospheric greenhouse gas emissions (Orlando, 2019). The combustion of coal also results in the emission of harmful gases, such as carbon monoxide. Other negative environmental consequences include soil and water contamination, including oil spills, which pose hazards to various organisms. Natural gas extraction, particularly through methods like hydraulic fracturing, can lead to minor seismic events,

among other impacts. Nevertheless, conventional (fossil) energy sources continue to hold a prominent position in both the global energy landscape and the energy portfolios of individual nations (Pichai, 2018).

The transportation of fossil fuels across borders presents a lucrative market; however, as easily accessible reserves diminish, the production costs of such energy escalate. Conversely, significant investments in innovative technologies drive down the expenses associated with cleaner or alternative energy sources.

Moreover, "green" energy is bolstered by its capacity to offer cost-effective localized energy solutions, like solar farms. Furthermore, these installations entail minimal ongoing energy resource expenditures post-commissioning, given their reliance on renewable sources. Consequently, "green" energy emerges not only as an economically viable option but also as the favored avenue for advancement.

Literature review

An examination of the literature regarding the green energy market offers an overview of current research and scholarly contributions concerning renewable energy, sustainability, and market dynamics.

Scholarly works by Shipalana P. (Shipalana, 2020), Nhamo J. (Nhamo, 2013), and Hauman M. and Hussain T. (Hauman et al., 2018) delve into the practices of developing countries in the realm of green energy. For instance, Shipalana P. focuses on the African green energy market, proposing a unified mechanism for developing alternative energy sources in developing nations, emphasizing financial aspects while overlooking project management issues (Shipalana, 2020). Conversely, Nhamo J. discusses the governmental role in green energy development, emphasizing the significance of political will in achieving success, albeit overlooking design considerations (Nhamo, 2013).

The competition for energy resources in the Caspian region and Central Asia, including Kazakhstan, has garnered the attention of numerous researchers (Akiner, 2004 & Dorian, 2006). Ebel and Menon, for instance, explore the correlation between energy resource competition and conflict proneness in the Caspian region, underscoring the global importance of Caspian oil and gas while advocating for renewable energy production in the area (Heng, 2017). Despite the dominance of fossil fuels in these regions, there is a burgeoning interest in renewable alternatives due to their environmental sustainability and potential for economic development (Srebotnik, Hardi, 2011).

Moreover, a cohort of domestic researchers investigates the potential of "green" energy in Kazakhstan, identifying various barriers to project development in this domain (Bekturganova et al., 2019). For example, Karatayev et al. highlight the underutilization of solar and wind energy resources in the country due to inadequate infrastructure, institutional frameworks, and legislative support (Karatayev et al., 2016). They argue that financial and institutional obstacles, such as low electricity prices, difficulties in attracting foreign investments, and limited access to credit, hinder green energy development. Similarly, Karatayev and Clark analyze these challenges further, citing the absence of competition laws and regulations in the nascent renewable energy market (Karatayev et al., 2014). Another research team led by Asembayeva proposes innovative solutions to address these issues by integrating renewable energy storage technologies in Kazakhstan, outlining an optimal model for their implementation alongside renewable energy sources (Assembayeva et al., 2017).

Methodology

The study employed a methodological framework, integrating the analysis of statistical datasets pertaining to the evolution of renewable energy within Kazakhstan, alongside the scrutiny of comparative data and expert evaluations. Emphasis was placed on discerning pivotal determinants influencing the sector's progression and assessing its ramifications on the nation's energy infrastructure. The derived insights facilitated the formulation of conclusions concerning the present status and future trajectories of renewable energy expansion within the milieu of

Kazakhstan's sustainable energy paradigm. Additionally, scholarly and analytical publications, as well as various open sources of information, were utilized as secondary sources of data.

Introduction

In recent decades, Kazakhstan, like most countries worldwide, has been increasingly focusing on transforming its energy sector and pursuing sustainable development projects. This includes efforts to develop alternative energy sources and promote environmentally friendly and sustainable economies. However, Kazakhstan also has significant experience with traditional energy sources, which form a crucial part of its national economy through extraction and export activities.

It is important to note that Kazakhstan is a major regional player in terms of fossil fuel reserves, ranking 11th in oil reserves and 19th in natural gas reserves globally. The oil and gas sector plays a vital role in Kazakhstan's state budget. However, global financial crises, often exacerbated by fluctuating oil prices, have highlighted the need for economic diversification and the reevaluation of state planning strategies.

However, it is noteworthy that the Kazakhstani government consistently discusses the "green" agenda. Regarding future prospects, Kazakhstan's geographical positioning favors the development of renewable energy sources (RES). The country, mainly located in the steppe zone, experiences wind speeds of 4-6 m/s, ideal for wind power generation. The Caspian Sea region, notably Atyrau and Mangistau, holds significant potential for wind energy. Southern regions offer promise for solar energy due to prolonged sunlight exposure (around 3000 hours annually). Additionally, hydroelectric resources are widespread, with major basins like the Irtysh, Ili, Syr Darya, Talas, and Chu rivers covering significant territories. As of early 2022, hydroelectric power contributed 11.7% to Kazakhstan's electricity generation, ranking as the second-largest source. Moreover, small-scale hydropower has a technical potential of about 8 billion kWh for alternative energy production.

As of the start of 2022, Kazakhstan had a total of 134 operational renewable energy installations, including solar power stations, wind farms, biogas facilities, and hydroelectric power plants, with a combined capacity of 2,010 MW. By the end of 2022, the country aims to bring online another 10 facilities, adding a total capacity of 290.6 MW (ОбзоррынкавозобновляемыхисточниковэнергиивРеспубликеКазахстан, 2021).

The country is also witnessing a favorable population growth dynamic, leading to an increased utilization of electricity, thus necessitating a rise in its production. A pivotal aspect contributing to this trend is the significant portion of Kazakhstan's territory characterized by a distinctly continental climate. This climatic condition entails pronounced seasonal variations, translating into heightened energy consumption for residential heating and cooling purposes. In this context, research conducted by the Chokin Institute of Energy at KazNII has indicated that the demand for electricity is expected to escalate by approximately 2.5% annually until 2030, driven by initiatives aimed at enhancing energy efficiency and fostering economic growth.

In 2022, Kazakhstan ascended to the 35th position (from the 40th in 2021) in The World Energy Trilemma 2022 rankings by the World Economic Forum. This ranking evaluates countries' performances in achieving a balanced energy trilemma, encompassing energy security, energy access, and environmental sustainability. This evaluation encompasses efforts towards diversifying energy sources, enhancing energy efficiency, and mitigating environmental impacts. While Kazakhstan ranks relatively well in terms of security and accessibility (within the range of 25th to 50th place), its sustainability index places it in the lower quartile, beyond the 75th position. This results in an overall score of 67, corresponding to a BBD rating. By comparison, the frontrunner of the ranking, Sweden, attained a score of 84.7 with an AAA rating.

At present, it is anticipated that oil demand will plateau by around 2030, while gas demand will continue to grow, albeit at a slower pace, until 2050. However, this does not suggest a slowdown in the journey towards carbon neutrality. For the EU, transitioning to renewable energy sources and technological advancements is essential for energy security, reducing reliance on imported fossil fuels. Kazakhstan, according to the World Energy Trilemma, is relatively

independent from fuel imports but struggles with diversifying electricity production, storage, and fostering innovation.

Despite possessing ample energy resources, the country faces significant challenges: aging coal power plants, outdated technologies, and substantial energy losses during transmission. The potential necessity for price hikes to fund modernization efforts poses a risk of public discontent. On average, the country's heat networks are 60% worn out, with an efficiency rate of around 40%, contrasting with the 70% efficiency seen in developed nations. Electricity losses in the grid reach 30%, compared to the 10% in modern energy systems. Coal serves as the primary energy source, contributing to over 70% of electricity production domestically. Despite this, Kazakhstan committed to reducing greenhouse gas emissions by 15% from 1990 levels under the Paris Agreement. In 2021, the country emitted 340.8 million tons of greenhouse gases, with targets set at 324.4 million tons by 2030. Nevertheless, Kazakhstan aims to double its GDP, raising concerns about balancing economic growth with environmental commitments. Furthermore, investments in renewable energy sources have declined in recent years due to various factors such as regulatory issues and technical limitations in integrating renewables into the energy system. Nonetheless, renewable energy sources have accounted for 80% of the growth in electricity generation over the past few years and are expected to continue driving growth in the near future.

However, even if the target of reaching a 15% share of renewable energy in generation by 2030 is achieved, it won't fully address the broader energy security issue. In regions with centralized heating, such as the northern parts of the country, there's a need for energy sources that aren't dependent on weather conditions. While globally, there's a shift from coal-fired to gas-fired generation, offering Kazakhstan an opportunity due to its substantial gas reserves, it faces what experts call the "Kazakhstan gas paradox." Despite being among the top 20 countries in terms of proven gas reserves (3.79 trillion cubic meters), Kazakhstan's gas production is insufficient to meet domestic demand. Moreover, declining gas exports, particularly to China, further strain the situation by reducing revenue available for subsidizing domestic prices. Notwithstanding these challenges, Kazakhstan prioritizes further gasification, successfully reaching 60% of the population with gas pipeline deliveries by the end of 2023, surpassing the target for 2030. However, transitioning to gas for thermal and electrical energy production would necessitate significantly larger gas quantities, which poses a considerable challenge.

Green energy does not negate the need to address traditional energy concerns. "Even wind turbines and solar panels require materials from machinery and metallurgy, which, in turn, necessitates burning something to obtain them. In my view, the primary challenge in energy security issues today lies in the global situation. Security is complex, shared between producers and consumers, and conflicts affect prices and transportation. The second challenge is climate change, which imposes new conditions on fossil fuel producers, including processing. The third challenge is protecting energy from various threats, ranging from terrorism to cyberattacks. This is indeed a serious problem that is gaining momentum. Dialogue within international organizations and finding the right balance are the only ways to address all this. However, I see a hidden threat in the fact that many extractive companies, under the guise of discussing energy transition, have stopped investing in exploration and expanding reserves. Even if we don't exploit them now, they must exist (Как Казахстан пытается сохранить энергобезопасность, 2024).

The support framework for renewable energy development in Kazakhstan, established in legislation since 2009, reflects global best practices in this field.

In 2013, Kazakhstan outlined specific objectives for the renewable energy sector, aiming to gauge market potential and assess the capacity for reducing greenhouse gas emissions. These objectives were incorporated into Kazakhstan's broader transition strategy towards a green economy, outlined in documents such as the "Concept of Kazakhstan's Transition to a Green Economy" and the "Kazakhstan-2050 Strategy." These strategies aim to progressively increase the share of alternative and renewable energy sources in the country's energy mix, targeting a 15% share by 2030 and a more ambitious goal of 50% by 2050.

As of 2022, Kazakhstan boasts 130 operational renewable energy facilities, collectively capable of generating 2400 MW of power. These facilities encompass a variety of renewable energy sources, including wind, solar, hydro, and bioenergy power plants.

In terms of output, renewable energy generation in Kazakhstan reached 5.11 billion kWh in 2022, representing 4.53% of the total electricity production. This percentage increased to 5% by the following year, indicating a gradual but steady growth in the contribution of renewable energy to the country's overall energy output (Development of renewable energy sources, 2022).

Further the study focuses on generated green electricity dynamics. In 2022 the most electricity was generated by wind power plants - 2.575 billion kWh and solar power plants - 1.572 billion kWh. Small hydroelectric power plants produced 760.9 million kWh, bioelectric power plants – 2.25 million kWh. Thus, the share of renewable energy sources in the overall structure of electricity production is 5.97%. The table 1 presents the results of electricity share for 2018-2022 years.

Table 1 - Share of electricity produced by renewable energy sources (RES) in the total volume of generated electricity in Kazakhstan for 2018-2022

	Category	Unit measurements	2018	2019	2020	2021	2022
Share of electricity produced by renewable energy sources in the total volume of generated electricity*		%	10,2	10,4	11,0	10,9	11,8
	including by type of renewable energy sources						
1	hydroelectric power stations	%	9,6	9,4	8,9	8,0	8,1
2	wind power plants	%	0,4	0,6	0,9	1,5	2,0
3	solar power plants	%	0,1	0,4	1,1	1,4	1,7
4	biogas use	%	0,0	0,0	0,0	0,0	0,0
	of the total volume of electricity generated by renewable energy sources						
1	hydroelectric power stations	%	94,5	90,1	80,9	73,2	68,3
2	wind power plants	%	4,2	6,4	8,6	13,8	17,2
3	solar power plants	%	1,3	3,5	10,4	12,9	14,1
4	biogas use	%	0,0	0,0	0,0	0,0	0,0
Source: (National Center for State Scientific and Technical Expertise of the Ministry of Science and Higher Education of the Republic of Kazakhstan)							

As of the end of 2023, Kazakhstan saw a surge in its renewable energy capacity, reaching 2.9 gigawatts, marking a significant 20.1% increase from the previous year. Compared to 2018, this represents a remarkable growth of 5.4 times in the renewable energy sector.

Solar energy dominated the landscape with a capacity of 1.4 gigawatts, experiencing a notable annual growth rate of 21.5%. Small hydropower plants also saw substantial growth, reaching a capacity of 1.2 billion tenge, marking a remarkable 4.3-fold increase compared to the previous year. Conversely, wind power plants witnessed a decrease to 269.6 megawatts (down by 71.9%), while bioelectric plants maintained their capacity at 1.8 megawatts, consistent with the previous year.

Table 2 - Electricity generation by renewable energy sources. January-December 2023

	2023/12	2022/12	Growth over the year
Total	2.868,6	2 388,00	20,10%
Solar power plants	1394,6	1 148,00	21,50%
Small hydroelectric power stations	1 202,60	280	329,50%

Wind power plants	269,6	958	-71,90%
Biopower plants	1,8	1,8	0,00%
Compiled by the authors based on the source (Рязанцева, 2024)			

The share of electricity generated by renewable energy sources (RES) in the total electricity production increased to 5.9%, compared to the previous figure of 4.5%.

The majority of electricity generation among RES facilities was accounted for by wind power stations, which increased their output by 58.6%, reaching 3.8 billion kilowatt-hours. Solar power stations followed (1.9 billion kilowatt-hours, up by 5.2%), followed by small hydropower stations (993.9 million kilowatt-hours, up by 6.4%). Bioelectric stations generated 2.7 million kilowatt-hours of electricity (an increase of 36.9%).

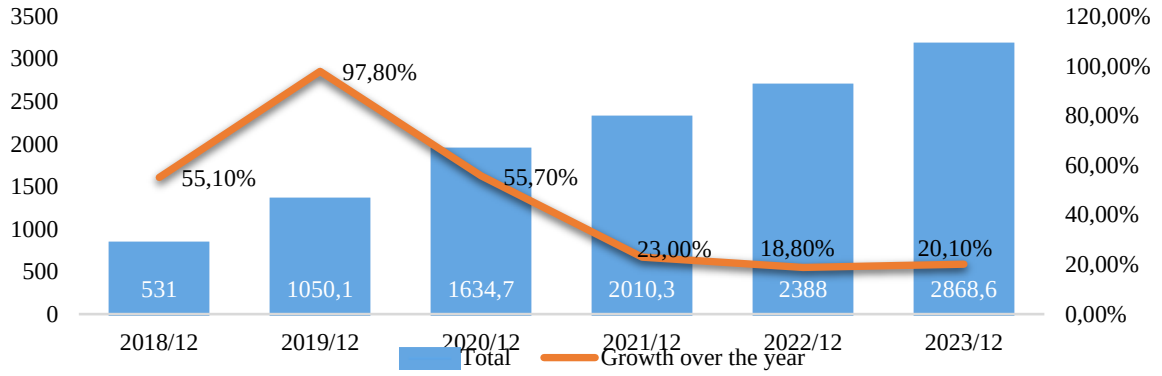

Figure 1- Electricity generation by renewable energy sources. Long-term dynamics. Compiled by the authors based on the source (Рязанцева, 2024)

In conclusion, the data underscores a significant uptick in the contribution of renewable energy sources (RES) to the overall electricity generation landscape of Kazakhstan. With a notable increase in the share of electricity generated from RES, particularly driven by substantial growth in wind power capacity, solar energy utilization, and small hydropower output, the nation is evidently making strides towards diversifying its energy mix and bolstering its sustainability agenda. However, while these advancements are promising, further efforts are warranted to capitalize on the vast potential of renewable energy resources, ensuring their sustained integration into the national energy grid and fostering resilience against future energy challenges.

Conclusion

The transition to green energy in Kazakhstan represents a complex yet crucial process that requires joint efforts from the government, private sector, and international partners. Despite existing challenges, the country holds significant prospects in the field of renewable energy sources, which can contribute to sustainable and environmentally friendly development of the national energy sector.

The examination of the data presented above underscores the necessity for diversification and modernization of Kazakhstan's energy sector. The growth in installed capacity of renewable energy facilities in the country signifies a strategic direction towards increasing the share of renewable energy sources in the energy balance. Special attention is devoted to solar and wind energy, which demonstrate significant growth both in installed capacity and electricity generation. However, the challenges faced by the energy sector, such as the need to reduce greenhouse gas emissions and ensure energy security, require further refinement of support mechanisms and integration of renewable energy sources. The implementation of a strategy for renewable energy development is a key element in achieving national and global goals for sustainable development and reducing environmental impact.

In conclusion, it is essential to underline the significance and prospects of the development of renewable energy sources (RES) in the Republic of Kazakhstan. The growth in installed capacity

of RES facilities indicates the country's aspiration towards diversifying the energy sector and reducing dependence on traditional energy sources. Particularly noteworthy is the dynamic expansion of wind energy, which underscores its potential in the context of energy security and sustainable development.

Solar energy and small hydropower stations also play a significant role in meeting the country's energy needs. This growth supports the strategic goals outlined in Kazakhstan's Concept for Transition to a "Green" Economy and the Kazakhstan 2050 Strategy, aimed at increasing the share of RES in the energy balance.

However, achieving energy sustainability and reducing greenhouse gas emissions requires further development and refinement of mechanisms for RES deployment. This entails improving infrastructure, supporting innovation, creating a favorable investment climate, and developing effective incentives for RES development.

Overall, the results of recent years indicate Kazakhstan's commitment to a sustainable and environmentally friendly energy future, aligning with global trends and the country's strategic priorities.

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MECHANISMS OF FORMATION OF TERRITORIAL TRANSPORT SYSTEMS

Akhmetkaliyeva Sandygul, Mussa Karlygash*
al-Farabi KazNU, Almaty, Kazakhstan
*E-mail: musa_karlygash.kz@mail.ru

Abstract. This article examines the role and importance of territorial transport systems in ensuring economic activity and social connectivity at various levels: local, regional and interregional (transit). The main focus is on the formation of efficient transport and territorial systems as a key aspect of ensuring sustainable development of territories. In the context of a modern dynamic economy, special attention is paid to the optimization of territories at the local, sectoral and transit levels.

The article states the importance of planning mechanisms for transport and logistics clusters in the context of optimizing resources and realizing the potential of regional transport systems. Various approaches to the organization of logistics clusters and the conditions for their formation are considered, including economic, spatial, resource, institutional, infrastructural and competitive aspects. The main emphasis is placed on the structural synthesis of multilevel territorial transport systems and taking into account their operational characteristics at various levels. The systematization of the conditions for the formation of a transport and logistics cluster is given and the stages of its creation using a systematic approach are discussed. The concept of a unified national transport and logistics system (UNTLS) is introduced to apply the methodology of structural analysis in the formation of mechanisms of territorial transport systems.

In general, the article highlights the key aspects and principles, stages necessary for the successful formation and development of transport and logistics clusters in order to ensure the sustainable development of transport systems.

Keywords. Territorial transport systems, transport and logistics clusters, regional transport systems, unified national transport and logistics system

Introduction

Territorial transport systems are an important element in ensuring economic activity and social connectivity at both the local and regional levels. They are complex networks of infrastructure that ensure the movement of people, goods and services within certain geographical areas. The formation of effective territorial transport systems requires an integrated approach that takes into account a variety of factors such as geographical features, population, economic activity and transport needs.

This article examines the mechanism of formation of territorial transport systems, taking into account modern challenges and requirements. The main factors influencing their structure and functioning are analyzed, and approaches to optimizing and improving their work are proposed. The importance of studying this problem is due not only to its relevance in the context of urban and regional development, but also to its impact on the economic and social well-being of society as a whole.

In today's dynamic economy, special attention is paid to the development and optimization of transport and logistics systems at the local, regional and interregional levels. The interregional level determines the territoriality of transport systems. The mechanisms of formation of territorial logistics transport systems are becoming a key factor for ensuring the sustainable development of the territory. In this context, the planning mechanism of the transport and logistics cluster is of particular importance as a tool for optimizing the use of resources and increasing the competitiveness of regional transport systems (Sassi & Benabdelhafid, 2020).

Literaturereview

The literary review in the scientific article is an analysis of the works of domestic and foreign researchers on the research topic. In this case, the review begins with the definition of the concept

of «cluster» in an economic context, introduced by Michael Porter (Porter, 2005).He describes a cluster as a group of interconnected companies operating in a certain field and mutually complementary. Transport and logistics clusters have been identified, representing geographical concentrations of companies engaged in logistics operations. The classification of the principles of the formation of a transport and logistics cluster is given, based on the approaches described in scientific research (Raimbekov & Syzdykova, 2019; Syzdykbaeva, 2010; Postan & Stolyarov, 2015; Prokofieva, 2009; Doroshkevich, 2014).

The development of regions and individual territories is associated with the functioning of a transport and logistics cluster and transport systems based on existing infrastructure. The efficiency of transport systems and clusters reduces transport costs. The construction of mechanisms that determine the functioning of territorial transport systems is difficult due to the lack of decision-making tools for their design, management and reconstruction.Territorial transport systems operating within established boundaries are considered in (Korchagin & Rizaeva, 2015; Singh, Gurtu & Singh, 2021; Gerami & Kolik, 2014; Kovalev, Demidov & Boyarsky, 2008) as a set of sources and consumers of transport flows interacting on the basis of a single transport network to meet existing needs in cargo transportation.

In general, it can be said that the mechanism of functioning of the territorial transport system will be determined on the basis of a methodology for solving problems of structural analysis and synthesis of territorial transport systems with specified properties. Modern methods of analyzing and optimizing the parameters of the process of functioning of the territorial transport system are aimed at improving existing and developing interacting structural elements (Ha, Yang & Lam, 2019; Tararychkin, Slobodyanyuk & Nechaev, 2016; Slobodyanyuk & Gorobchenko, 2020; Slobodyanyuk, 2017).

Methodology

The analysis of the structure of territorial transport systems is carried out to determine the composition, properties, nature and features of the interaction of individual elements in the process of functioning, which allows us to assess the adaptability of such systems to solving problems determined by their intended purpose. The structure of the transport system in general may consist of three interconnected levels, differing in their composition and functions performed. However, the number of structural levels may be less than three, and the known methods of structural analysis do not allow us to unambiguously determine their number and composition, which creates difficulties in solving practical problems, including those related to the choice of optimal modes of operation.

The method of structural analysis of territorial transport systems is carried out in several stages:

1. On the basis of the existing scheme and the known nature of the interaction of individual elements, the composition of the local, regional and interregional levels of the analyzed territorial transport system is established in an assumed form.

2. Taking into account the existing traffic volumes, as well as the characteristics of the transport routes, the structure of the system is being clarified. To do this, the indicators of paired proximity are calculated, the structural index is determined, and the need to combine overlapping sets on the Y0X plane is estimated, if there is such an overlap.

3. After the implementation of all procedures related to the clarification of the composition of individual structural levels, their total number is determined. The application of this methodology is illustrated by the example of territorial transport systems at the regional level (Slobodyanyuk & Gorobchenko, 2020; Slobodyanyuk, 2017).

ResultsandDiscussion

The concept of «cluster» can have different interpretations depending on the context of its application. In the economic sphere, the term «cluster» was coined by Michael Porter in his work «Competition». According to Porter's theory, «a cluster is a group of geographically adjacent interconnected companies and related organizations operating in a certain area and mutually complementary»(Porter, 2005).

Approaches to the organization of logistics clusters are considered in the context of transport and logistics clusters. Attention is paid to defining the conditions and principles of cluster formation, their economic and legal aspects, organizational and economic mechanism of functioning, synergetic effect and development management. The conditions for the formation of a logistics cluster can be divided into six groups: economic, spatial, resource, institutional, infrastructural and competitive. The systematization of the conditions for the formation of a logistics cluster is shown in Figure 1 (Doroshkevich, 2014).

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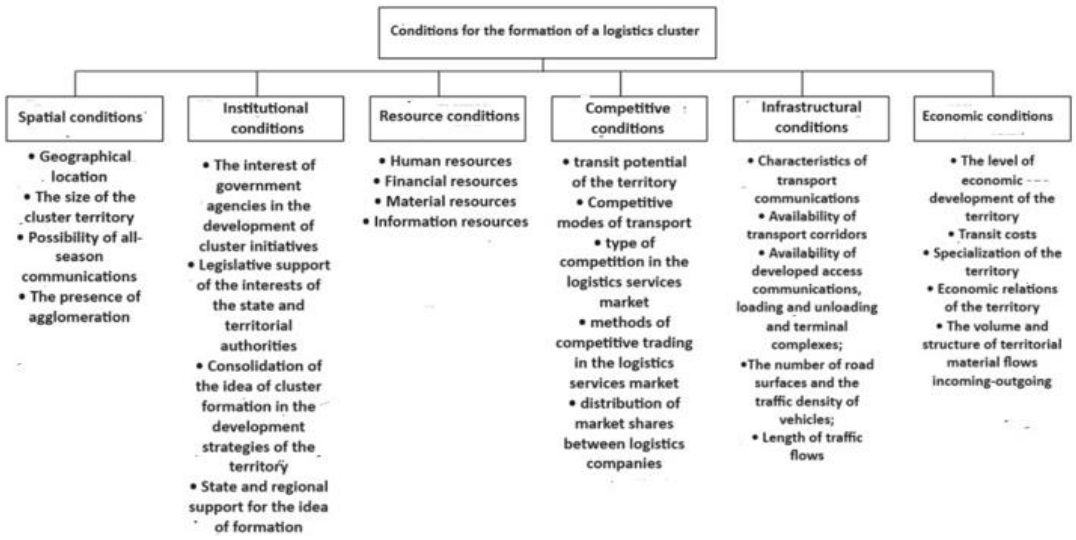

Figure 1. Systematization of conditions for the formation of a logistics cluster (Doroshkevich, 2014)

Analyzing the mechanisms of formation of a logistics cluster, it can be concluded that each of these aspects plays a critical role in the success and effectiveness of the cluster.

Economic conditions, such as the level of economic development, transaction costs and the volume of territorial flows, determine the demand for logistics services and market potential.

Infrastructure conditions, including the characteristics of transport infrastructure and the quality of road surfaces, significantly affect the cluster's ability to provide effective logistics solutions.

Competitive conditions, such as transit potential and competitive modes of transport, determine the cluster's market opportunities and its development strategy.

Resource conditions, including the availability of labor, financial, material and information resources, are key to ensuring the operational activities of the cluster.

Institutional conditions, such as government support and legislative support, stimulate cluster initiatives and ensure stability in its development.

Spatial conditions, including geographical location and accessibility of transport communications, determine the effectiveness of logistics operations in the cluster.

All these conditions are interrelated and important for the successful formation and development of a logistics cluster. The economic viability of the region, the availability of infrastructure and competitive advantages determine its potential to attract investment and develop the business environment. Support from the State and regional authorities, as well as willingness to cooperate in the implementation of cluster initiatives, is essential for the sustainable functioning and long-term success of the cluster. Special attention should also be paid to spatial conditions, since the geographical location and accessibility of transport communications can significantly affect the efficiency of logistics operations and the competitiveness of the cluster as a whole.

Transport and logistics clusters (TLC) are a geographical concentration of companies, enterprises and organizations engaged in various logistics operations such as transportation,

warehousing, transshipment, forwarding and others. These clusters also include companies that contribute to the development of the logistics services sector (Postan & Stolyarov, 2015).

The stages of TLC formation based on a systematic approach:

1. The formation of the institutional and organizational structure of TLC consists of the following tasks:

– creation of the coordinating council of the joint authority, business, science, both at the republican and regional levels;

– participation of public, private, innovative organizations, educational and research institutes, business associations, civil society institutions;

– implementation of the principles of openness and trust, that is, the formation of an «institution of trust».

2. Determining the type of cluster will allow you to set goals, directions of activity and development of the cluster, outline the range of tasks solved by the cluster, identify the specialization of clusters and the territorial aspect of cluster activity.

Setting preliminary goals and objectives for the synthesis of regional transport and logistics system (RTLS). Justification of the choice of the research object.

3. Identification of the composition of the cluster members:

– identification of all transport, forwarding, industrial, financial organizations included in the cluster, including within certain territories;

– identification of the final product (service) created by the efforts of all participants in the process from science and training to technologists, transport workers and dealer networks.

A systematic description of the object under study: goals, criteria and limitations of TLC activities in the region, the main functions of the object and its structural elements (links). Preliminary formation of the organizational structure of the TLC. Description of the main input and output parameters and the state of the external environment.

4. Quantitative analysis of the cluster and identification of the structure of interconnections of cluster participants:

– the number of employees and institutions involved in the sector of the proposed cluster;

– the proportion of local sectors in the cluster and their share in the region, country;

– the ratio of costs and revenues along the entire chain of the technological process from the supply of raw materials to the sale of products; the growth rate of cluster enterprises;

– development labor potential.

5. Analysis of the competitive environment and the innovative component of TLC:

– the presence of an innovative component is an integral part of any kind of clusters; innovation is a complex concept and includes both technologies themselves and innovations in educational and social processes, in public relations;

– conducting marketing of the region, attracting various types of businesses, specialists and professional workers;

– creating a cluster center conducting marketing research, developing a marketing strategy, identifying possible competitors at the national and global levels.

6. Synthesis of TLC. Synthesis of the optimal organizational structure of the TLC according to the selected system of criteria. Analysis and optimization of logistics costs in the system. Coordination of local and global criteria for optimizing the functional and organizational management structure. Formation of algorithms for optimal management of material, information, financial and service flows. Synthesis of TLC and algorithms for managing the cargo and commodity movement system. Evaluation of the quality of control algorithms.

7. Determining the success rate of the cluster. System analysis and consideration of alternatives to synthesized TLCs. Assessment of the main integral parameters of TLC functioning: reliability, stability, adaptability, economic efficiency. Assessment of the quality of transport and logistics services for end users. The final choice of the TLC option. At the same time, the possible scenario for the development of TLC is as follows. First, suppliers of the same transport and logistics services respond to increased competition by deploying horizontal integration with other

enterprises, which allows reducing production costs by increasing the scale of production or improving the specialization of the participants in the association. Secondly, enterprises connected by a sequence of stages of transport and logistics services are trying to increase competitiveness on the basis of vertical integration, which guarantees joint supply of services. Third, conglomerate-type associations are being created that reduce risks by diversifying activities. Fourth, targeted associations of medium and small firms are emerging to perform some common functions (marketing, advertising, forwarding, storage, etc.) (Figure 2.) (Raimbekov & Syzdykova, 2019).

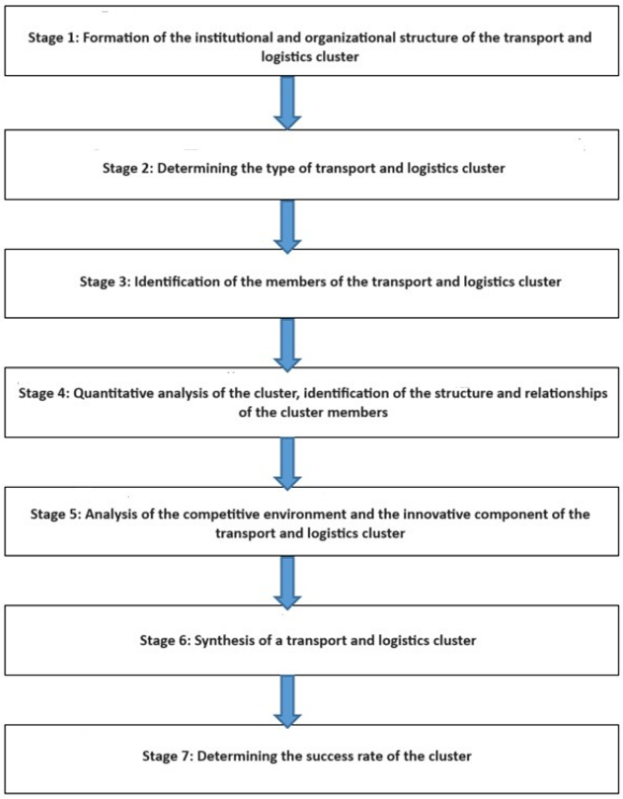

Figure 2 - Stages of formation of a transport and logistics cluster based on a systematic approach (Raimbekov & Syzdykova, 2019)

The stages of formation of a transport and logistics cluster (TLC) based on a systematic approach are a sequential process aimed at creating an effective organizational structure and cluster development:

At the stage of formation of the institutional and organizational structure, a coordinating council is being created, including representatives of government, business and science, and the principle of openness and trust is being implemented.

Determining the type of cluster allows you to determine its goals, areas of activity and specialization, as well as set preliminary goals and objectives of synthesis and justify the choice of the research object.

Identification of the composition of the cluster participants includes the definition of all organizations included in it and their relationships, as well as a systematic description of the object under study, taking into account the main input and output parameters and the state of the external environment.

A quantitative analysis of the cluster and the identification of the structure of the interrelations of the participants allows us to assess its development dynamics, labor potential and other key parameters. The analysis of the competitive environment and the innovation component is necessary to determine the competitiveness and innovation potential of the cluster.

TLC synthesis includes optimization of its organizational structure, analysis and optimization of logistics costs, formation of management algorithms and assessment of their quality.

Determining the success rate of a cluster includes a systematic analysis of its functioning and an assessment of integral parameters such as reliability, sustainability, economic efficiency and quality of services provided.

Thus, from the fact that the entire process of forming a transport and logistics cluster (TLC) is based on a systematic approach and is aimed at creating a stable and efficient transport and logistics system in the region, we turn to the fact that the structural synthesis of complex technical systems is carried out to find and form an optimal structure. This structure must comply with established principles and define design requirements for individual structural elements, ensuring effective solution of tasks defined by the purpose of the system (table1).

Table 1. The principle of regional transport and logistics clusters

Principle	Description	The main idea
A systematic approach	Requiring consideration of all cluster elements as interconnected and interacting in order to achieve the overall goal of the system functioning, while optimizing the functioning of not individual elements, but the cluster as a whole. From the point of view of a systematic approach, a cluster is a set of business entities of interconnected various industries united into a single organizational structure, the elements of which are interconnected and interdependent, and function together for a specific purpose.	The main idea of the author is that for the effective functioning of the cluster, it is necessary to apply a systematic approach in which all its elements are considered as interrelated and interacting to achieve a common goal. This approach is aimed at optimizing the operation not of individual cluster components, but of the entire cluster as a whole. A systematic approach to the cluster allows us to consider it as an association of business entities of various industries that work together to achieve a certain goal.
The principle of synergy	A cluster is nothing more than a specially organized space that allows large firms, small enterprises, suppliers (equipment, components, specialized services), infrastructure facilities, research centers, universities and other organizations to successfully develop. At the same time, it is important that, first of all, a synergistic effect is achieved in the cluster, since the participation of competing enterprises becomes mutually beneficial.	The main idea of the author is that a cluster is a special space that contributes to the successful development of various organizations, including large firms, small enterprises, suppliers, research centers and others. It is important to note that a synergistic effect is achieved in the cluster, since the participation of competing enterprises brings mutual benefits.
The principle of territorial localization	One of the distinctive features of the cluster in the general model of production cooperation and other interactions of business entities is the principle of territorial localization. However, it should be understood that the geographical scale of a cluster can vary from one city, region to a	The author emphasizes that one of the characteristic features of the cluster is its territorial localization. However, it is important to keep in mind that the geographical size of a cluster can vary from a small city or region to an entire country or even several neighboring

	country or even a number of neighboring countries.	countries.
The principle of cluster efficiency	It consists in achieving the main goals: increasing the profitability of the region and ensuring employment of the population. These statements are confirmed by successful experience in a number of countries.	The author highlights the basic principle of cluster efficiency, which consists in achieving two main goals: increasing the profitability of the region and providing jobs for the population. He emphasizes that these claims are supported by successful experiences observed in several countries.
The principle of universal quality and competitiveness management	Based on the maximum satisfaction of market demand in the quality of goods and services provided to end users, as well as ensuring the reliability and efficiency of the functioning of each element of the logistics system individually and the system as a whole	The main idea of the author is the principle of universal quality and competitiveness management, which is based on meeting market demand for goods and services, ensuring the reliability and efficiency of each element of the logistics system, as well as its whole.
The principle of sustainability and adaptability	according to which the logistics system must function stably with changes in internal and external environmental factors.	The main idea of the author is that the logistics system should be able to function sustainably with changes in internal and external conditions. This means that it must be adaptive and flexible to deal effectively with variable environmental factors such as changes in demand, technological innovations or economic conditions.
Note: compiled by the author based on the source (Syzdykbaeva, 2010)		

The TLC formation program should contain an analysis of the state of the transport complex and the TLC of the region, the territorial structure of the economic complex of the region and its territories, the place of the transport complex in the economy of the region, the justification of the goals and objectives of the TLC creation and the main directions of their solution, the recommended most effective measures for the implementation of the TLC formation program and the deadlines for their implementation (Raimbekov & Syzdykova, 2019).

In turn, the formation of territorial transport systems consists of several stages, including the above-discussed TLC:

1.Basic stage (warehouses, terminals and distribution centers);

2.Stage of transport and logistics centers (TLCs) (international, regional, local);

3. The stage of regional transport and logistics systems (RTLS) (vertically integrated TLCs).

The regional transport and logistics system (RTLS) is understood as a set of functional and supporting subsystems consisting of numerous interacting and interconnected objects - elements of the commodity distribution network of the region, ensuring the realization of the common goal of the system's functioning, consistent with regional socio-economic goals and obtaining maximum synergetic effect based on the integration of material, service, financial and information flows (Prokofieva, 2009).

In the future, the improvement of stage 3 will form a unified national transport and logistics system (UNTLS).

The unified national transport and logistics system (UNTLS) is a comprehensive integrated system covering all types of transport and logistics operations in the country. It is a combination of infrastructure, vehicles, logistics services, as well as information and management resources to ensure efficient and safe transportation of goods and passengers inside and outside the country.

The purpose of the UNTS is to increase the efficiency and competitiveness of the country's transport and logistics system by:

–Integration of various modes of transport and logistics services;

–Reduction of cargo delivery time;

–Reduction of logistics costs;

–Improving the quality of transport and logistics services;

–Development of Kazakhstan's transit potential.

The content TLC, TLCs, RTLC, UNTLS defines the scheme of the territorial transport system, which includes both regional and transit cargo flows.

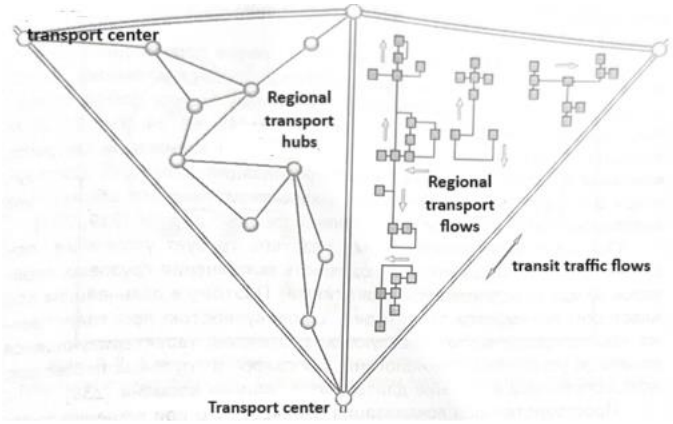

Figure 3. The scheme of the territorial transport system, which includes both regional and transit cargo flows (Slobodyanyuk, 2017)

The peculiarity of the structural synthesis of multilevel transport systems is associated with the need to perform a number of sequential optimization procedures, starting from the lowest structural level and using appropriate target functions.

In the future, when solving structural synthesis problems, we will assume that the functioning of multilevel systems is associated with the presence of the following number of operational features.

1. Economic activity and interaction of local enterprises lead to localization of production cargo flows mainly at the local level.

2. Freight transit is carried out mainly along transport corridors, which play a connecting role in interregional communication. At the same time, such cargo flows that pass through interregional transport centers are considered transit (Fig. 3), and their contribution to the total volume of traffic between such centers turns out to be decisive.

The presence of these features simplifies the procedure of structural synthesis of transport systems and allows their formation consistently at the local, regional and interregional levels, while unconditionally observing the principle of integrity of the entire system.

Thus, the structural synthesis of systems and the solution of issues related to multiparametric optimization must be carried out starting from the local level, which, regardless of the purpose of the territorial transport system and the total number of levels, is the basic one (Slobodyanyuk & Gorobchenko, 2020; Slobodyanyuk, 2017).

In accordance with the principle of territorial localization discussed in table 1, it is fair to note the following levels of the territorial transport system:

1.Local level;

2.Regional level;

3. Interregional level.

In the creation of regional transport and logistics clusters, common methodological principles are applied, including a systematic approach, synergy, territorial localization, efficiency, universal quality and competitiveness management, as well as sustainability and adaptability. These principles help to optimize the functioning of the cluster as a whole, create mutually beneficial relationships between participants, achieve goals such as increasing the profitability of the region and ensuring employment, meeting market demand, ensuring the reliability and efficiency of the logistics system (Ha, Yang & Lam, 2019).

Let's consider the features of the synthesis of the regional level of the transport system, as a process of combining individual cluster nodes into a single network (Fig. 4).

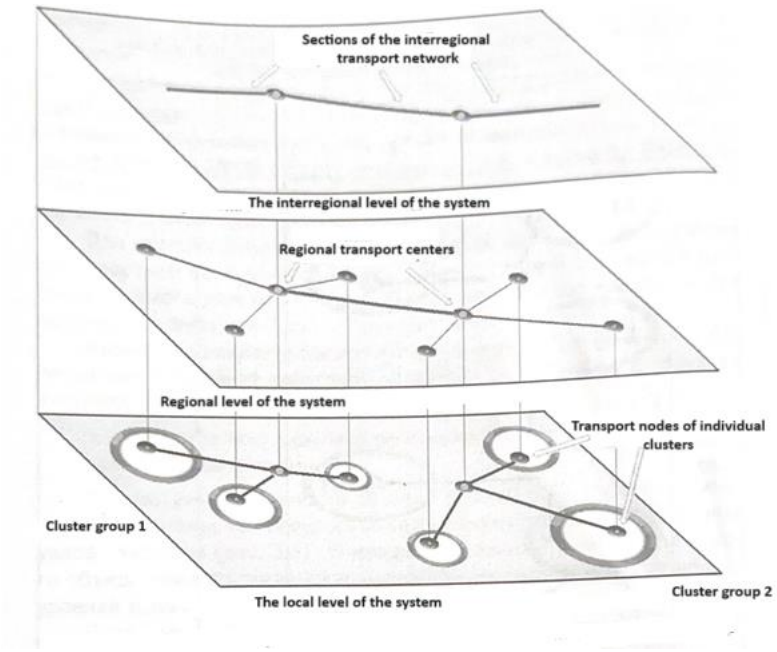

Figure 4. Structural levels of the territorial transport system and the nature of their mutual connection (Slobodyanyuk, 2017)

Obviously, it is as a result of such a combination that the possibility of interaction between different levels and the integrity of the entire system is achieved.

Since the main transport work at the local level is carried out within the boundaries of clusters, and the volume of traffic between clusters is relatively small, then at the regional level of the synthesized system, the total length of connecting routes should be as minimal as possible.

The implementation of the principle of the minimum total length of transport routes at the regional level is advisable, since it reduces the cost of creating and maintaining the entire transport system at this level. In this case, the solution of the problem of synthesis of the regional level is associated with the need to minimize the total length of all transport routes belonging to this level of the system:

$$Ip = \sum_i Ii - \min$$

Where, li - is the distance between nodes of individual clusters combined into a single regional network.

The creation of regional transport and logistics clusters is based on the following general methodological principles.

Let's consider an example of the synthesis of the regional level of a transport system for a group of three nearby clusters K1, K2 and K3, the characteristics of which are shown in Fig. 5. The figure 5 also shows options for possible connection of nodes of the listed clusters.

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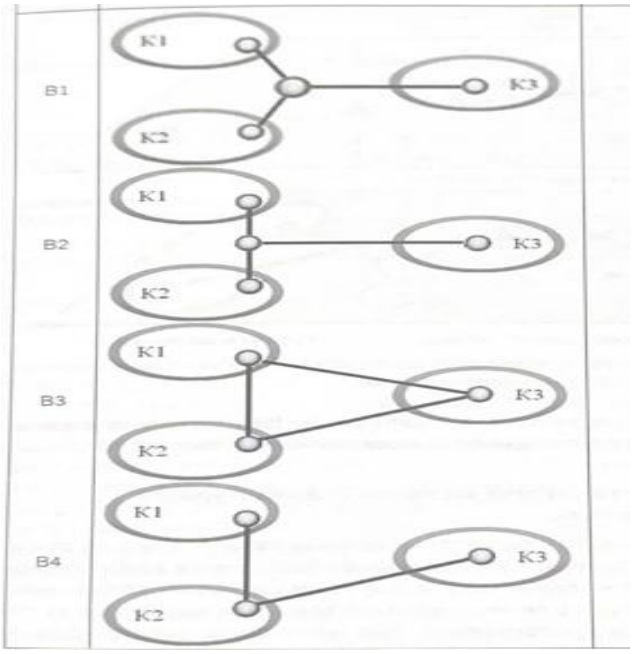

Figure 5. Comparative characteristics of various options for the formation of the regional level of the transport system (Slobodyanyuk & Gorobchenko, 2020; Slobodyanyuk, 2017)

Within the framework of the synthesis methodology under consideration, the choice of a set of transport routes for the analyzed group of clusters should be carried out in accordance with option B1, since it is in this case that the total safety of all transport routes turns out to be the least.

Conclusions.

The article emphasizes the importance of territorial transport systems for ensuring economic activity and social connectivity at both local and regional, interregional (transit) levels. These systems are complex infrastructure networks that ensure the movement of people, goods and services within certain geographical areas. To form effective territorial transport systems, an integrated approach is needed, taking into account a variety of factors such as geographical features, population, economic activity and transport needs.

In today's dynamic economy, special attention is paid to the development and optimization of transport and logistics systems at the regional level. The formation of efficient transport and logistics clusters is becoming a key factor for ensuring the sustainable development of the territory. The importance of the planning mechanism for transport and logistics clusters is emphasized as a tool for optimizing the use of resources and increasing the competitiveness of regional transport systems.

The article also raises questions that approaches to the organization of logistics clusters and their formation should take into account a number of conditions and principles, such as economic, spatial, resource, institutional, infrastructural and competitive. Transport and logistics clusters represent a geographical concentration of companies and organizations engaged in logistics operations, and are an important factor for the development of the logistics services sector.

Also in the article, a new definition of the unified national transport and logistics system (UNTLS) is introduced and the methodology of structural analysis is applied to study the stages of formation of territorial transport systems. The stages of the formation of territorial transport systems, the stages of the formation of a transport and logistics cluster based on a systematic approach are discussed, emphasizing the importance of the structural synthesis of multilevel transport systems. This process requires consistent optimization and consideration of various operational features at the local, regional and interregional levels in order to ensure the sustainable and efficient functioning of the transport and logistics system in the region.

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SOCIAL NETWORK AS A MARKETING TOOL IN THE PROMOTION AND SALE OF AGRICULTURAL PRODUCTS

Ibrayeva L. M.[1], Sartova R. B.[2]
[1] 1st year doctoral student, al-Farabi Kazakh National University, Almaty, Kazakhstan
[2] c.e.s, docent, al-Farabi Kazakh National University, Almaty, Kazakhstan
E-mail: lavrenti_pvl@mail.ru (corresponding author)

Abstract: Currently, SMM (Social media marketing) is gaining rapid popularity, social networks are actively introduced into our daily life, taking up all the free time of people.We are used to choosing, buying, exploring the internet everything that interests us.Because of these habits, sales companies are forced to keep up with the Times and be on the same page with the client.To gain customer loyalty and attention, you must be up-to-date and meet the demands of modernity.In the article, the place and importance of marketing in the promotion and sale of agricultural products is emphasized.

Keywords: Social media, target audience, agricultural products, digital marketing, promotion and sales.
JEL: G01. G39. 042

Introduction

Digital marketing is relevant and plays an important role in the success of an agricultural business. It helps agricultural producers promote their own products, gain valuable information about consumers, and improve important processes related to the sale and delivery of their products.
Digital marketing in agriculture is the marketing of goods and services using digital technologies. It is used at all stages of interaction with customers in the B2C and b2b segments. Unlike online marketing, digital marketing also includes offline channels. The effectiveness of this direction is due to close interaction with customers and coverage of the target audience. Digital marketing is actively used to promote popular brands. With digital marketing, you can captivate a company's sales through marketing tools, such as: target advertising, contextual advertising, content strategy, SMM, all this is possible thanks to digital marketing, digital marketing now all businesses do business through internet marketing, finding customers via the internet, selling via the internet, accepting payments via the internet. In addition, digital marketing is the process of promoting goods and services through digital communication channels, such as the Internet,social media, mobile applications, and email. It involves the use of various tools and technologies, such as SEO, content marketing, contextual advertising, email marketing, SMM, analytics, and other methods to create leads and increase sales. Digital marketing is an integral part of modern business and helps companies achieve their goals in an online environment.

Digital marketing in agriculture helps businesses in several ways:

Attracting new customers: digital marketing allows companies to reach a wider audience that uses the Internet and social networks to find products and services.

Increase sales: digital marketing allows companies to increase sales through the efficient use of various communication channels and promotion methods.

Improving brand image: digital marketing allows companies to create a positive brand image by informing potential customers about products and services, as well as communicating with them through social networks and other channels.

Reducing marketing costs: digital marketing allows companies to reduce marketing costs because it requires fewer physical resources and can be more effective than traditional marketing methods.

Results analysis: digital marketing allows companies to analyze the results of their marketing campaigns, which allows them to improve their strategies and achieve better results in the future. For a small business to survive on the internet, it needs the right tools for online marketing. It sounds dramatic, but with these tools, the business grows faster, because it does not

waste precious time on everyday life and without them at least lags behind competitors. We have compiled a list of the main internet marketing tools for various tasks-finding customers, selling, creating an image, evaluating performance. There are dozens or even hundreds of effective digital tools, so we chose one from each category as an example. To improve marketing technologies for promoting products on the internet, you can use the following methods:

Data usage: collecting and analyzing data on user activity on the Internet allows you to fine-tune targeted advertising and improve conversions.

Use of social networks: social networks are one of the most effective channels for communicating with potential customers. It is necessary to use social networks to build a community around the brand and interact with customers.

Content use: content marketing is one of the most effective ways to attract customers online. It is necessary to create high-quality and interesting content that will attract the attention of potential customers.

Use of mobile technologies: mobile devices are becoming more and more popular among internet users. To create a mobile version of a site or application that is convenient to use on mobile devices, you need to use mobile technologies.

Using automation: automation of marketing processes can significantly reduce the time and cost of marketing campaigns. It is necessary to use automation to manage advertising campaigns, send email newsletters and other marketing processes.

Digital marketing allows agricultural producers to develop new formats for selling their products, such as online stores, personal cabinets and mobile devices. These new formats provide consumers with convenient access to products, which creates additional opportunities to increase sales**.**

Literature Review

Several authors and research groups have been researching the use of social media in marketing agricultural products. Some of them include:Matthew J. Baker and G. Alan Sturdivant, who conducted the study "Social Media in Agriculture: Usage and Perception among Salespeople in South Carolina." Their work examines the specifics of the use of social media in agriculture and their impact on marketing and sales. Another author, John Kasner, in his work "The use of social networks in agriculture: Assessing opportunities and obstacles", analyzes the advantages and limitations of using social networks for marketing agricultural products. Alexander Saveliev and Tatyana Lunina in the article "Social networks as a marketing tool in agribusiness" explore the effectiveness of using social networks to promote and sell agricultural products, as well as strategies for using social media in agribusiness.These studies present various aspects of the use of social media in agriculture and product marketing, as well as help to understand trends and prospects for the development of this area.

Methodology

There is a growing number of companies that are developing their business through online sales. Recent digital marketing statistics suggest that U.S. mobile advertising spending will reach $156.38 billion by 2023, slightly exceeding the projected $155.26 billion before the coronavirus pandemic (Nasakaeva B.E., Stozharova K.S., 2020).

Digital marketing statistics related to the pandemic show a slowdown in the growth of mobile advertising costs in 2020, as companies reduce previously planned marketing campaigns. However, it is expected that the growth in the use of mobile phones by consumers will accelerate the development of digital advertising in the next few years. Global digital advertising spending is expected to reach $389.29 billion in 2021 (Statista, 2020). This is 17% more than in 202, when annual growth slowed due to economic problems caused by the coronavirus pandemic (Anikin, B.A., 2011).

Global digital marketing spending of $332.84 billion in 2020 increased by just 2.4 percent over the year. However, in the next few years, growth will grow again with constant growth.2022 is expected to be another year of strong growth, as digital advertising spending increased by 13.3% to $441.12 billion. Global digital advertising spending is projected to range from half a trillion to 524.17 billion dollars by 2024. For comparison, this is 85.7% more than in 2018.

The digital marketing statistics that we have talked about so far should show how popular online marketing is for businesses. But how common is this in the general system? After all, traditional (offline) marketing still exists.

According to the latest digital marketing statistics, online marketing costs account for 46% of total global spending on advertising in 2021 (WebStrategies Inc, 2020).The exact proportion for each company varies according to factors such as sector, expansion strategy, target market, etc. (Vekshinsky A. A., Tyvin L. F., 2017).

For example, it is expected that traditional businesses, especially those aimed at the older generation, are less likely to be online, will have balanced investments in online and offline marketing. On the other hand, the Online e-commerce business relies more on digital marketing.However, online marketing is becoming more popular than traditional marketing. In fact, online advertising spending is expected to more than double in 2021.

It is impossible to talk about digital marketing statistics without talking about Facebook. With an advertising audience of 2.14 billion people, it is the default marketing platform for many e-commerce businesses.Its growing popularity means that the company is showing impressive growth in advertising revenue. Recent Facebook advertising statistics show that the company's revenue from the advertiser increased by 22 percent in the third quarter of 2020 to $21.2 billion. This is 21.8% more than in the third quarter of 2019 (Alekseev I.V., 2014).

Advertising revenue has long accounted for a large portion of Facebook's total revenue. In the same quarter, the company's total revenue was $21.5 billion. In other words, 98.84 percent of Facebook's revenue comes from advertising.

In 2020, Tik Tok's user base grew by 75% in just nine months. It didn't bring more money into any other app. In 2021, 44% of advertisers intend to increase their advertising spending on Tik Tok this year (WARS, 2021). This is five percentage points behind Facebook, which is commonly referred to as the “king of social media (Bolshakova L.V., 2017).

Results and Discussion

SMM (Social Media Marketing) is a social media method that appeared relatively recently in the mid-2000s. SMM consists of the actions of a social media marketer. This includes participating in discussions, presenting interesting articles to friends and acquaintances, posting publications, and creating events.

In 2006, webmaster Rohit Bargava introduced the concept of SMO (Social Media Optimization) - a system for optimizing social sites, a little later the term SMM (Social media marketing) began to be used – marketing efforts in social networks. Today, both of these tools, along with SEO, are the most effective methods of promoting goods, services and direct sites on the Internet (Anikin, B.A., 2011).

The main focus of SMM advertising is on SEO advertising. SEO focuses on promotion through interaction with the search engine, while SMM promotion has a special impact on people, taking into account their psychology, interests, habits, mood. Let's look at these concepts in more detail in Figure 1:

SMO	SMM
To optimize the site for its further promotion in social systems, work (analogous to internal optimization in SEO). In other words, the site provides users of social networks (Social networks in general) with the opportunityto find what interests you, tag it, tell friends about the site, etc.	Unlike SMO, all SMM promotion activitiesadvertised are conducted off-site and consist in the implementation of marketing activities on social networks. In other words, SMM is the promotion of a website through direct interaction with the target audience, which involves a social space.

Figure 1. SMO and SMM promotion concepts

There are several ways to promote SMO and SMM. The main ones are shown in table 1 below.

Table 1. The main methods of promotion

The main methods of promotion	
SMO	SMM
Working with content. The goal is to use it on social media or communities. To make them interesting to the users of one, therefore they must be written.	Work with advertising on the site at the expense of thematic resources with the ability to link to the blog.
Creating an interface. Creating a colorful design, original and attractive interface.	The ability to create a thematic public on social networks in order to attract and interest the user to go to the advertised site.
Creating special channels for clients. For example, these can be keys that allow you to automatically move content from site pages to your blog.	By attracting the attention of the network user to access the advertised site, creating provocative and vivid themes.
Creating an opportunity to communicate with users on the site by creating a chat, forum, comments, etc.	Buying bots, likes on social networks to attract attention to the content.
Note: compiled by the author.	

Each of the above methods has its own tools for development and implementation methods. All these activities are aimed at comfortable use of the site on social networks, which contributes to the maximum possible advertising of users among friends and acquaintances.

In addition, the methods discussed above may have different subgroups, which may include new exclusive methods. But the main purpose of SMM advertising remains unchanged-to create a good reputation on the site, attract and recognize the target audience from the social space.

In Table 2, we have studied the advantages and disadvantages of SMM advertising.

Table 2. Advantages and disadvantages of SMM advertising

Advantages of SMM	Disadvantages of SMM
Low cost. The cost of attracting one visitor compared to using other services is relatively low.	Lack of information in analytics. Currently, it is not very easy to find out and analyze the actions of visitors on the page. It's hard to say where and from which services they found out and went to a certain page. Unfortunately, analytical sites, we offer Yandex or Google Analytics yet. Everything here depends on the control and intuition of the marketer.
High exposure to the virus. Through the viral effect of spreading information in a short time, the viewing of your page can be increased.	Control by the moderators of the network. You can easily stop excessive activity on your page or freeze the page.
Good development prospects. As you know, social networks are actively developing. Every minute there are more and more users, and this number is constantly growing.	The presence of the advertised brand or website. If the advertised brand is audible, then it is much easier to convey the necessary information to a potential client through it and vice versa.

Low competition. Large companies are not investing much in social media yet, so with less money you can get positive results for your business.	An administrative necessity. To keep a social group alive, you need to devote a lot of time.

Today, social networks are very popular and growing among Internet users. In a few years, the audience of such communities has grown to tens of millions of visitors. People like it and it's convenient to communicate, get a lot of information, immediately learn something new, learn from friends.

Conclusion:

As a result of the research, we were convinced of the relevance of the chosen topic and this work: now social networks are beginning to develop in this perspective.

Each stage of the work met the requirements of the tasks set. All the tasks set at the beginning of the study were consistently performed.

There are several reasons to use social media to promote agricultural products, especially when production is carried out in remote areas:

1. A growing number of social media users. Social networks have long gone beyond simple means of communication and have become platforms for advertising goods and services.The number of social media users is constantly growing, which opens up new opportunities for agricultural producers.
2. Availability. Social networks are available for use almost anywhere in the world, which facilitates access to the audience for both farmers and consumers.
3. Low costs. Placing advertising materials on social media usually costs much less than traditional advertising methods such as outdoor advertising, newspaper advertising or television advertising.
4. Establishing close contacts with manufacturers. Social networks provide

the opportunity for farmers to create close contact with consumers, monitor opinions and requests, as well as receive feedback from customers.

5. Ease of use. The use of social networks to advertise agricultural products does not require special knowledge or skills and can be carried out independently.

All these factors make social networks one of the most effective and affordable means to promote agricultural products, especially for agricultural producers who conduct their production in remote areas.

SMM is a new, but very promising way to promote goods and services through forums, the blogosphere, social networks, instant messaging services, that is, all social media channels available today.

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NEW KNOWLEDGE ABOUT THE TYPOLOGY OF MONOCITIES

Tovma N.A*.,Akimbaeva K.T.
Al-Farabi Kazakh National University, Almaty Kazakhstan
*E-mail: nataliya-tovma@mail.ru

Abstract. The goal is to study the typology of single-industry towns in order to gain new knowledge about single-industry towns. The study used the method of systemic bibliometric-network analysis, which allows to make a comprehensive analysis of scientific literature and determine the main theoretical foundations and identify gaps in the study of the revival of single-industry towns. Results: the factors influencing the development of single-industry towns have been studied, the typology of single-industry towns in the Republic of Kazakhstan has been disclosed. Despite the many types of single-industry towns, it is possible, from the standpoint of their classification according to the concept of the "mono-city life cycle", to single out groups of cities with the same development model, therefore, the process of forecasting and planning the socio-economic development of a mono-territory will not only become the most reliable, but will also allow the development of such development programs, which will be feasible and feasible in real conditions.

Key words – single-industry towns, classification of single-industry towns, small towns. Introduction.
JOD codes 651.1, 06.52.35

Introduction.In modern conditions, special importance is attached to the development of single-industry towns.The relevance of the research topic is due to the need to improve the process of modernization of single-industry towns as an important condition for their sustainable socio-economic development.The formation of a fundamentally new paradigm for the development of society is based on the economy of innovation and technological renewal institutions.Scientific concepts are becoming relevant, allowing to rethink the role and key areas of development of single-industry towns.In this regard, of particular importance is the need to develop a theory and methodology for managing the factors of sustainable socio-economic development of the territories of single-industry towns, the development of evidence-based recommendations for improving the management of their modernization.

Literature review.The problem of the development of single-industry towns was dealt with by such scientists as in the Republic of Kazakhstan as: Shedenov U.K., Myrzaliev B.S. Among the scientists of the near abroad, this problem was dealt with by such scientists as: Antonova I. S., Turgel I. D., Zinovieva V. V., Omarova G., Sembay N., Niyazbekova N., Krupnov U., Koshetkov I., KrutikovV.K., Dorozhkina T.V., Tyutin D.V., Yakunina M.V., Khlestova K.S., Voronov A.S., Uskova, L.G., Iogman, S.N.Tkachuk, A.N.Nesterov, N.Yu.Litvinova, Sokolinskaya, Yu.A., Ivashkin, D.N.Lapaev, D.A.Kornilov, V.V.Bespalov. Among scientists from far abroad, this problem was dealt with by such scientists as: Harris R. However, despite the contribution of scientists, there are still unexplored factors affecting the development of single-industry towns and the very classification of single-industry towns.

Methodology.The study used the method of systemic bibliometric-network analysis, which makes it possible to make a comprehensive analysis of scientific literature and determine the main theoretical foundations and identify gaps in the study of the revival of single-industry towns.In addition, a retrospective analysis of single-industry towns was applied to develop a unified approach to this concept.

Results and discussions.The factors influencing the development of single-industry towns are studied. Various factors influence the development of single-industry towns. Figure

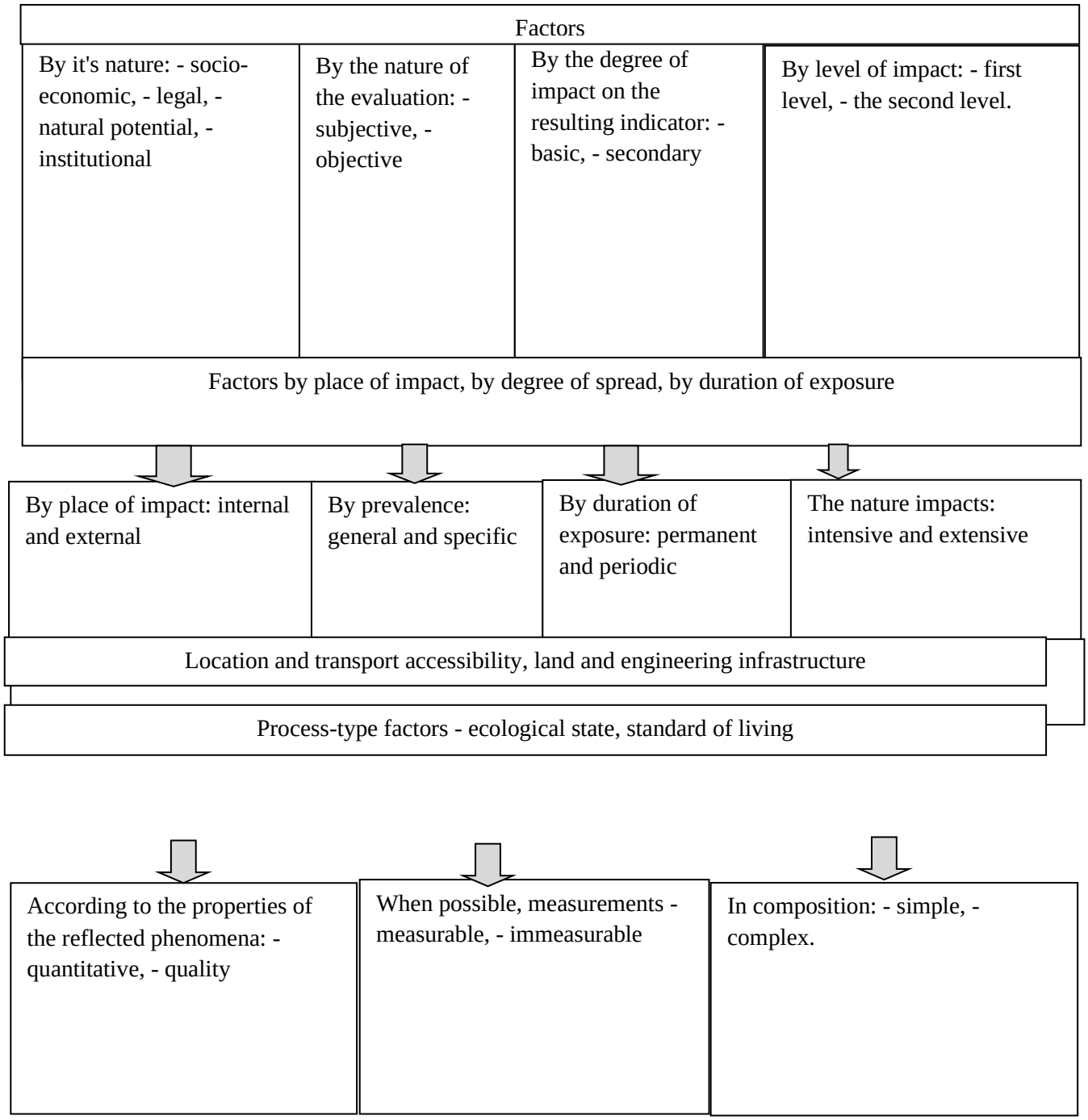

Figure 1 - Factors influencing the development of single-industry towns
Note - developed by the author.

In this case, the factors can be divided into several levels.Factors of investment attractiveness of the city, the industry belong to the factors of the first level.These factors are subdivided into factors of investment potential and investment risk.In turn, each factor of the investment potential is determined by factors of the 3rd level, various potential factors, for example, production, infrastructure, consumer and other potentials form the investment potential.At each level, a weighting coefficient is determined, reflecting the different significance of each factor in determining the factor of a higher level.However, these factors have not been studied in the literature.We have made an attempt to develop a classification of factors influencing the development of single-industry towns. We believe that a single-industry town requires a dual grouping of socio-economic potential factors for the development of a single-industry town, which

is based on factors of a process and resource type that diagnose investment (location and transport accessibility, size and structure of the economy, the state of business, administrative structure and social (labor resources), natural resources, ecological state, standard of living of the population) attractiveness of the territory. Such a classification of factors expands the concept of single-industry towns. Based on the identified factors affecting the development of single-industry towns, it is possible to determine the development indicators of single-industry towns.- economic potential.The typology of single-industry towns of the Republic of Kazakhstan is revealed. The most interesting is the classification of single-industry towns from the standpoint of their life cycle. In his works, I.D.Tourel studied the trajectories of the life cycle of the mono-settlement specialization [4], but he did not link all the factors influencing the trajectory of the life cycle of single-industry cities.To complete the study, the life cycle of single-industry towns must be considered from the standpoint of three approaches: from the standpoint of the cyclical nature of single-industry production and from the standpoint of the cycle of a single-industry town as a settlement in the structure of the region, as well as from the standpoint of self-sufficiency at the corresponding stage of the life cycle.According to the classical definition, the life cycle of any system is the lifetime of this system.The concept of the life cycle describes the chronology of the development of the system from the moment of inception to the end of life.According to the methodology of I. Adizes, the life cycle of an organization is based on the fundamental law of life cycle stages and behavior patterns of organizational systems as living organisms [5].At each stage of the development of an organization, the system faces a certain set of challenges and complications.The success and development of any organizational system, including single-industry towns as representatives of the socio-economic system, is determined by the ability to predict the model of transition from one stage to another and by competent planning of control actions in the form of a development strategy for a single-industry territory. Therefore, it is necessary to consider the existing classification of single-industry towns from the point of view of the “life cycles” approach (figure). First, the classification of mono-settlements depending on the form of the life cycle trajectory of their functional specialization is extremely important for assessing the prospects for innovative development of the corresponding territory.The fact is that such a trajectory initially acts as a kind of signal about the level of innovativeness of the city-forming enterprise at a certain point in time and about its capabilities for the production of innovative products.In addition, the study of such trajectories makes it possible to assess how receptive a city-forming enterprise is to the latest scientific and technological achievements at different stages of its development. Secondly, the classification of single-industry towns according to the period of the life cycle will make it possible to combine the identified opportunities of a single-industry town with the prospect of development. Thirdly, the classification of single-industry towns according to their ability to self-regulate, taking into account the stage of the life cycle, makes it possible to predict the development model of a single-industry town in dynamics. Thus, despite the many types of single-industry towns, it is possible, from the standpoint of their classification according to the concept of the “mono-town life cycle”, to single out groups of cities with the same development model, therefore, the process of forecasting and planning the socio-economic development of a mono-territory will not only become the most reliable, but will also allow developingsuch development programs that will be feasible and feasible in real conditions.

There are 4 groups of single-industry towns: 1) single-industry towns of the agglomeration belt of development, 2) single-industry towns of the industrial development belt, 3) single-industry towns of the peripheral zone of development, 4) science cities. (E.G. Ivashkin, D.N. Laptev, D.A. Kornilov, V.V. Bespalov, 2020) Shedenov U.K., Myrzaliev B.S.Monotowns are classified 1) According to the current state of city-forming enterprises: in 19 cities they are functioning;in five - they function partially, in three cities the enterprises do not function. 2) By population: from 100 to 200 thousand - 4 cities, 50-100 thousand - 9 cities, up to 50 thousand - 14 cities. 3) By sectoral orientation: 1) processing-chemical - Serebryansk, etc.;2) metallurgical - Aksu;3) coal mining - Ekibastuz, Abay, Shakhtinsk, Saran;4) oil and gas production - Zhanaozen, Kulsary, Aksai;5) mining of metal ore - Arkalyk, Balkhash, Zyryanovsk, Karazhal, Kentau, Lisakovsk, Ridder, Rudny, Tekeli, Khromtau;6) extraction of other types of raw materials - Zhanatas, Zhetikara, Karatau and

Stepnogorsk;7) scientific and experimental centers - Kurchatov.At the same time, 8 single-industry towns are located in the Karaganda region, 4 single-industry towns in the East Kazakhstan and Kostanay regions, 2 single-industry towns in the Zhambyl and Pavlodar regions.In terms of sectoral orientation, single-industry towns are mainly represented in the extractive sector of the economy.In terms of population - 4 single-industry towns with a population of 100 thousand to 180 thousand people, 9 - from 50 thousand to 100 thousand people and single-industry towns with a population of up to 50 thousand people. 4) A conceptual approach to solving the problems of single-industry towns is the grouping of single-industry towns into cities with high, medium and low economic potential.The criteria for classifying cities as single-industry towns with high, medium and low potential are the presence of a city-forming enterprise and the availability of a resource base for the future, self-sufficiency of the budget, the location of single-industry towns at the intersection of major transport corridors, the location of a single-industry town near a large city or as part of an agglomeration, and the potential for economic diversification, the possibility of providing a wide range of services to adjacent settlements, a high proportion of active small and medium-sized businesses, the negative dynamics of the migration balance over the past ten years, the deterioration of social engineering infrastructure, and the environmental situation.(ShedenovU.K., MyrzalievB.S., 2013).

According to the results of the analysis, in 19 single-industry towns the city-forming enterprises work stably, in 5 - partially (Stepnogorsk, Karatau, Zhanatas, Saran, Arkalyk), in 3 - do not work at all (Tekeli, Kentau, Serebryansk). Krutikov V.K., Dorozhkina T.V., Tyutin D.V., Yakunina M.V. classify single-industry towns: by the time of occurrence, depending on socio-economic processes, by types of single-industry towns, by areas of predominant distribution (Krutikov V.K.., Dorozhkina T.V., Tyutin D.V., Yakunina M.V., 2017). Krutikov V.K., Dorozhkina T.V., Tyutin D.V., Yakunina M.V., several types of single-industry towns are distinguished according to their structural features: Mono-profile satellite cities of large cities; Mono-profile cities with several city-forming enterprises; Mono profile cities with one city-forming enterprise. As noted by Idrysheva, Z., Tovma, N., Abisheva, K.-Z., Murzagulova, M., Mergenbay, N., it is necessary to take into account the factors of digital development in territorial development and single-industry towns in particular.(Idrysheva, Z., Tovma, N., Abisheva, K.-Z., Murzagulova, M., Mergenbay, N., 2019). As noted by Tovma, N., Nurgalieva, G., Dzhakisheva, U., ...Ussabayev, A., Aristambayeva, A. In addition, it is necessary to take into account the development of public-private partnerships in the development of a single-industry town.(Tovma, N., Nurgalieva, G., Dzhakisheva, U., ...Ussabayev, A., Aristambayeva, A., 2019). According to Niyazbekova, S., Anzorova, S., Tochieva, L., ...Dzholdosheva, T., Supaeva, G., it is necessary to take into account the environmental factor influencing the development of single-industry towns.Many cities are in an ecological disaster and this factor affects the development of single-industry towns.(Niyazbekova, S., Anzorova, S., Tochieva, L., ...Dzholdosheva, T., Supaeva, G., 2023) As noted by T.V.Uskova, L.G.Iogman, S.N.Tkachuk, A.N.Nesterov, N.Yu.Litvinov distinguish monotowns satellites, monotowns with one city-forming enterprise, monotowns with several city-forming enterprises (T.V. Uskova, L.G. Iogman, S.N. Tkachuk, A.N. Nesterov, N.Yu. Litvinova, 2012). A monotown is classified as: city-settlement, science city, technopolis, industrial city, agro and port cities, closure of administrative territories, garrison city (Sokolinskaya Yu.A., 2020).At the same time, it appears that the proposed classification is clearly insufficient for the formation of a complete and complete presentation of single-industry towns.The problem of classifying single-industry towns is of great importance from the point of view of theory and practice, since, reflecting the features of their functioning, they are the basis for developing approaches to solving their problems and ensuring development.Monotowns differ significantly from each other in terms of industry, the number of residents, proximity to large cities and the level of economic development.In this regard, agreeing with a number of studies, we propose to use the following criteria for the classification of single-industry towns (Figure 1)

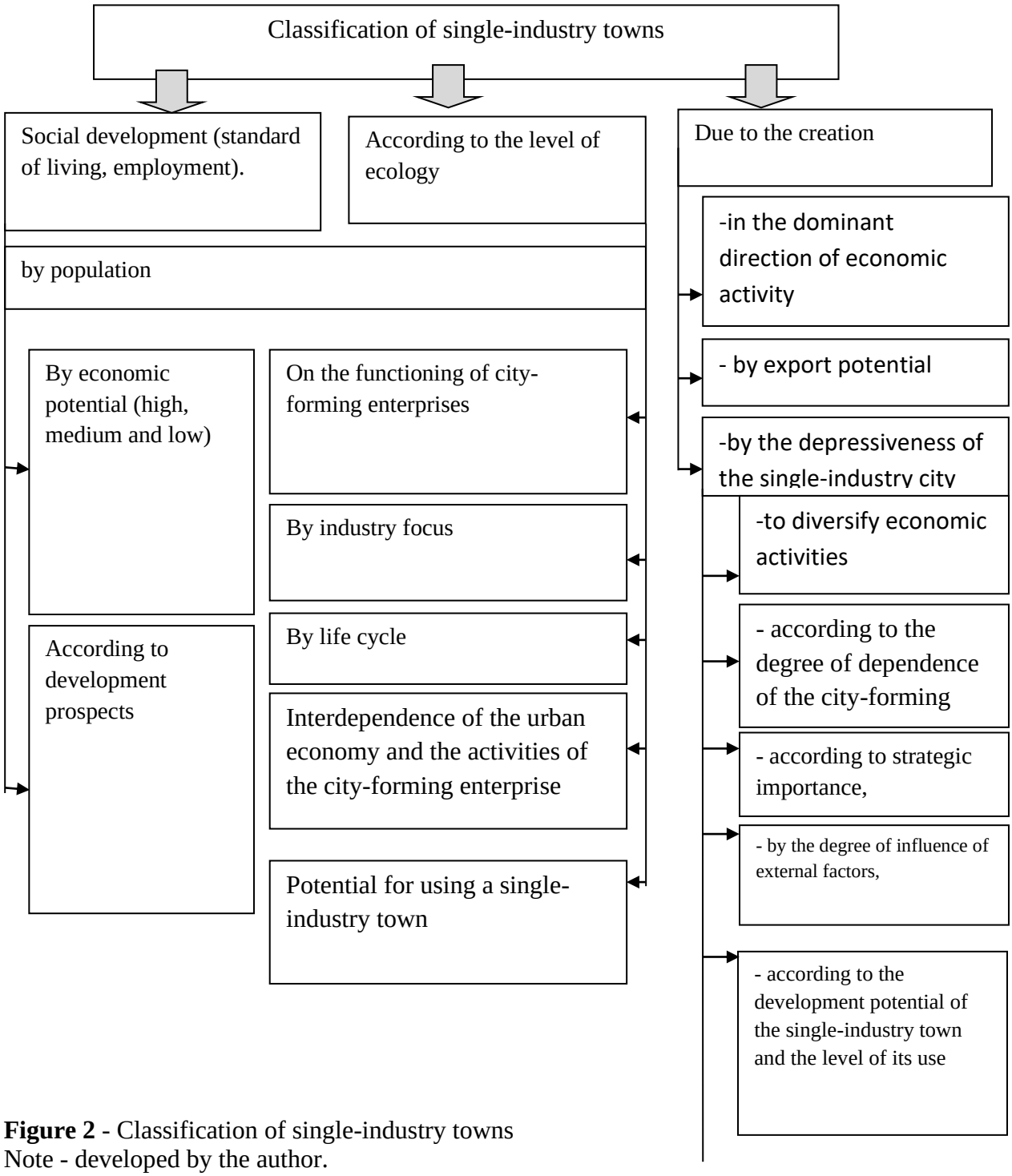

Figure 2 - Classification of single-industry towns
Note - developed by the author.

The use of the proposed classification in relation to single-industry towns will allow a more constructive approach to solving the issues of their effective development and the formation of tools.

Table 1 - Classification of single-industry towns

№	Classification sign	Types of diversified cities
1	Social development (standard of living, employment).	- standard of living, - employment, - income, - wage
2	According to the level of ecology	- ecological catastrophy, - average ecological level, - moderate environmental level, -low environmental level
3	By population	- up to 2000 people, - from 2000 to 5000 people, -over 5000 people,
4	By economic potential	- high, medium and low, - on the functioning of city-forming enterprises, - by sectoral focus,
5	According to development prospects	- according to the life cycle, - interdependence of the urban economy and the activities of the city-forming, - the potential of using a single-industry town,
6	Due to the creation	- single-industry towns formed as a natural result of the evolution of the settlement, - single-industry towns created on the basis of government decisions and meeting the criteria of rationality, - single-industry towns created on the basis of government decisions, but not meeting the criteria of rationality
7	Dominant line of economic activity	- industrial city, - science city, - resort city, - agro-city, - seaport, - city garrison, - city-special settlement.
8	Export potential of the single-industry town	- single-industry towns whose products (services) are oriented mainly to domestic demand, - single-industry towns whose products (services) are mainly export-oriented
9	Level of depressiveness of a single-industry city	- relatively stable condition, - temporary difficulties in a crisis, - economic crisis of a city-forming enterprise, - the impossibility of modernizing the city-forming enterprise.
10	By the nature of the diversification of the functions of a city-forming enterprise.	- single-industry towns, where the only function is implemented by a limited number of city-forming enterprises that produce non-diversified products, a significant part of which goes not for final consumption, but for subsequent processing, monotowns, where the only function is implemented by a limited number of city-forming enterprises that produce diversified products, - single-industry towns, where the only function is implemented by several technologically interconnected enterprises, - single-industry towns, where a combination of industries focused on it is formed around the dominant function, i.e.a specialized complex is being formed
11	Interdependence of the urban economy and the activities of the city-forming enterprise.	- the dynamics of the socio-economic indicators of the city is directly proportional to the city-forming enterprises, - a developing city, a developing city-forming enterprise, - a stagnating city, a stagnating city-forming enterprise, - the dynamics of the socio-economic indicators of the city is inversely proportional to the indicators of the city-forming enterprises, - a developing city - a stagnant city-forming enterprise, - a stagnant city - a developing city-forming enterprise
12	The strategic importance of a single-industry town	- single-industry towns that are not of strategic importance, - "open" strategically significant single-industry towns, - "closed" strategically significant single-industry towns

13	The degree of influence of external economic factors on socio-economic development	- single-industry towns, the socio-economic development of which is in line with the national socio-economic dynamics, - single-industry towns with stable socio-economic development, not dependent on national socio-economic dynamics, - single-industry towns with stable socio-economic development in a crisis and developing in a socio-economic upsurge, - single-industry towns with unstable socio-economic development, not influenced by national socio-economic dynamics
14	The development potential of a single-industry town and the level of its current use	- single-industry towns that have exhausted their development potential, - single-industry towns with unrealized development potential, - single-industry towns that have and use development potential
15	According to the features of creation	- created before the 20th century, - created in the 20-21 centuries
Note - developed by the author		

As classification criteria, it is proposed to single out the time of occurrence, the peculiarity of the origin and the stage of the life cycle of a single-industry town.The success and development of any organizational system, including single-industry towns as representatives of the socio-economic system, is determined by the ability to predict the model of transition from one stage to another and by competent planning of control actions in the form of a development strategy for a single-industry territory.Therefore, it is necessary to consider the existing classification of single-industry towns from the standpoint of the “life cycles” approach, according to social development, living standards and ecology.First, the classification of mono-settlements depending on the form of the life cycle trajectory of their functional specialization is extremely important for assessing the prospects for innovative development of the corresponding territory.The fact is that such a trajectory initially acts as a kind of signal about the level of innovativeness of the city-forming enterprise at a certain point in time and about its capabilities for the production of innovative products.In addition, the study of such trajectories makes it possible to assess how receptive a city-forming enterprise is to the latest scientific and technological achievements at different stages of its development.Secondly, the classification of single-industry towns according to the period of the life cycle will make it possible to combine the identified opportunities of a single-industry town with the prospect of development.Thirdly, the classification of single-industry towns according to their ability to self-regulate, taking into account the stage of the life cycle, makes it possible to predict the development model of a single-industry town in dynamics.So, in the cities of Arkalyk, Kentau, Balkhash, Saran, the average per capita cash income amounted to 80-85% of the average regional level, and in the city of Khromtau - 73%.

Conclusions.Thus, the proposed classification and factors influencing the development of single-industry towns will contribute to their development.Thus, despite the many types of single-industry towns, it is possible, from the standpoint of their classification according to the concept of the “mono-town life cycle”, to single out groups of cities with the same development model, therefore, the process of forecasting and planning the socio-economic development of a mono-territory will not only become the most reliable, but will also allow developingsuch development programs that will be feasible and feasible in real conditions. Gratitude.The article was prepared under the program BR18574200 "Revival of single-industry towns in the context of the creation of New Kazakhstan based on territorial marketing" within the framework of program-targeted funding of the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan.

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THE MAIN ASPECTS OF THE FORMATION OF STUDENTS' COMPETENCIES IN FAMILY ECONOMICS

Nurmatova Maftuna Ilkhamovna*
Kokand State Pedagogical Institute, Kokand, Uzbekistan
*E-mail: maftunanurmatova2020@gmail.com

Abstract: the article examines the main aspects of improving the competencies of conducting family economics among students in the pedagogical process. The analysis of disciplines related to teaching family economics is carried out, as well as the main directions of this process are considered. The purpose of the study is to select technologies that serve to enhance students' competencies in the field of family economics in the process of pedagogical education

Keywords: competence, family economy, economic competence, economic socialization, integration.

Introduction

By age, students studying in higher educational institutions (HEI) are considered to have their own family or are about to start a family. Therefore, they need to have competencies related to the family farm and its effective management. On the basis of market production, strong competition arises, the type and volume of socio-economic needs increase, this demand is of particular relevance. It is necessary that the general educational process, including teacher education, organized in higher educational institutions, be able to contribute to the formation of students' knowledge, skills and competencies related to the family economy, its effective management, ensuring a mutual balance between income and family activities, creating additional sources of income.

Methodology

Research methods: study the literature on the basics of pedagogical, psychological and economic knowledge and the content of scientific research conducted in the relevant areas; questionnaire; test; conversation; pedagogical observation; modeling; pedagogical experience; mathematical-statistical method.

Results and discussion

In the process of pedagogical education, the duration of improvement of competencies regarding the family economy in students is considered the process of pedagogical activity, which is consistently, continuously and systematically organized on the basis of a specific goal in the period involving a period including a bachelor's or master's degree.

The main subjects in the organization of the process are teachers of pedagogical disciplines. Their knowledge of not only pedagogical, but also the basics of economic knowledge, theoretical and practical experience in the effective organization of a family economy allows us to achieve the expected result. In addition, for the effective promotion of the planned process, it is important for the interaction of pedagogical subjects with teachers of a number of subjects - "Fundamentals of Economic Knowledge", "Technology", "Applied Arts", law and mathematics. Also, in improving the competencies of students related to the family economy, teachers of pedagogical disciplines work on themselves, have experience in independently acquiring economic knowledge, and have analytical skills, which is a guarantee that the planned process will take place in a certain sequence and be effective. In the process of pedagogical education, the improvement of the competencies of students related to the family economy was carried out in three areas:

the first direction is the organization of training in the education system in such a way that a person can acquire economic knowledge, skills, qualifications and experience;

the second direction is the decision to integrate the process of education and spiritual and educational work in order to enrich the economic knowledge, skills, qualifications and experience acquired by a person in the learning process;

the third direction is diagnostics and assessment of the level of availability (or development) of competencies related to the family economy among students.

At the same time, the improvement of the competencies associated with the family economy of students is ensured on the basis of creating the necessary conditions, selecting innovative forms, methods, tools and technologies.

At the same time, it should be noted that in the process of pedagogical education, the improvement of the competences of students related to the family economy is considered as a special process. The peculiarity of this process is that it is organized on the basis of interaction and connection of pedagogical education with a number of disciplines, in particular, "Fundamentals of Economic Knowledge", "Applied Arts", "Technology", jurisprudence, mathematics. Thus, the available opportunities of these subjects contribute to the improvement of students' competencies in relation to the family economy.

In the process of improving the competencies of students related to the family economy, the abovementioned interdisciplinary interaction and connection with teacher education is manifested in the following (Table 1):

Table 1. Interdisciplinarity and interrelationship in improving the competencies of students related to the family economy

№	Sciences	Their capabilities
1.	"Fundamentals of Economic Knowledge"	Systematic acquisition of economic knowledge; a correct understanding of such concepts as the “consumer basket”, household needs, family budget, balance of income and expenses; the formation and development of knowledge, skills and competencies related to the proper organization of activities in the areas of family farming, the creation of new sources of income.
2.	"Applied Arts"	Creation of theoretical and practical knowledge about the cost and market value of products created by folk crafts (carpentry, copper, needlework, blacksmithing, pottery, lullaby, embroidery, carpet weaving, jewelry, hat making).
3.	"Technology"	The essence of cooking, confectionery, design (clothing and landscape design), improving knowledge and skills related to the technology of organizing activities for them.
4.	Law	Knowledge of their rights and obligations as a consumer, producer or business entity, development of competencies related to the use of rights and the full fulfillment of obligations.
5.	Mathematical Sciences	Deep mastery of the principles of accounting, rational management of family finances, the ability to assess income, profits, expenses, losses over time, the formation of knowledge and skills to prevent "family bankruptcy".

In the organization of pedagogical education, as well as in improving the competencies of students related to the family economy, as well as with different subjects, it is based on the relationship and connection of educational and educational processes. “Undoubtedly, the educational effect of upbringing is conditional, and it is directed primarily at the subject as an integral person who is under the influence of existing factors or turns away from them. “Undoubtedly, the educational effect of upbringing is conditional, and it is directed primarily at the subject as an integral person who is under the influence of existing factors or turns away from them.

In the process of teacher education, it is necessary to explore the possibilities of a number of subjects taught in higher educational institutions in improving the competencies related to family farming. Therefore, attention was paid to the analysis of the possibilities of the relevant subjects taught in higher educational institutions operating in the field of pedagogy.

A number of subjects are taught in higher educational institutions related to the following specializations, working mainly in the field of pedagogy: "Pedagogy", "History of Pedagogy", "Pedagogical Excellence", "Pedagogical Technology", "Pedagogical Conflictology". Among them, on the basis of the disciplines "Pedagogy" and "History of Pedagogy", students are given concepts related to the organization of economic education within the following topics, and there is the possibility of their further enrichment in the course of seminars and self-study:

1. Within the framework of the science "Pedagogy": "Formation of a scientific worldview and intellectual education of students" ("Economic education"), "Labor education", "Institutions of civil society and the foundations of education in the family" [2], "Content of types of education", "Family - personality as a subject of education" [3].
2. Within the framework of the science "History of Pedagogy": "History of Pedagogy as a Science. "Education and pedagogical ideas from ancient times to the 7th century" (in particular, based on the work "Avesta"), "Education and school in Movarounnahr in the second half of the 14th and 16th centuries" (in particular, based on the pedagogical views of Unsurul-Maoliy Kaykovus), «XIV century. The Development of Pedagogical Ideas in Movarounnahr in the Second Half and the 16th Century" (in particular, based on the pedagogical views of Alisher Navoi), "Education, school and pedagogical ideas in Turkestan in the second half of the 19th - early 20th centuries" (in particular, on the basis of pedagogical views Abdullah Avloni) [4].

Within the framework of these topics, although economic knowledge is covered on the basis of the general foundations of economic and family education, the work "Avesta" and the pedagogical views of scientists who lived in different periods, however, at the expense of seminars, as well as hours allocated for self-study, the family economy of students and its conduct is an opportunity to consolidate their knowledge. This requires the teacher to have a creative approach to the educational process, creative thinking.

Pedagogical activities aimed at improving the family and economic competencies of students in the process of pedagogical education, based on the study of the wishes of students, taking into account their needs, include the following areas:

1. Creation of the family budget, participation in its management.
2. Housekeeping (reasonable housekeeping; organization of subsidiary farming).
3. Consumer needs (food, clothing, property (household facilities, vehicles, non-residential buildings, land, commercial or industrial facilities) and their satisfaction).
4. Control of payment and expenses of family members as a whole (for household and communal services) and personal (for daily expenses, personal needs).
5. Participation in the family division of labor.
6. Storage and disposal of food products, household goods, property.
7. Construction (housing), repair (household appliances and equipment, vehicles), storage (work tools) in the household.
8. Know your rights and obligations as a consumer and respect them.
9. Creation of a family business (production and service).

These indicated areas indicate that the process of improving the competencies of students in the process of teacher education is complex. Each area requires specific tasks. Especially:

I. Formation of the family budget, participation in its disposal: enrichment of students' knowledge about the family budget; inform them about the ways and methods of effective formation of the family budget; to develop in students the ability to manage family income and activities, to ensure a mutual balance between them.

II. On housekeeping (reasonable housekeeping; organization of subsidiary farming): equipping students with knowledge related to rational housekeeping; develop their understanding of the effective organization of subsidiary farming; the formation of students' skills of rational housekeeping and organization of subsidiary farming.

III. On the regulation of consumer needs (food, clothing, property, possession of household items, housing, vehicles, non-residential buildings, land, commercial or industrial facilities): primary and secondary consumer needs of students (Formation of concepts about food, clothing, property, possession household items, housing, vehicles, non-residential buildings, land, commercial or industrial facilities); they are primary and secondary, taking into account family

income; getting used to developing a plan to meet consumer needs; the formation of students' skills to regulate the primary and secondary needs of consumers in difficult situations.

IV. In terms of control over the payment and expenses of family members as a whole (for household and communal services) and personal (for daily expenses, personal needs): teaching students the reasonable disposal of personal expenses; to create in them a clear idea of the total expenses of the family; accustoming students to the calculation of family and personal expenses for one (three, six) months or a year; develop skills in coordinating the general and personal expenses of family members.

V. With regard to participation in the family division of labor: the formation of the habit of students to determine and evaluate their place in the family division of labor; ensure that they have the skills to understand their responsibilities in the division of family labor; ensuring that students are responsible for their participation in the family division of labor.

VI. On the issues of safety and disposal of food products, household items, property: the formation of students' skills in the storage and disposal of food products; instill in them a careful attitude to household items in the family; formation of students' skills of preservation and disposal of property.

VII. Construction of housing in the household, maintenance of household appliances and equipment, repair of vehicles, maintenance of labor tools: developing students' knowledge about domestic housing construction, maintenance of household appliances and equipment, repair of vehicles, maintenance of labor tools; ensure that they have the skills to build a house in the household, maintain household appliances and equipment, repair vehicles, maintain working tools. VIII. Know your rights and obligations as a consumer, observe them: consolidate students' knowledge of the rights and obligations of a consumer; formation of skills to use the rights and obligations of the consumer in them; development of consumer culture of students.

IX. On the creation of a family business (production and service): informing students about the forms of family business; inform them about the methods of starting a family business by studying and analyzing the internal capabilities of the family; the formation of students' skills to open a family business; develop their competencies in creating a family business.

Conclusions

Thus, in the process of teacher education, the improvement of students' competencies related to the family economy is a consistent, continuous, systematically organized process over a certain period of time - undergraduate or graduate, based on a specific goal. The main subjects of this process are teachers of pedagogical disciplines. Their theoretical and practical knowledge of the basics of economic knowledge, as well as the effective organization of the family economy is essential in organizing the envisaged process. In addition, independent research to enrich existing economic knowledge, interaction with teachers of the "Economic Knowledge Base", "Technology", "Applied Arts", law and mathematics can achieve the expected result.

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THE ROLE OF EDUCATION IN ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS: STRATEGIES FOR INVOLVING THE TEACHING STAFF OF SCHOOLS

Kurbanov Muzaffar Ummatovich
Kokand state pedagogical institute, Kokand, Uzbekistan
*E-mail: economykspi@gmail.com

Abstract. This article investigates the pivotal role of education in advancing the Sustainable Development Goals (SDGs) and proposes effective strategies for engaging teaching staff in schools to facilitate this process. The aim is to explore the intersection between education and sustainable development, emphasizing the transformative potential of integrating sustainability principles into teaching practices. Drawing on a comprehensive review of literature and best practices, this study identifies key challenges and opportunities in leveraging education for sustainable development. Additionally, it presents a range of practical methods and approaches for involving teaching staff in promoting sustainability within their classrooms and beyond. By fostering collaboration, providing professional development opportunities, and integrating sustainability into curricula, educators can empower students to become agents of change in addressing pressing global issues. Ultimately, this article advocates for a holistic approach to education that equips learners with the knowledge, skills, and values necessary to contribute to a more just, equitable, and sustainable world.

Keywords: education, Sustainable Development Goals (SDGs), teaching staff, schools, sustainability, integration, strategies, professional development, curriculum, transformative education, global challenges, empowerment, values, skills, holistic approach

Introduction. Education stands as a cornerstone in the pursuit of sustainable development, playing a pivotal role in shaping the mindset, knowledge, and skills of individuals towards building a more equitable, resilient, and prosperous future. The United Nations Sustainable Development Goals (SDGs) outline a comprehensive framework aimed at addressing global challenges, ranging from poverty eradication to environmental conservation. However, the realization of these goals heavily relies on the transformative power of education.

In this context, the involvement of teaching staff in schools becomes paramount. Teachers serve as the catalysts for change, imparting not only academic knowledge but also values, attitudes, and behaviors that align with the principles of sustainability. Empowering educators with the necessary strategies and tools to integrate sustainable development into their teaching practices is essential for fostering a generation capable of addressing complex societal and environmental issues.

This paper explores the indispensable role of education in achieving the SDGs and delineates strategies for engaging teaching staff in this endeavor. By enhancing the capacity of educators and nurturing a culture of sustainability within educational institutions, we can foster a collective commitment towards realizing the vision of a more inclusive, just, and sustainable world.

Materials and methods. Conducted a comprehensive review of literature focusing on the intersection of education and sustainable development, including scholarly articles, reports, and policy documents.Identified key concepts, challenges, and best practices related to integrating sustainability principles into education.Examined case studies from various educational institutions globally that have successfully integrated sustainable development into their curricula and practices.Analyzed strategies employed by these institutions to engage teaching staff and promote sustainability education.Designed and distributed surveys to teaching staff in schools to assess their current knowledge, attitudes, and practices related to sustainability education.Conducted interviews with educational experts, administrators, and teachers to gain insights into effective strategies for involving teaching staff in promoting sustainability.

In the 2008 OECD report, Improving school leadership, (volume 1, p2), Pont et al. highlight the international phenomenon of a spotlight on school leadership: “School leadership has become a priority in education policy agendas internationally. It plays a key role in improving school outcomes by influencing the motivations and capacities of teachers, as well as the school climate

and environment. Effective school leadership is essential to improve the efficiency and equity of schooling." [1]

Research and discussion. Education is one of the most important components of the social system and ensures the effective activity of individuals and social groups. A well-organized educational process contributes to solving socially significant tasks, including ensuring conditions for sustainable development. School is a socialization tool. It should prepare the younger generation for social change, foster the right attitude to innovation and overcoming difficulties, form an active position in solving local and global social problems, and teach harmonious transformation of social relations. Awareness of the principles of sustainable development and the integration of these principles into life should be carried out everywhere: in a wide variety of community groups, government agencies, schools, colleges and universities [2]. The goals of sustainable development can be achieved only by creating a society that actively and dynamically adapts to new conditions through a carefully thought-out and effective education system.

Education stands as a cornerstone in the pursuit of sustainable development, playing a pivotal role in shaping mindsets, fostering knowledge, and instilling skills crucial for addressing global challenges. The United Nations Sustainable Development Goals (SDGs) provide a comprehensive framework for addressing pressing issues such as poverty, inequality, and environmental degradation. Achieving these goals requires a concerted effort from all sectors of society, with education emerging as a key enabler for transformative change. In this section, we delve into the research conducted on the role of education in achieving the SDGs, focusing specifically on strategies for involving teaching staff in schools.

Importance of Education in Sustainable Development.

Education is recognized as a fundamental human right and a powerful tool for sustainable development. It empowers individuals, builds capacity, and fosters critical thinking and problem-solving skills essential for addressing complex challenges.

The SDGs underscore the integral role of education in achieving all other goals, highlighting its potential to eradicate poverty, promote gender equality, ensure access to quality healthcare, and foster environmental stewardship.

Research demonstrates that education not only enhances economic opportunities but also contributes to social cohesion, environmental sustainability, and resilience to climate change [3].

Challenges in Integrating Sustainable Development into Education.

Despite the recognized importance of education in sustainable development, significant challenges exist in integrating sustainability principles into educational systems.

Limited awareness and understanding among teaching staff about the relevance and significance of sustainability education pose barriers to its effective implementation.

Constraints such as curriculum rigidity, resource limitations, and competing priorities within educational institutions often hinder efforts to prioritize sustainability education.

Strategies for Involving Teaching Staff in Promoting Sustainability.

Professional Development. Providing training and professional development opportunities for teaching staff to enhance their knowledge and skills in sustainability education. This can include workshops, seminars, and online courses tailored to the needs of educators.

Curriculum Integration. Integrating sustainability principles across various subjects and grade levels to ensure that it becomes a core component of the curriculum. This involves revising existing curriculum frameworks and developing interdisciplinary approaches to teaching sustainability.

Experiential Learning: Engaging teaching staff and students in hands-on, experiential learning activities such as field trips, community projects, and outdoor education initiatives. These experiences help reinforce theoretical concepts and promote active engagement in sustainability issues.

Collaboration and Networking. Facilitating collaboration and networking among teaching staff, educational institutions, and external stakeholders to share best practices, resources, and support networks. This can involve establishing partnerships with environmental organizations, government agencies, and community groups.

Institutional Support. Providing institutional support and recognition for teaching staff involved in promoting sustainability education. This may include allocating dedicated resources,

creating incentives for innovation, and incorporating sustainability goals into performance evaluations and institutional policies.

Discussion and Implications.

The research underscores the critical role of teaching staff in advancing sustainability education within schools and highlights the importance of tailored strategies to support their engagement.

By empowering teaching staff with the necessary knowledge, skills, and resources, educational institutions can foster a culture of sustainability and prepare students to become responsible global citizens.

However, it is essential to recognize that promoting sustainability education is not a one-size-fits-all approach and requires context-specific strategies tailored to the unique needs and challenges of each educational setting.

Future research should focus on evaluating the long-term impact of these strategies on teaching staff engagement, student learning outcomes, and institutional culture, as well as identifying innovative approaches to overcome persistent barriers to integrating sustainability into education.

Conclusion.

In conclusion, education emerges as a fundamental catalyst for achieving the Sustainable Development Goals (SDGs), serving as a cornerstone for fostering sustainable societies and addressing pressing global challenges. The involvement of teaching staff in schools is crucial for integrating sustainability principles into education and nurturing a generation of environmentally conscious and socially responsible individuals. Through the implementation of tailored strategies, educational institutions can empower teaching staff to effectively promote sustainability education within their classrooms and beyond.

The research discussed in this article highlights the importance of providing professional development opportunities, integrating sustainability into the curriculum, facilitating experiential learning, fostering collaboration, and providing institutional support for teaching staff. These strategies are essential for overcoming challenges and maximizing the impact of sustainability education in schools.

However, achieving meaningful progress towards the SDGs requires a collective effort from all stakeholders, including governments, educational institutions, civil society organizations, and the private sector. Collaboration and partnership are essential for scaling up successful initiatives, sharing best practices, and mobilizing resources to support sustainability education globally.

In moving forward, it is imperative to continue advocating for the prioritization of sustainability education within educational policies and frameworks at the national and international levels. By investing in education and empowering teaching staff, we can equip future generations with the knowledge, skills, and values necessary to address the complex challenges of the 21st century and build a more equitable, resilient, and sustainable world for all.

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LEGAL BASIS OF ORGANIZATION OF EDUCATIONAL PROCESS IN UZBEKISTAN

Saidova Xilolaxon Rashidjon qizi
Teacher of the Department of Educational Management
of the Kokan State Pedagogical Institute
h.saidova2020@gmail.com
https://orcid.org/0009-0007-9427-6997

Annotation Standardization of education is carried out in developed countries of the world, by perfectly developing curricula and programs, setting a certain level of education. The standard allows for the implementation of a general strategy for the development of education, as if it connects the quality of the educational process with the goal of the development of the economy and society, the state and the individual. The quality of a standard is reflected in its effectiveness in relation to its purpose and organizational role. The standard also has quality indicators, and these quality indicators are implemented during its development. In this regard, in this article, the goals and objectives and main directions of the state educational standards for the legal regulation of education are mentioned. There was talk about state education standards for the field of higher education.

Key words: education, standard, quality, state educational standard, higher education, bachelor's, master's degree, educational program, curriculum, curriculum, standardization, curriculum,

Ensuring the quality of education is seen in the way the educational process is organized, along with the level of professional training of graduates, and how it meets the established quality criteria. This task is defined in a number of legislative and regulatory documents, in particular, in the National Program of Personnel Training, in the example of restructuring the system and content of personnel training based on the prospects of the social and economic development of the country, the needs of society, and the modern achievements of science, culture, technology and technology. reflected in the form of guidelines and principles.

At the same time, today the organizational and legal provision of education is carried out through the Law "On Education", State Standards, decisions of the Ministries of Education aimed at the development of the field, and several other regulatory documents.

The main place in the quality organization of education is occupied by State educational standards. The minimum amount of knowledge, skills and moral qualities that learners should acquire is an official pedagogical document - the state educational standard - determined on scientific grounds. It defines the educational content forms, methods, and the procedure for evaluating their quality, and is the core of the educational content. By means of the standard, it is necessary to ensure a stable level of education in various educational institutions (state and non-state) operating on the territory of the country. The state education standard is essentially:

- requirements for the quality of personnel training;
- requirements for educational content;
- qualification requirements for the necessary and sufficient level of training of learners;
- qualification requirements for graduates of educational institutions;
- the necessary size of the training load;
- determines the procedure and mechanism for evaluating the activity of educational institutions and the quality of personnel training and serves as a basis for the creation of other regulatory documents.

In general, a standard is a generally accepted norm that educational institutions strive to meet in order to meet a certain standard or model of educational quality and professionalism in order to gain the public recognition they need.

Standards can be informal or formal. Informal standards are implemented as a natural norm of general social and psychological relations, social behavior and activity. But strict adherence to

informal norms is very slow and often ineffective in guiding the learning process. That is why there are official standards, i.e. norms established in relevant documents - the law on education, decisions of the Ministry of Education or a special document, which are called "State Education Standard".

Along with the Law of the Republic of Uzbekistan "On Education", the standard of education is the main regulatory document. "Standard" when translated from English means "standard", "sample", "model", "model". With the help of the standard, it is possible to ensure the level of stability of education in various educational institutions of the republic, to adjust the norms of educational work, and to develop criteria for evaluating students' knowledge.

Standardization of education is carried out in the developed countries of the world by perfectly developing curricula and programs, setting a certain level of education. But the term "standard" itself has been used in relation to education since recent times. State educational standards allow to improve the quality of education. They record the minimum amount of educational content and determine the lower limit of the level of education. In general, the State Education Standard is a system of basic parameters accepted as the standard of the state for the level of education. is a set of basic state requirements for the level and size of educational loads.

The state standard is a flexible limiter, it has clearly defined and approved mandatory requirements for the size, structure, content and form of training. The standard determines the specialist's specialty and qualification, the duration of the full training program, and the differentiation of the main training cycles. These include humanities, natural sciences, general professional, special and specialized training, volume ratio of cycles, the set of compulsory subjects for the first four periods, the amount of study time allocated to practice, holidays and control activities. Two main tasks of DTS can be highlighted separately. Such standards determine the mandatory minimum of the content of education given to students and the set of requirements for the level of training of graduates. The mandatory minimum of educational content must be fully reflected in curricula and textbooks.

According to the level of preparation of the graduates, the minimum amount of knowledge, skills and qualifications that the student must acquire at a certain stage is determined.

According to the researchers, the standard is the possibility of coordinating and pairing educational programs of different institutions in accordance with the minimum required quality criteria, a guarantee of sufficient quality of education that a person can acquire.

In particular, R.I.Nurimbetov expressed the following opinion, in his opinion, the quality of higher education (as a result) is the compliance of higher education with various needs, goals, requirements and standards.

According to E.M.Korotkov, the quality of education is a set of characteristics of professional consciousness that determine the ability of a specialist to effectively perform professional activities in accordance with the current requirements of the economy.

A standard is a regulatory document that defines the standard, example, model, norms, rules, and requirements of a specific event.

Currently, there are cases of students moving from one place to another or temporarily suspending their studies. Without common requirements for specializations, periods and training levels, this would be completely impossible. A person's right to education will be limited. Therefore, the standards protect the rights of people not only to the quality of education, but also to the individual strategy of education. Today, standards are the main means of state regulation of the quality of education. In accordance with the requirements specified in the standard, the activity of the educational institution is monitored in the form of attestation and accreditation. These requirements are the criteria for evaluating the activity of the educational institution. Based on them, a comparative analysis of educational programs and a study of the experience of educational development are carried out. The standard defines the place and role of specialties, without limiting their number, and includes them in the specialty according to the principles of general and specific, stable and dynamic, perspective and uniqueness.

The standard allows for the implementation of a general strategy for the development of education, as if it connects the quality of the educational process with the goal of the development of the economy and society, the state and the individual. The quality of a standard is reflected in its

effectiveness in relation to its purpose and organizational role. The standard also has quality indicators, and these quality indicators are implemented during its development. These include the fact that the requirements of the standard are logically connected, free from ambiguities and contradictions, the possibility of using the standards specified in the standard in assessing the quality of education, the scientific and practical importance of the specialty and its specific features. As we mentioned above, state standards are among the factors affecting the quality of education.

The state educational standard of higher education includes relevant documents that regulate the educational process, the activities of educational institutions, personnel, the quality assessment of the preparation of textbooks and training manuals (qualifications for undergraduate courses and master's specialties requirements, curricula, training programs, etc.) is the basis for development. Regardless of the form of departmental subordination and ownership in the training of highly educated personnel, it is mandatory for all higher education institutions that train personnel based on the state education standards of the Republic of Uzbekistan.

The standard should meet the following requirements

• taking into account the capabilities of all stakeholders in the educational process based on the needs of the country's socio-economic development and analysis of international experiences.

• the standard provides, first of all, the standardization of the results.

• in the standards, it is required to maintain compliance experiences in the form, stage and fields of education.

• according to the content and internal structure of the standard, it should be complete in terms of ensuring the maturity of the person.

• each item statement in the standards should be as complete as possible in terms of consistency that ensures its integrity and fully covers the objectives of education

• the proportionality of the interests of the standard state, region and educational institution according to its internal structure and content. should reflect the right.

• it is necessary to standardize the content of standard educational loads.

• the content of the standard should take into account all categories of its users.

• designed for the possibility of checking with standard technical means, that is, it should be technically convenient.

In addition, one of the documents that helps to regulate education is the educational program. The educational program is a set of factors that ensure the integration of all elements of the educational process into a single process of competencies.

The training program includes:

• curriculum, curriculum, which is the basis for organizing the educational process;

• material and technical provision of education;

• information and methodological support;

• providing the educational process with pedagogical personnel;

• control-measurement materials of the final certification of the graduate.

Integration of curricula and curricula of undergraduate majors in higher education institutions with general secondary and secondary special, professional education

In particular, on the basis of the order of the Minister of Higher and Secondary Special Education of the Republic of Uzbekistan No. 35-2021 of October 19, 2021, the state educational standard of Higher Education was developed.

State educational standards of higher education, ensuring continuity and continuity of curricula and curricula of undergraduate majors in higher education institutions with general secondary and secondary special, professional education , will be developed on the basis of the qualification requirements of undergraduate education. The content of master's degree programs and curricula is formed with the provision of in-depth fundamental and practical knowledge of the specialty as the primary and initial stage of training highly qualified scientific and scientific-pedagogical personnel.

The educational program should be aimed at achieving the educational goal and reflect the requirements of the state standard, as well as the potential, position and strategy of the university in training specialists. The quality of the educational program is reflected in:

• level of compliance with the state standard;

• balance of various factors of the educational process (curriculum, methodological support, availability of teachers, etc.);

• compliance with the requirements of the staff;

An important feature of the educational program is the proportionality of types of knowledge in modules and types of training.

Organization of education based on the state educational standards, determination of the educational load is carried out as follows. Bachelor's and master's training is carried out in the form of full-time, evening (shift), part-time (special part-time) and, if necessary, distance education based on the state educational standards of higher education, qualification requirements, curriculum and curriculum. The size of the academic load, which includes all types of classroom and non-auditory work, is set at 60 credits per academic year and 30 credits per semester. 1 credit is equal to 30 academic hours of study.

The volume of classroom training for the form of study separated from production (daytime) is 22 - 32 academic hours per week when the educational process is carried out on the basis of the credit-module system, when the educational process is carried out on the basis of the rating (evaluation) system, 22 - 36 academic hours are determined.

For the non-production (evening) form of study, it is usually five days a week, and the maximum volume of classroom training is set at 20 hours a week.

The volume of classroom training for the form of study without separation from production (extramural, special extramural) is determined to be at least 30% of the form of study without separation from production (full-time).

The standard period of study for the (full-time) form of study in bachelor's specialties is divided according to the table below.

Table 1 The standard period of study

Study period	**Number of weeks**	**Amount of credits**	**Amount of academic hours**
3 years	152	180	5 400
4 years	204	240	7 200
5 years	256	300	9 000
6 years	308	360	10 800

The total volume of the study period is distributed according to the following table.

Table 2 Study periods

Study periods	For all fields of education, except health education, in %	For the health education sector, in %
Theoretical and practical education	40 — 65	50 — 70
Including the ratio of classroom (contact) and independent education	From 40/60 percent ratio to 50/50 percent ratio	

Attestation	6 — 15	8 — 15
Vacation	8 — 21	10 — 18
Skill practice	6 — 25	6 — 20
Graduate thesis	2 — 7	2 — 5

At least 85% of the volume of theoretical and practical education for all fields of education should consist of blocks of compulsory and elective subjects consisting of general professional and specialized (special) subjects. The size of blocks of compulsory and optional subjects in the curricula is determined by the higher education institution that develops the curriculum based on the specific characteristics of the educational field. The procedure for the training of students of undergraduate education and the procedure for completing the graduation qualification work is determined by the competent state management body for the management of higher education.

In order to systematize and optimize the catalog of subjects based on the international principles of the credit system, it is recommended to determine the distribution of credits by courses and semesters in the curriculum according to the following table.

Table 3 Credits allocated depending on the passing of the subject for one or two semesters

An hour allocated to academic subjects	Credits allocated depending on the passing of the subject for one or two semesters	
	1st semester	2nd semester
120	4	-
180	6	-
240	4	4
300	4	6
360	6	6

All aspects necessary for the development of education are included in the state educational standard, in particular, qualification practice is gaining importance in the preparation of bachelor specialists for the quality implementation of education.

In this standard, the general requirements for qualification practices of undergraduate education are mentioned, based on which students are sent to practice. Their types are as follows:

educational (acquaintance) practice - introduction to economic sectors, relevant organizations, institutions and enterprises, aimed at strengthening theoretical knowledge in natural-scientific and general professional sciences;

production practice - focusing on strengthening theoretical knowledge from general and specialized disciplines and combining it with practical (production) processes, forming relevant practical skills, competencies and qualifications;

pre-graduation practice - focuses on further strengthening of professional skills in production (in enterprises, organizations and institutions of the relevant field), adaptation to professional

activity, collection and systematization of information for preparation of graduation qualification work;

Pedagogical practice is used for professional education and focuses on improving pedagogical skills.

Quality control of personnel training is also carried out on the basis of state educational standards. They are as follows:

• internal control is carried out by the higher education institution. Internal control is carried out in accordance with the rating (evaluation) system and the credit-module system established by the competent state management body for higher education management in accordance with the criteria;

• the final control is carried out in the form of the final state certification and (or) defense of the graduation qualification work and (or) the defense of the master's thesis in the master's degree in accordance with the curricula of higher education directions and specialties;

• state-public control is carried out in accordance with the procedure established by the competent state management body for higher education management, public organizations and personnel contractors;

• external control is carried out by the competent state management body for the management of higher education and the state inspection of the quality of education under the Cabinet of Ministers of the Republic of Uzbekistan.

As can be seen from the above, the educational standards are multi-level, and in order to create a common educational environment in Uzbekistan, to control the quality of education, the state educational standards define mutual norms. The implementation of educational standards in educational organizations makes it possible to provide students with accurate information on the specialties being taught, and to guarantee quality education. It also helps to increase the quality and potential of personnel.

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DEVELOPMENT OF A MARKETING STRATEGY IN THE HIGHER EDUCATION SYSTEM AND EVALUATION OF ITS EFFECTIVENESS

Radjabova Gavkhar Umarovna*
Kokand State Pedagogical Institute, Kokand, Uzbekistan
*E-mail: r.gavxar69@gmail.com

Abstarct. The article is devoted to the theoretical and methodological foundations of the formation of a marketing strategy in the system of higher education and the assessment of the effectiveness of its implementation. In particular, the article shows an algorithm for the formation of a marketing strategy, methods for assessing the effectiveness of a marketing strategy in higher education, key indicators for monitoring the effectiveness of marketing in the system of higher education, a method of implementing marketing strategies. It also emphasizes the importance of implementing a marketing strategy in the higher education system.

Keywords:marketing strategy, higher education system, higher educational institutions, development of a marketing strategy, monitoring the effectiveness of marketing, methods of implementing marketing strategies.

Introduction

The reform of the higher education system, the creation of new state and non-state higher educational institutions, the gradual transition of educational institutions to self-financing pose new tasks for higher educational institutions to ensure competitiveness in the market of educational services.

These tasks, in turn, require the introduction of marketing technologies into management activities aimed at ensuring a constant flow of consumers for the successful operation of modern higher education institutions. This allows higher education institutions to maintain financial independence.

Today, the use of marketing in the management of higher education institutions, including market research, formulation (development) and implementation of marketing strategies, is becoming one of the leading modern trends in the educational services market. In this case, it is important to formulate a marketing strategy and evaluate the effectiveness of its implementation.

Analysis of literature on the topic

F. Kotler, J. J. Lamben, M. Porter, M. E. Afanasyev studied the development of marketing strategy, and such scientists as I. Ansoff, K. Bowman, A. Henry, A. D. Strickland, A. A. Thompson, explored issues related to the methodological basis for choosing an organization’s development strategy.

Scientific research on marketing strategy in higher education in our country was carried out by G. Akhunova [9] and G.S. Sadullaeva [10].

F. Kotler defines marketing strategy as “the rationale for marketing activities.” With its help, the company hopes to achieve its marketing goals [1].

V.R. Vesnin argued that “a marketing strategy is the formation of goals, their achievement and solving the problems of a production enterprise for each individual product, each individual market in a certain period”[7].

A.G. Chernyavsky interprets marketing strategy as a reasonable logical structure in which an enterprise expects to solve its marketing problems [8]. The marketing strategy must clearly define the market segments on which the company will focus its main efforts. After developing a marketing strategy, a detailed program of action is developed, including the appointment of responsible managers, setting deadlines and determining costs. This program allows you to create a budget for the current year.

It is known that marketing strategy is traditionally based on the “4R” model. That is, product, price, distribution and displacement [2]. In 1981, Booms and Bitner [3] proposed adding three additional “R’s” to the marketing mix. In terms of services, this "4R" model has been expanded to "7R". It included the following elements: process, materiality and people.

O. V. Prokopenko in his monograph “Marketing of Educational Services” emphasizes that the added “3Rs” (process, materiality and people) directly depend on the internal environment of the educational institution and that special attention should be paid to these components of the marketing strategy. higher educational institutions [4].

The author of the book “Data Driven Marketing” Mark Jeffrey [5] proposes the “Balanced Scorecard for Marketing” methodology for assessing the effectiveness of a company’s marketing strategy.

The key to data-driven marketing is measurement and tracking. The author emphasizes that to measure marketing activity, it is enough to select several indicators (no more than 10) that provide quantitative indicators, instead of 50-100 indicators, as usual. This significantly reduces the time of their analysis and, accordingly, increases the efficiency of decision-making based on the results of the analysis and further actions. Each metric must have the highest marketing value and be measurable. Taking measurements before and after a marketing event allows you to evaluate its effectiveness. It should be noted that the choice of marketing indicators depends on the specifics of the company’s activities, and in each specific case they should be selected carefully.

To create an effective scorecard that works, you first need to clearly define the goals of your marketing strategy. Based on the goals set, an action plan is developed. The most important indicators were selected, a methodology for their assessment was developed, and methods for assessing data were determined. This creates a true, measurable, unique “Balanced Scorecard” that is linked to marketing goals and the implementation process. With the help of such a “Balanced Scorecard” and the methodology for measuring them, it will be possible to evaluate the effectiveness of a marketing strategy at the most accurate level.

N.K. Shemetova in her research work offers the main directions for assessing the marketing strategy of a university and indicators for monitoring the effectiveness of marketing activities [6].

Marketing strategy and its importance in the field of education are shown in the scientific works of foreign and Uzbek scientists. However, there is insufficient research into the algorithm for scaling marketing strategies in the higher education system and assessing their effectiveness.

Research methodology

The purpose of the study is to develop a scientifically based proposal and practical recommendations for improving methods for developing and assessing the effectiveness of marketing strategies in the higher education system. The article uses group, comparative, structural, factorial and statistical methods of methodology to highlight the issues of formation and evaluation of marketing strategies in higher educational institutions.

Discussion and results

Undoubtedly, the development and establishment of a higher educational institution in modern conditions will lead to fundamentally new management methods. The practice of development of higher educational institutions clearly shows that a factor in the effective operation of an educational organization is the use of an advertising approach in managing its activities, in this volume of sales and promotion of services.

Marketing strategy is a comprehensive component of the company’s unified strategy, describing the main directions of the organization’s activities in the relationship between consumers and competitors in the educational services market. Thus, a marketing strategy is a long-term plan aimed at increasing the average market performance through the regular implementation of a policy of development of goods and services that provide consumers with goods and services that have the most significant consumer value compared to competitors. [13].

Currently, the main goals of the marketing strategy of a higher education institution are:

1. increase market share;
2. profits increased;
3. leadership in our segment;
4. increase the flow of clients.

Effective management of an educational organization requires a well-thought-out marketing strategy. All activities in the field of marketing, advertising, public relations and sales of work in one direction. And frankly, this approach effectively implements the marketing strategy.

Depending on the goals set by the higher education institution and the means to achieve them, the following marketing strategies are distinguished:

1. Gain market share or expand it to the indicators established by the institution.

2. Innovation strategy – creation of services and educational products that have no analogues on the market.

3. Differentiation of educational services is characterized by changes and modifications of educational conditions.

4. Waiting strategy. It must be used in cases where trends in demand for educational services and market changes have not been identified.

5. Internationalization. At the same time, the marketing strategy involves the planned and systematic processing of foreign markets.

6. Cooperation. This involves mutually beneficial cooperation with other higher education institutions in the field of educational services [12].

Developing an advertising strategy for an educational structure is impossible without preliminary research. Marketing research must be carried out constantly. Constantly updated information provides information about the real results of events and the dynamics of their influence on the market of educational services and consumers of these services. In addition, this makes it possible to qualitatively regulate communication activities and the production of educational products.

The marketing plan of an educational company includes 6 stages: situation analysis, goals, strategy, tactics, budget and control.

Analysis of the situation. During this period, the educational organization studies external factors (economic, sociocultural, technological), as well as competitors and consumers. The organization examines strengths, weaknesses and potential risks. Research is carried out from external factors to internal factors. The study of external and internal environmental conditions of an educational organization can be carried out using SWOT analysis.

Marketing strategy goals. After analyzing the situation, the organization's goals are formulated and the time frame for their achievement is determined. Goals are determined taking into account the interests of all participants in the educational system, the reputation of the university and other important conditions [13].

Strategy. Choosing the most optimal course to achieve a goal is the main task of strategy. The main task of promoting educational services on the market is to provide information about a higher educational institution to potential buyers.

The next step in developing a marketing strategy is *tactics*. The strategy must be developed by detailing elements related to marketing tools and specific activities. The timing of the events is established and responsible persons are appointed.

Budget. Planned activities and works relate to the costs necessary to achieve the goals of the higher education institution.

Control. The institution of higher education must establish criteria to determine how well the activity is progressing toward achieving the goal. If actual performance falls short of plans, the organization must review its goals, strategy, or activities to correct the situation. [13].

From the point of view of these criteria, three main models of education can be distinguished: European, American and Asian, which are used with a certain degree of variation in developed and rapidly developing countries.

The strategy for fundamental change in Uzbekistan is based not only on local values, experience and traditions, but also on the use of advanced foreign experience. In the process of reforming the national education system of Uzbekistan, the above three educational models, primarily elements of the Asian educational model, try to take into account the achievements of other countries and use them creatively.

The number of students in universities is increasing every year. In particular, if we analyze the number of students at the Kokan State Pedagogical Institute, then in the 2022/2023 academic year it amounted to 14,996 people. In the last three academic years of the institute, there has been a dynamic growth in data on the number of students. Specifically, in the 2020/2021 academic year the

total number of students was 8,847, and in the 2021/22 academic year this number reached 14,672, or 60% more than in the previous academic year. The dynamics of growth can be observed according to the following diagram (Figure 1).

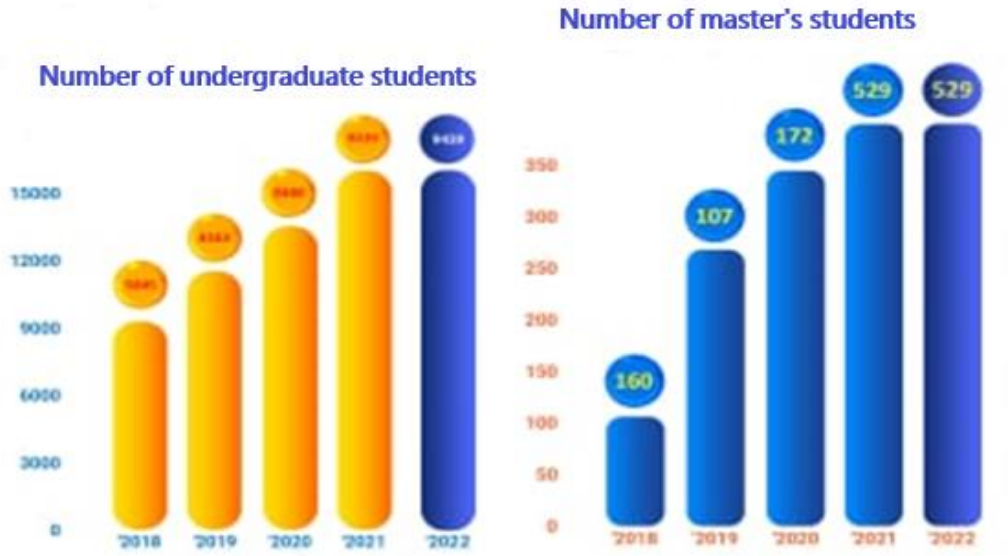

Figure 1. Number of students at KSPI (over academic years)

In the 2022/23 academic year, the institute employed 526 teachers. The number of academic degrees of professors and teachers is 145, of which 10 are Doctors of Science (DSc), 135 are Candidates of Science. The indicator of the scientific potential of the institute in the 2022/23 academic year was 27.5 percent. (Figure 2)

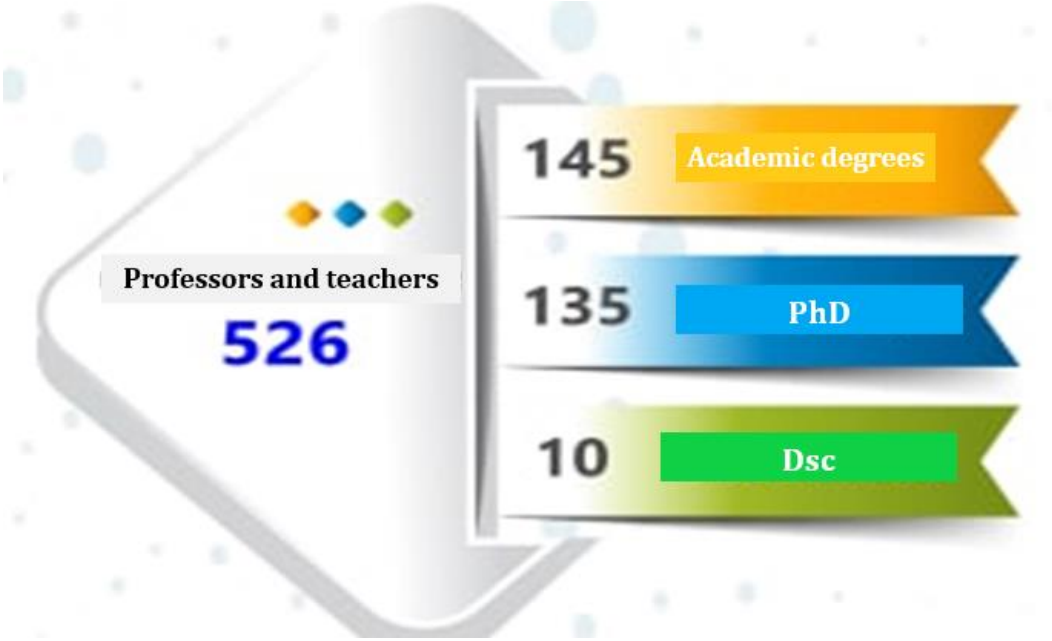

Figure 2. Number of professors and teachers of KSPI (scientific potential)

An analysis of the work carried out on the implementation of international marketing and the use of local and foreign funds, programs, participation in the preparation of projects shows that the number of foreign teachers in international cooperation programs and foreign projects in 2021 was 26 people. from 2022 to 30, and the number of students - from 7 in 2021 to 9 in 2022 (Figure 3).

Figure 3. Number of foreign specialists (in terms of academic years)

Based on the results of the above analysis, we have developed an algorithm for forming a marketing strategy in the field of higher education.

1. The first stage is preparatory. To achieve this, the necessary tools and resources are involved.

2. The second stage consists of setting marketing goals, identifying tasks and responsible persons.

3. At the third stage, marketing analysis is carried out according to the elements of the marketing mix.

4. At the fourth stage, the methods of SNW analysis and SWOT analysis are used to summarize the collected material. The source of information is the internal documents of the higher education institution, including annual reports approved by the council of the higher education institution.

5. At the fifth stage, the organization's marketing strategy is developed. At the same time, clearly identify the persons/departments responsible for implementing the strategy. Depending on the structure of the university, the centers for implementing the strategy and control may be the marketing department, the education quality control department, etc. To carry out intermediate and final control over the implementation of the marketing strategy, it is necessary to determine its effectiveness indicators and their threshold values.

The marketing strategy of the university must be coordinated and interconnected with the overall development strategy of the university (if any).

6. Once the marketing strategy is developed and adopted, the sixth stage begins - the implementation stage. Here, intermediate control is of particular importance, allowing timely adjustment of the marketing plan [11].

Based on the general system of performance indicators for universities, a system of indicators for intermediate and final monitoring of the implementation of the marketing strategy is proposed.

7. At the seventh stage, the effectiveness of the marketing strategy is assessed.

In our opinion, it is necessary to evaluate the effectiveness of marketing in higher education institutions through specific indicators.

We can suggest the following option for calculating the overall indicator of marketing effectiveness. In this case, it is necessary to determine the initial values of the selected indicators at the stage of developing the university's marketing strategy. In our study, the indicator is defined as **Y**. The choice of one or another indicator depends on the strategic priorities of the university. It is also possible to select more than one indicator for each direction or not to evaluate more than one direction.

Then (Y1) the planned values of the selected indicators are found, that is, intermediate (monthly, quarterly, annual) and final values (if the university is developing a long-term marketing strategy). At the end of the selected period, the deviation of the actual value of the indicator from the planned value is calculated using the following formula.

$$Y_{ei} = Y_{e1} / Y_{e0} * 100\% \quad (1)$$

here,

Yei – the effectiveness of the implementation of the university's marketing strategy according to the Yi indicator;

Ye1 – actual value of the Yi indicator;

Ye0 – planned value of the Yi indicator.

Then the average indicator is calculated for each area of the university's marketing assessment:

$$\bar{U}_{ie} = (Y_{e1} + Y_{e2} + \ldots + Y_{ei}) / i \quad (2)$$

here,

Uie – average value of marketing effectiveness for a specific area of assessment, %;

Y1 – efficiency of implementation of the university's marketing strategy according to indicator Y1;

Yei – the effectiveness of the implementation of the university's marketing strategy according to the Yi indicator;

i - is the number of selected indicators.

The overall indicator of the implementation of the university's marketing strategy Cv (marketing effectiveness) is assessed as the average value of the effectiveness of all areas:

$$C_v = (T_{1e} + T_{2e} + \ldots + T_{ie}) / i \quad (3)$$

here,

Cv - is a general indicator of the university's marketing strategy;

T – direction of assessing the effectiveness of the marketing strategy;

i - is the number of directions selected to assess the effectiveness of the marketing strategy;

If the marketing strategy is successfully implemented, the value of the overall effectiveness indicator Cv will approach 100%.

The following table shows the criteria for assessing the effectiveness of the implementation of the marketing strategy of a higher education institution.

Table 2. Criteria for assessing the effectiveness of marketing strategy implementation

№	Cv indicator value	Efficiency mark	Basis and reasons	Action to take
1	A+ (above 100%)	This strategy cannot be called successful.	This indicator arises as a result of planning errors (when the potential of a university is not sufficiently assessed, influencing factors are not fully taken into account) or due to sudden changes in factors in the external or internal environment of the university.	Identified shortcomings and errors should be eliminated.
2	A (80% - 100%)	In this case, the implementation of the strategy can be considered successful.	The closer the indicator value is to 100%, the more successful the strategy.	
3	B (60%-80%)	In practice, the implementation of the strategy can be considered successful.	The strategy will not be fully implemented.	It will be necessary to pay attention to the factors that impede the successful implementation of the strategy and take

				appropriate measures to eliminate them.
4	C (30% - 60%)	The implementation of the strategy can be considered satisfactory.	There are deviations from the established strategy.	Analysis is necessary to identify deviations and develop measures aimed at improving efficiency.
5	E (less than 30%)	The implementation of the strategy was considered unsatisfactory.	The strategy will be chosen or formulated incorrectly.	It is necessary to comprehensively analyze all stages of the formation of a marketing strategy, the selected marketing tools, and the process of implementing the strategy in order to change the strategy at each stage.

Assessing the effectiveness of the implementation of a university's marketing strategy increases the chances of successful implementation of this marketing strategy.

We propose to use the following methodology to implement a marketing strategy in a higher education institution.

The term ARCI is an acronym for the words below.

Responsible (accountable) (Accountable) – bears full responsibility for the implementation of the stage/task and has the right to make decisions on the method of implementation. Only one person can be appointed responsible for completing a task.

Performer (Responsible) - performs the task, is not responsible for choosing the method of solving it, but is responsible for the quality and timing of completion. Each task must have at least one performer.

Consultant (Consult before doing) – gives advice in the process of solving project problems, monitors the quality of implementation.

Observer (Inform after doing) - can give advice in the process of solving project problems, does not bear responsibility.

Work distribution matrix "What services?", "Who?" and how?" should be used by structural units (SU) of the university to determine answers to questions.

The work distribution matrix is presented in Table 2.

Table 2. Work Breakdown Matrix [14]

ARCI Matrix	**Operations for services (within competence).**				
SU	**Establish distribution and relationship matrix**	**PR promotion**	**Identifying service needs**	**Offer services in aggregate**	**Offer services individually**
SU1	C	I	I/C within the annual plan	I	I
SU2	A	A	A	A	C
SU3	R	R	R	R	A
SU4	R	R	R	R	A
SU5	R/A	R/A	R/A	R/A	A

Based on the matrix, we can highlight the specifics of interaction between structural units. It is based on the following principles, which are not reflected in the labor distribution matrix.

1. The head of the institution organizes the work of a structural unit or specialist that ensures the promotion of educational services (marketing). It also promotes services through communication tools established by the management of the organization. In addition, the manager must draw up an annual plan for attracting extrabudgetary funds.

2. Based on the services provided by the structural units included in the annual plan, specialists responsible for marketing in the organization solve the complex task of promoting the necessary services in accordance with the plan.

3. Structural units from among the above specialists, after determining a guaranteed sales market in sufficient quantity to implement the plan.

then, in accordance with the plan, implement measures to ensure adequate availability of services in the market.

4. The manager provides general operational management of the implementation of the plan.

Conclusions and offers

The introduction of an algorithm for the formation of a university's marketing strategy into the practice of university management allows us to formulate its marketing strategy directly and taking into account the needs of end consumers and thereby increase the competitiveness of the university in the educational services market.

In our opinion, it is necessary to evaluate the effectiveness of marketing in higher education institutions through specific indicators. Each of these areas should include a set of specific indicators that measure the achievement of set goals and identify existing "problem areas".

Assessing the effectiveness of the implementation of a university's marketing strategy will increase the chances of successful implementation of this marketing strategy. With the successful implementation of a marketing strategy, the value of indicators should grow steadily. Consequently, the importance of the overall marketing effectiveness indicator increases.

To summarize the rules of a marketing strategy, as well as to create an organizational structure for its implementation, you can use the work distribution matrix according to the ARCI methodology. ARCI Work Division

The matrix determines the level of responsibility of each member of the project team for the implementation of individual stages and tasks of the project. A method called ARCI is used to create a work allocation matrix. The ARCI methodology is a convenient and visual tool for planning the responsibilities of project team members when performing tasks at each stage of the project.

Thus, we can come to the following conclusion. That is, there is no universal method for assessing the effectiveness of a marketing strategy. The optimal set of metrics will always be unique to each organization.

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DIGITAL TRANSFORMATION IN EDUCATION AND HIGHER EDUCATION MANAGEMENT

Ustadjalilova Khurshida Alievna*
Kokand State Pedagogical Institute, Kokand, Uzbekistan
*E-mail: **xurshida.ga@gmail.com**

Abstarct. The article shows the main trends in the management of higher education, where the management of an educational organization in the context of digital transformation involves a digital assessment of the quality of education, organization and planning of activities, providing access to students and teaching staff to materials and services in a new digital format, as well as monitoring using new technologies and services.

Keywords: digital transformation, higher education, electronic platform, competencies, digital tools, interactive tasks, Internet services.

Introduction

The modern economy is characterized by technological breakthroughs and new ways of processing information. This process of digitalization has made significant changes in the education system, which has led to the formation and development of the necessary digital skills. Digital transformation in education has been one of the leading characteristics in the last few years. We have passed the stage of quantitative development through the increase of digital platforms, distance learning, online lectures and webinars, universal computerization, mobile applications and digitization of all kinds of processes in various fields, etc.

The digitalization of Uzbekistan began about 10 years ago. In 2012, the Government of the Republic approved the "Comprehensive Program for the Development of the National information and communication System". The execution of the document was designed for the period 2013-2020.

In July 2013, a single portal of interactive public services was launched in Uzbekistan. In 2016, citizens of Uzbekistan on the portal my.gov.uz A unified One ID system has become available. It allows you to identify users, opening access to a wide range of services provided by government agencies and commercial enterprises. In 2020, the strategy "Digital Uzbekistan — 2030" was adopted, within the framework of which over 220 priority projects are planned, providing for the improvement of the e-government system, further development of the domestic market of software products and information technologies, organization of IT parks in all regions of the republic, provision of this area with qualified personnel.

Analysis of literature on the topic

The research of L.N. Samborskaya shows the main trends in the management of secondary schools, where the management of an educational organization in the context of digital transformation involves, among other things, a digital assessment of the quality of education, organization and planning of activities, providing access to students and teaching staff to materials and services in a new digital format, as well as monitoring using new technologies. technologies and services.[1]

The monograph "Digital transformations in education. Technologies, communications, solutions" explores modern views and tasks of organizing the educational process in the context of digital transformation. The current approaches to setting up effective communications in the educational environment in the context of digitalization are shown. Practical solutions based on the experience of introducing digital technologies into the educational process are revealed.

In the work of the authors G.A. Sumina, E.Y. Novikova "Digital transformation of education".[2]the list of normative documents, basic concepts and requirements for the digital transformation of educational organizations, models for the introduction of the digital educational environment, its capabilities, digital educational technologies and tools are shown. The purpose of the publication is to recommend the most effective, rational options for implementing the digital transformation of education.

In the work "Digital renewal of the Russian school:newsletter" by the team of authors A. R. Goryainova, I. V. Dvoretskaya, etc. The changes taking place in the field of information, communication and digital technologies in relation to the educational process, and in relation to the content of school education, and in relation to its management are shown. The work is informative, with the presented data allowing to describe in more detail the process of digital renewal of schools and to provide a more accurate prediction of its further development.[3]

In the context of digital transformation, university management can become effective on the basis of a digital platform Hemis.uz [4] which allows you to:

• automate the administrative, educational and scientific activities of the university;
• provide modern electronic services to teachers and students;
• create an information and educational corporate portal of the university.

The main tasks of the system:

• accounting and monitoring of the student body;
• accounting and monitoring of the faculty contingent;
• organization of the educational process;
• Monitoring of student attendance;
• monitoring students' academic performance in disciplines;
• accounting for payments made under paid contracts;
• formation and accounting of normative documents on the educational process;
• formation of electronic reports on the educational process;
• Provision of interactive online services.

Research methodology

The purpose of the study is to develop a scientifically based proposal and practical recommendations for improving the management of an educational organization in the context of digital transformation and evaluating the effectiveness of digitalization in the higher education system. The article uses group, comparative, structural, factorial and statistical methods of methodology to highlight the effectiveness of digitalization in the higher education system.

Discussion and results

Today, the emergence of new technologies has led to a qualitative and tangible change in the educational space around the world, this is working with large databases, the introduction of artificial intelligence, etc. From an interpersonal communication process, education, in fact, has turned into a technological process dependent on the use of rapidly developing information technologies. Over the past few years, fundamentally new online educational projects have emerged, comparable to the "avalanche of digital innovations"[5].

Analysis of the situation. The importance of the topic of this study also stands out from the huge number of research activities in the field of education, which accounts for more than a quarter of all research conducted in 2022-2023 *(Figure 1).*

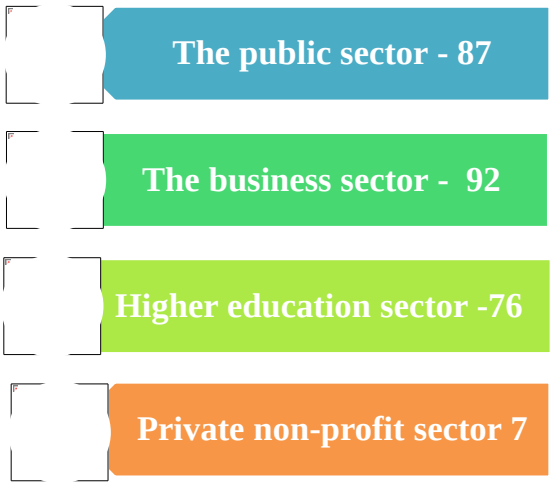

Figure 1. The number of organizations that carried out scientific research by sector[6]

In accordance with the above changes, the number of doctoral students is also increasing (Figure 2), as well as the number of publications and research papers on this topic. According to the collections of the Statistics Agency under the President of the Republic of Uzbekistan "Science and innovation in Uzbekistan" and "Key indicators of the development of the information society in Uzbekistan", the number of applications for competitions of innovative projects in the field of ICT, as well as the number of publications in publications indexed in Scopus, has been growing significantly in recent years.[7]

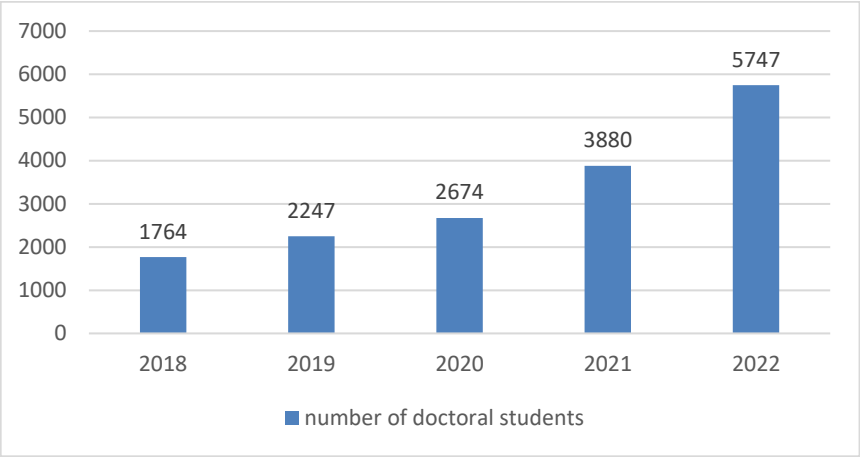

Figure 2. The number enrolled in institutions with the basic doctoral studies in the regions of the Republic of Uzbekistan

In 2022, the total number of organizations in the Republic of Uzbekistan with doctoral degrees reached 107, of which 45.8% are scientific organizations (49 units) and 54.2% (58 units) are higher educational institutions. In 2021, their total number was 97 units. The growth rate is fixed at 10.3%.

The number of teachers with academic degrees is also growing. For example, in the KSPI 2022/23 academic year, 526 teachers worked at the institute. The number of academic degrees of professors and teaching staff is 145, including 10 Doctors of Sciences (DSc), 135 candidates of Sciences. The indicator of the scientific potential of the institute in the 2022/23 academic year was 33.5 percent (Figure 3), which raises the question of the need for further development of scientific potential, which also indicates the need for digitalization and strengthening of the digital base to gain access to electronic resources, electronic libraries, the use of remote tags, virtual laboratories, software, artificial intelligence.

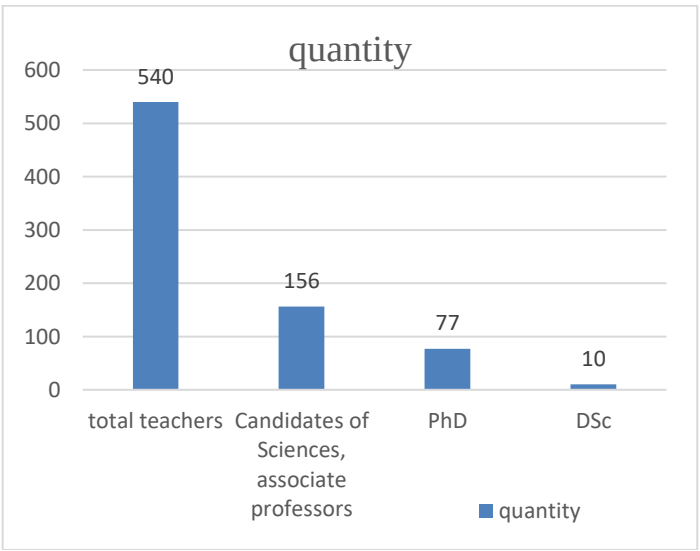

Figure 3. Number of professors and teachers of KSPI (scientific potential)

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Tashkent University of Information Technologies named after Muhammad al-Khorezmi, including its branches, has more than 27,000 students;

Inha University in Tashkent has 1,720 students.

Amity University in Tashkent has 881 students.

"IT-Park University"" the digital university **"IT-Park University"** was established in Tashkent and began its activity from the **2022/2023 academic year, about 350 students study,** in the future it is planned to accept 1,000 students annually.

The digital university "IT-Park University" trains personnel in accordance with the contract concluded between the foreign enterprise "Epam Systems".

Graduates of the IT-Park University digital University are awarded a diploma of their own sample, which is recognized as a document on higher education in the republic.

It should be noted that in recent years, bachelor's and master's degree programs in computer engineering, information systems, programming, and information technology have been opened in all universities of the country.

In addition, the digital transformation at the university is aimed at:

-development of the digital space,

-development of educational and methodological support, digital tools and services, assessment of student training

-development and implementation of new directions for the organization of educational work.

Digital technologies are also necessary in the management of the educational process, assessment and certification of learning outcomes, social networks for teachers and students, researchers and employers, etc[10].

According to the research results of Plekhanov Russian University of Economics, it turned out that specialized digital educational startups are able to more effectively perform many traditional functions of universities – teaching, evaluating results, forming communities, etc.: Plekhanov Russian University of Economics has developed and launched its own system for conducting entrance tests, Olympiads and intermediate certification using a proctoring system. The information security of existing systems has been ensured.

Instagram Facebook, YouTube, and other popular social networks, where an audience of all ages from all regions of the world is gathered, are used by universities to promote themselves in the modern world.

Digital transformation is indispensable in the educational process itself, its content, the choice of methods, techniques, tools and tools, technologies and communications.

Modern models of educational work organization are also changing. Using personal mobile devices in the workflow is an increasingly popular BYOD (Bring Your Own Device) model

Virtual technologies that enhance the interactivity of training courses, including, for example, Scenario-Based Learning (SBL), the use of virtual (VR) and augmented reality (AR) technologies.

Digital tools in education are "a subgroup of digital technologies that are being developed to develop the quality, speed and attractiveness of information transfer in teaching and learning." To conduct online lessons, the teacher is provided with a wide range of platforms, services and applications, but everyone chooses the one that is convenient for him. Zoom is a service for

organizing various educational (and not only) video conferences and webinars, Google Meet is a video conferencing service, the advantages of which are convenient planning, simple and intuitive design, Microsoft Teams is a platform designed for online collaboration.

The use of interactive tasks in the classroom (LearningApps, Kahoot, etc.), Google Forms (Google Forms) allow you to conduct surveys, get students' answers to the questions specified in the questionnaire, and create tests.

Modern students cannot imagine themselves and their lives without smartphones, the smartphone becomes a part of the body. In addition, they are all immersed in the Internet, in social networks.

It is smartphones that can be used as tools and tools for electronic educational resources, can be used in any educational institution in classes and trainings. This always provides new opportunities for the formation of ICT competencies of teachers and students.

What methods should a school have in order for the educational product that a student receives to be effective? Allan Carrington transformed Bloom's theory into a single scheme where you can find mobile applications for educational purposes.[11] (picture.1)

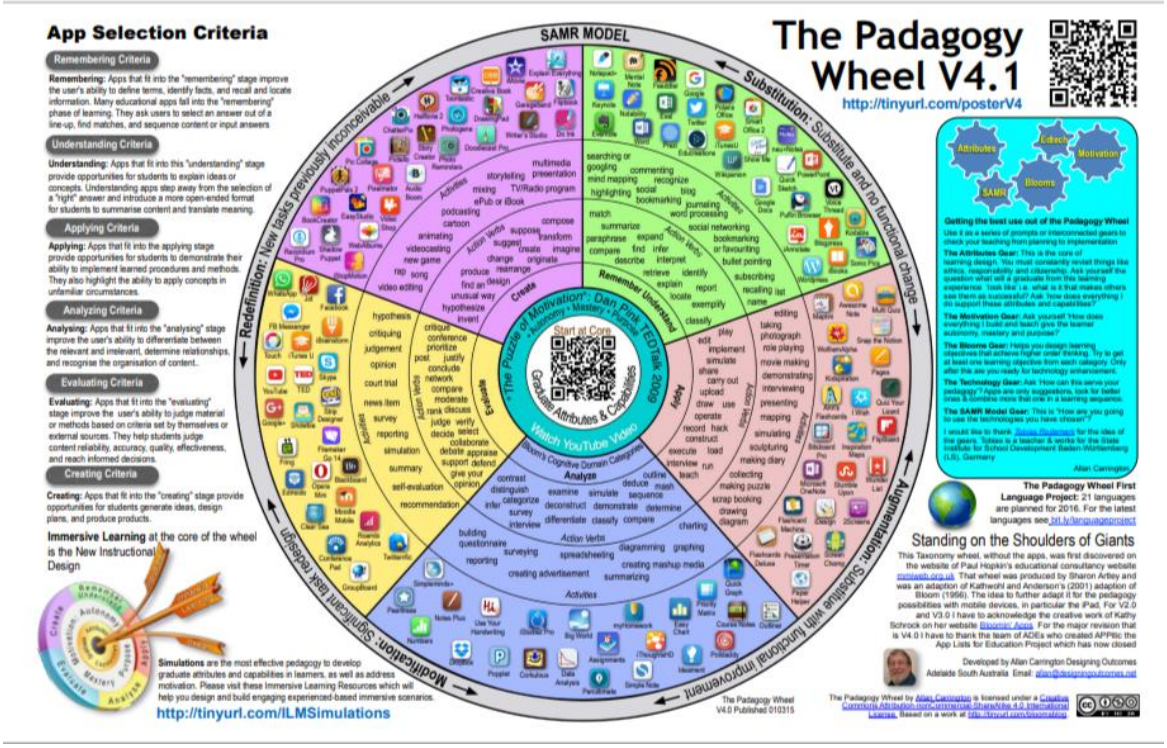

Figure 4. Interactive Lesson Tools Using Bloom's Taxonomy [11].

The map should be read from the center. The map tells you where learning should begin and what it should be like at the last stage. For more information about the description of the map and its instructions, see the article by Allan Carrington. [11] This map shows how technology can work inside, improve skills in using computer technology in the classroom.

In conclusion, I would like to note that Google has many services that successfully help teachers in their work — you can safely start using them in the classroom if you haven't done so yet. The applications from the Pedagogical Wheel are diverse, as is the scope of their application.

Conclusions and offers

Thus, we analyzed the current model of university management and the organization of the educational process in the context of digital transformation in the Republic of Uzbekistan, showed the relevance of this area in the field of research activities of teachers, doctoral students and researchers, noted the use of interactive tools and online services in the field of education.

The conclusion will be the criteria for assessing the digital maturity of the university, which are given below. (Figure 5)

Indicator	characteristics
Users and services	of the provision of services in digital form for key business processes; relationships with users
Information systems	description of existing information systems : classification of IP, architecture, integration of IP, etc
Data management	assessment of measures for the transition of the university to data-based management
Infrastructure	indicators for assessing the level of development of the ICT infrastructure of the NGO
Frames	assessment of measures and actions to form the digital competence of the administrative and managerial staff, teaching staff and students.

Figure 5. Criteria for assessing the digital maturity of a university

This table shows the criteria for evaluating university management in the context of digital transformation, which provides a digital assessment of the quality of education, organization and planning of activities, providing access to students and teaching staff to materials and services in a new digital format, as well as monitoring using new technologies and services.

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BIBLIOMETRIC STUDY: THE IMPACT OF DIGITAL TRANSFORMATION ON SUSTAINABLE ECONOMIC GROWTH IN REGIONAL ECOSYSTEMS

Zhansaya Imangali*[1]Aksana Panzabekova[2]
[1]phd student at KazNU after Al-Farabi, Almaty, Kazakhstan
[2]c.e.s., chief researcher, Institute of Economics SC MS&HE, Almaty, Kazakhstan
*E-mail: imangali.zhansaya@gmail.com

Abstract

This study aims to explore the impact of digital transformation on sustainable economic growth within regional ecosystems. Digital transformation, characterized by integrating digital technologies into various sectors, significantly enhances efficiency and fosters innovation, thus promoting sustainable economic practices. Utilizing bibliometric analysis, data was collected from the Scopus database, focusing on documents published between 2010 and 2023. VOSviewer was employed for constructing and visualizing bibliometric maps. The analysis included temporal trends, keyword co-occurrence networks, and geographic distribution of research contributions.The temporal analysis revealed a significant increase in publications from 2013 to 2023, indicating a rising trend towards digital transformation. Keyword analysis identified major themes such as technological foundations, sector-specific applications, economic impacts, and sustainability. Geographic analysis showed leading contributions from China, the United States, and the Russian Federation, with notable efforts from emerging economies like Kazakhstan.The findings underscore the critical role of digital transformation in promoting sustainable economic practices and resilience in regional ecosystems. The close collaboration between Russia and Kazakhstan is particularly emphasized, reflecting their joint efforts in integrating digital technologies to enhance regional development. Future research should focus on continuous monitoring and refinement of digital transformation policies to support sustainable development goals, especially in underrepresented regions.

Keywords: digital transformation, sustainable economic growth, regional ecosystems, bibliometric analysis, vosviewer

JEL codes: R11, O44, O33, Q56

1 Introduction

Digital transformation, characterized by the integration of digital technologies into various sectors, fundamentally reshapes regional ecosystems, enhancing efficiency and fostering innovation. It supports sustainable economic growth by promoting efficient resource use and reducing environmental footprints, crucial for achieving the Sustainable Development Goals.

However, the impact varies regionally, with developed regions often leveraging advanced technologies for automation and digital services, while developing areas may focus on establishing basic digital infrastructure. This disparity underscores the need for tailored digital strategies to ensure equitable benefits across different regions. Understanding these dynamics through a bibliometric analysis helps identify trends, collaboration patterns, and thematic focus areas, providing valuable insights for policymakers and business leaders to formulate effective digital adoption strategies.

Despite the crucial role of digital transformation in enhancing sustainable economic growth across regions, there remains a substantial gap in targeted research exploring its specific impacts within diverse regional ecosystems. This deficiency underscores the need for a comprehensive bibliometric analysis to precisely delineate how digital strategies influence economic sustainability in varying regional contexts.

This study aims to employ bibliometric analysis to delve into the specific impacts of digital transformation on sustainable economic growth across various regions, focusing on discerning

patterns in scholarly publications, analyzing geographic data contributions, and investigating prevalent thematic areas. Through this approach, the research seeks to provide a nuanced understanding of how digital technologies are integrated into regional economies and their consequent effects on sustainability.

2 Literature review

Digital transformation is increasingly recognized as a pivotal force in modern economies, driving sustainable economic development through the integration of digital technologies across various sectors. This transformation encompasses a broad range of technological advancements including AI, IoT, blockchain, and cloud computing, which revolutionize industries by enhancing efficiency, customer experience, and creating new business models. The relevance of digital transformation in achieving sustainable economic growth is well-documented, with significant impacts on productivity, job creation, and economic resilience. Studies have shown that digital transformation not only boosts economic growth but also plays a critical role in advancing sustainable development goals (SDGs).

The relevance of digital transformation in modern economies and its increasing importance in achieving sustainable economic development is well-documented by studies showing how digital economies drive production efficiency, create new jobs, and develop sustainable business models, although it also brings challenges that impact different sectors differently across regions(Lukmanova et al., 2024; Mottaeva et al., 2023).

2.1 Digital Transformation: Concepts and Global Impacts

Digital transformation encompasses the adoption of digital technologies, such as artificial intelligence (AI), the Internet of Things (IoT), blockchain, and cloud computing, across various sectors, leading to significant changes in business models, organizational processes, and cultural attitudes towards continuous innovation ((Gray & Rumpe, 2017); (Verina & Titko, 2019)). The role of digital technologies in transforming organizations and social relationships is crucial, with themes like openness, affordances, and generativity being central (Nambisan et al., 2019). Moreover, digital transformation introduces strategy-oriented and customer-centric changes in infrastructure and processes, making it a continuous process with the potential for significant growth and savings ((Tang, 2021); (Pihir et al., 2018)). However, a unified definition of digital transformation is needed to provide conceptual rigor (Gong & Ribiere, 2021). Phenomena such as collaboration, sharing, communication, connectivity, flexibility, mobility, and co-creation are central to the digital transformation narrative, highlighting its complex and evolving nature (Bockshecker et al., 2018). Thus, developing digital competencies and knowledge is essential in this digital economy to fully leverage its benefits and drive sustainable economic growth (Larionov et al., 2019).

Digital transformation has widespread impacts across different sectors globally. The digital transformation in healthcare has significantly improved patient care and operational efficiency through the adoption of new technologies such as electronic health records, telemedicine, and AI-driven diagnostics (Gopal et al., 2018; Haggerty, 2017; Limna, 2023; Tomar et al., 2023). The finance sector has been revolutionized by innovations such as fintech, blockchain, and digital payment systems, which have increased accessibility and security (Jain et al., 2023; Liang, 2023; Zhao, 2023). Manufacturing has also benefited, with the integration of IoT and AI in smart factories has significantly improved productivity, reduced costs, and enhanced supply chain management. This has been achieved through the digitalization of control quality processes, production planning, and the introduction of sensor-based data (Belli et al., 2019). IoT has also facilitated automation, continuous monitoring, anticipatory maintenance, and data analysis, leading to increased operational efficiency and productivity (Babu et al., 2023).Meanwhile, in education, the use of digital platforms and e-learning tools in education has significantly transformed the teaching and learning process. These tools offer flexible access, interaction, and collaboration (Josué et al., 2023)and have been found to be effective in creating a personalized learning environment (Shurygin et al., 2021).These global impacts underscore the transformative potential of digital technologies in driving economic growth and improving service delivery across sectors.

2.2 Sustainable Economic Growth: The Role of Digital Transformation

Digital transformation is a pivotal force in modern economies, driving sustainable economic growth through the integration of advanced digital technologies into various sectors. Digital transformation plays a crucial role in promoting sustainable economic practices by enhancing resource efficiency, reducing environmental footprints, and fostering innovation(Rosário & Dias, 2023). By driving green economic development and sustainable business strategies, these technologies enable organizations to align their operations with environmental goals (Kalluri, 2023; Yang et al., 2022). The integration of digital technologies in sustainable entrepreneurship and the business models of new ventures leads to broader stakeholder integration and value creation (Fuerst et al., 2023). This holistic approach ensures that sustainability is embedded in core business strategies, facilitating the development of products and services that meet both economic and environmental objectives. Moreover, the use of digital technologies supports transparent and efficient resource management, which is critical for minimizing waste and maximizing productivity. The role of digital transformation in sustainable economic growth is multifaceted and significant, as it drives innovation, enhances productivity, and fosters sustainable development across various sectors (Kaggwa et al., 2023). The digital economy, encompassing digital technologies, connectivity, and data-driven innovation, promotes sustainability and resource efficiency by enabling smarter resource management and reducing environmental footprints (Youssef, 2022). Furthermore, digital enterprises—including e-commerce, digitalization, and digital marketing—play a critical role in mediating and moderating the relationship between digitalization and economic development, amplifying the positive impacts of digital transformation (Pei, 2022). The use of digital technologies in business models not only creates value-producing opportunities but also enhances management accounting, leading to better decision-making and improved organizational performance (Achar et al., 2022). Collectively, these advancements highlight the indispensable role of digital transformation in achieving sustainable economic growth and fostering resilient, future-proof business practices.

After exploring the broader implications of digital transformation, it becomes essential to understand how regional ecosystems are adapting to these changes. This involves examining regional disparities in digital adoption, analyzing case studies on regional responses, and understanding the role of policy and strategic planning in fostering digital transformation.

2.3 Regional Ecosystems: Adapting to Digital Transformation

The digital transformation of regional ecosystems is a complex process that involves changes in information, resource, capital, and technology flows (Hao & Zhang, 2021). This transformation is driven by the emergence of digital ecosystems, which are interdependent groups of economic actors sharing digital platforms (Nikitaeva et al., 2021). The sustainability and adaptability of regional development in the context of digitalization are crucial, with a focus on resource efficiency, justice, and minimizing environmental damage (Akimova et al., 2020). The development of digital ecosystems in industrial enterprises is particularly important, with a need for a conceptual understanding and analysis of their development (Nikitaeva & Serdyukov, 2020). The increasing role of digital assets and methods in digital ecosystems is emphasized, with a focus on sustainable development (Astafyeva, 2022). Additionally, (Hao & Zhang, 2021) investigates the impact of digital transformation on the flow of information, resources, capital, and technology in China's regional innovation ecosystems, identifying potential risks and offering countermeasures and recommendations. This study explores changes in flow direction and rate under digital transformation, highlighting alterations in information flow, acceleration in resource, capital, and technology flow rates, and potential risks with improvement recommendations. Moreover, (Nikitaeva et al., 2021) analyze the development of digital ecosystems in industrial enterprises in the South of Russia, emphasizing the role of regional drivers and the importance of integrating various stakeholders into the information circuit for increased adaptability. (Akimova et al., 2020) provides a comprehensive analysis of sustainability and adaptability indicators for regional development, stressing the importance of human welfare, regional inequality, and digitalization in

formulating strategies for economic behavior. Collectively, these studies underscore the multifaceted nature of digital transformation in regional ecosystems, highlighting both opportunities and challenges in fostering sustainable and adaptable regional development.

3 Methodology

This research employs a bibliometric analysis to investigate the impact of digital transformation on sustainable economic growth in regional ecosystems. The Scopus database, known for its comprehensive coverage of peer-reviewed literature, was utilized for data collection. Scopus has been extensively studied and compared to other databases, with (Ballew, 2009) and (Baas et al., 2020)highlighting its wide global and regional coverage, rigorous content selection, and high-quality data.

Bibliometric analysis, encompassing a range of techniques and quantitative measures, is a valuable tool in research. It can be used to assess the impact of research outputs, identify related and updated research, and reveal trends and gaps in the literature (Blakeman, 2018; José de Oliveira et al., 2019). This analysis is increasingly used in decision-making processes, such as research evaluation and the selection of capable leaders (Ledesma & Malave González, 2022). It also plays a crucial role in library collection management, journal relevance assessment, and correlating available information resources with scientists' publication activity (Gureev & Mazov, 2015; Lavrik et al., 2019). Despite challenges such as comparability of measures between fields (Gunashekar et al., 2017), bibliometric analysis remains a powerful tool in research, providing valuable insights and supporting decision-making processes.

Data was sourced from the Scopus database, focusing on documents published between 2010 and 2023. Keywords such as "digital transformation," "regional ecosystems," "sustainable economic growth," and "digital innovation" were used to refine the search and ensure relevance. VOSviewer was employed to conduct the bibliometric analysis, enabling the construction and visualization of bibliometric maps with a focus on graphical representation (Eck & Waltman, 2009). VOSviewer also offers text mining functionality for analyzing large amounts of text data (Eck & Waltman, 2011), aiding in identifying and mapping the intellectual structure and evolution of research within this domain.

First, temporal analysis was conducted to examine trends in the number of publications over the years. This analysis helped to identify periods of increased research activity and correlate them with significant global events or advancements in digital technologies. Following this, a keywords analysis was performed to identify the most frequently occurring terms, understand the main themes and areas of focus in the literature, and generate keyword co-occurrence networks to visualize relationships between different research topics and identify key research clusters.

Finally, the geographic distribution of research contributions was analyzed to determine which countries are leading in research on digital transformation and sustainable economic growth. This included mapping the number of publications by country, examining international collaboration patterns, and performing country-specific analyses to assess the contributions of various regions to the overall body of literature.

This methodology, centered around bibliometric analysis using VOSviewer and data from the Scopus database, provides a comprehensive overview of the research landscape. It identifies key trends, geographic contributions, and thematic areas, offering valuable insights into the role of digital transformation in promoting sustainable economic growth within regional ecosystems.

4 Results and Discussion

Trends in Research Publications

Analysis of documents by year from Scopus shown below reveals a quantitative perspective on the evolution of research concerning combination of digital transformation, ecosystems and sustainable economic growth .

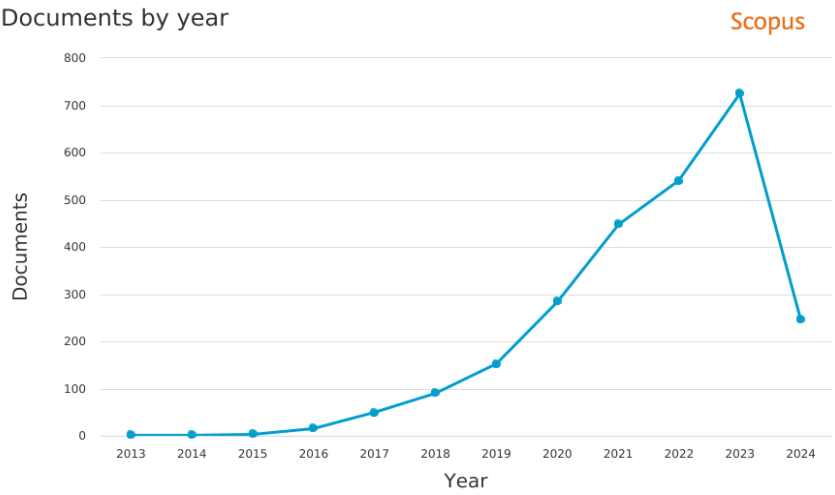

Figure 1- The dynamics of the publications
Note: obtained from scopus database website

The temporal analysis of documents by year reveals an interesting growth pattern in publications from 2013 to 2023, with a sharp increase particularly from 2020 onwards, likely driven by the COVID-19 pandemic and advancements in digital technologies, if there were 284 documents in 2020 overall, amount of publications in 2023 reached 725 which proves the increase of the interest of researchers in that particular area. This trend highlights the growing recognition of digital transformation's potential to enhance sustainable economic practices and resilience in regional economies.

The surge in research interest regarding the impact of digital transformation on regional economic growth is evident through several recent studies. (Lukmanova et al., 2024) in their longitudinal analysis have revealed a consistent growth in digital transformation measures and positive trends in economic development indicators over the years [1]. Studies by (Mirolyubova & Voronchikhina, 2022) have also quantified the impact of regional digital transformation on sustainable development indicators, emphasizing the crucial role of digitalization in regional advancement [2]. Moreover, empirical evidence from Chinese provincial data by (Chen et al., 2023)has indicated a U-shaped impact of the digital economy on regional Total Factor Productivity (TFP), highlighting the increasing significance of digital transformation in driving regional innovation and entrepreneurship [3]. Furthermore, examinations of Industry 4.0 and digital service economy transformations studied by (Capello & Lenzi, 2023)have underscored their varying effects on regional economic growth, underscoring the need for tailored regional policies to maximize their benefits [4]. Additionally, (Ding et al., 2024)demonstrated that digital transformation significantly contributes to innovation performance, with its impact influenced by agglomeration in the productive service industry [5]. These studies collectively reflect a growing interest and recognition of the pivotal role of digital transformation in shaping regional economic growth.

This increase in research publications correlates with a heightened global focus on sustainable practices and the integration of digital strategies into regional development plans. Enhanced resource efficiency, economic resilience, and innovation are central themes connecting digital transformation to sustainable economic growth in regions.

Analysis of Keyword Networks

The VOSviewer visualization provides a detailed depiction of the interconnected themes within the broader discourse of digital transformation and its impact on sustainable economic growth in regional ecosystems. The keyword network is segmented into various clusters, each represented by a different color, revealing the multifaceted nature of digital transformation research and its integration into diverse areas of economic and social development as shown below on Figure 2.

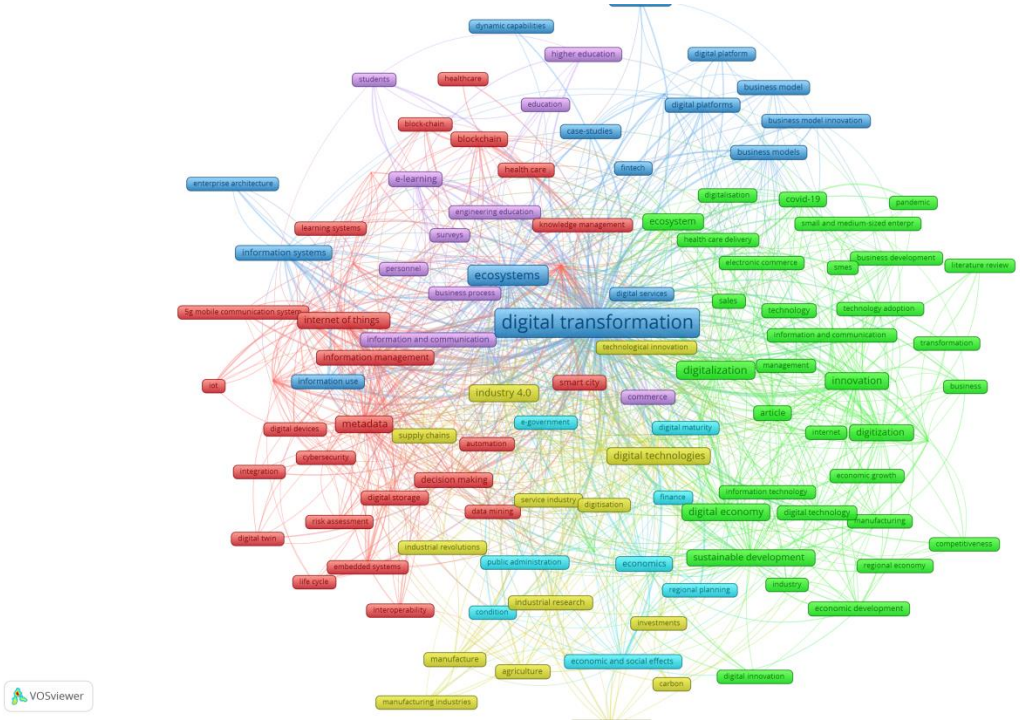

Figure 2- Keyword analysis by clusters
Note: compiled by author

Red Cluster: Technological Foundations of Digital Transformation

The red cluster encapsulates foundational digital technologies and their infrastructural applications, such as “blockchain”, “IoT” (Internet of Things), and “cybersecurity”. These technologies are essential for enabling secure, efficient, and scalable digital solutions in regional ecosystems.

Blue Cluster: Digital Transformation in Public and Commercial Sectors

This cluster highlights the application of digital transformation within various sectors, with keywords like “e-government”, “commerce”, “fintech”, and “healthcare”. It suggests how digital technologies are reshaping public services and commercial activities, enhancing accessibility, and improving service delivery.

Green Cluster: Economic and Industrial Impact

Central to this cluster are terms such as “economic growth”, “industry”, “manufacturing industries”, and “supply chains”. This cluster connects directly with the economic implications of digital transformation, emphasizing how digital technologies integrate into traditional industries to spur economic activity and enhance industrial efficiency.

Yellow Cluster: Sustainable Development and Regional Planning

Focusing on sustainability, this cluster includes “sustainable development”, “regional planning”, and “economic and social effects”. It reflects research into how digital transformation can be leveraged to achieve sustainable goals, particularly in optimizing resource use and enhancing regional economic strategies.

Interconnections Between Clusters

Technological foundations in the red cluster enable various applications in public and commercial sectors depicted in the blue cluster, which in turn bolster economic performance in the green cluster and contribute to sustainability in the yellow cluster.Efficient manufacturing and optimized supply chains can reduce waste and energy consumption, aligning with sustainable development goals (yellow cluster).

Analysis of Country-wise Contributions to Digital Transformation Research

The VOSviewer country overlay visualization below illustrates country-level contributions, highlighting the intensity of research activity and collaborative networks.

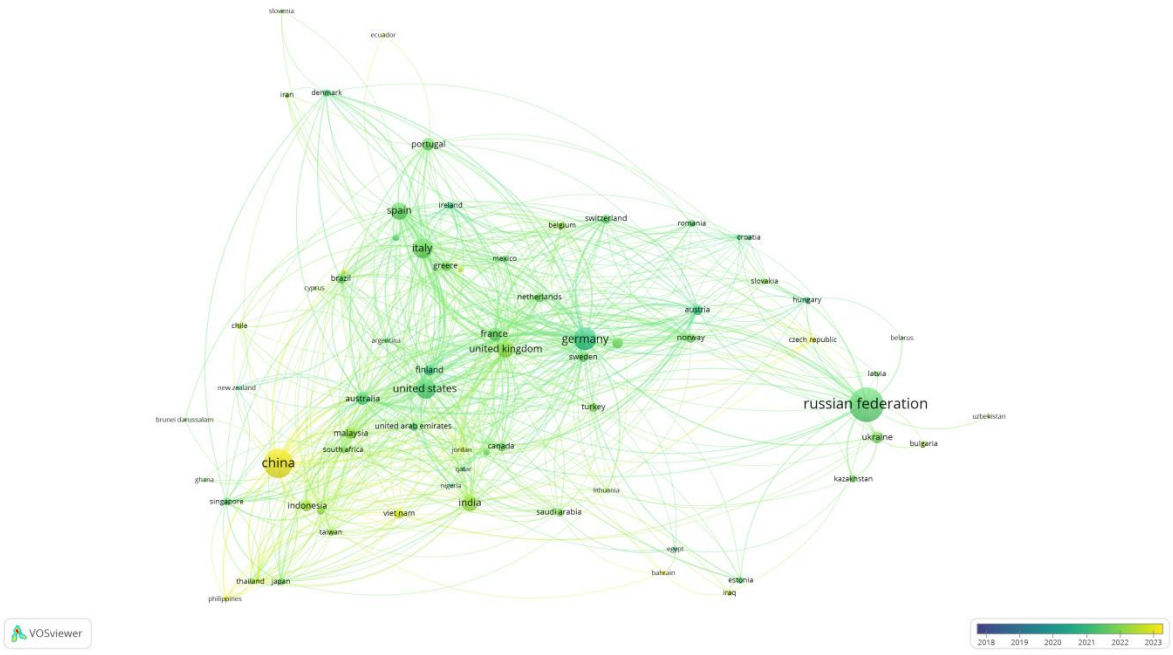

Figure 3- Country overlay visualization between 2018-2023
Note: compiled by author

Key players such as China, the Russian Federation, the United States, and Germany demonstrate significant contributions, indicating their central roles in advancing research on digital transformation. Kazakhstan, though smaller in scale, is significant for regional implications in Central Asia, indicating a proactive approach towards integrating digital technologies into its economic framework.

The East-West collaboration visible in the network underscores a global approach to digital transformation challenges, emphasizing shared interests in harnessing digital technologies for sustainable growth; this is supported by findings that highlight the importance of international cooperation (Miashchanava, 2022), collaborative governance (Verhoest et al., 2024), strategic digital development cooperation in regions like the Indo-Pacific (Okano-Heijmans & Vosse, 2021), and the role of collaborative networks in integrating new technologies (Camarinha-Matos et al., 2019).

The multifaceted analysis of keyword networks, country contributions, and temporal publication trends provides a comprehensive view of how digital transformation impacts regional ecosystems. This synthesis reveals that digital transformation fosters sustainable economic growth by enhancing technological infrastructure, integrating digital technologies across sectors, and driving innovations that lead to efficient and sustainable regional development practices.

For policymakers and regional planners, these insights underscore the importance of fostering an environment conducive to digital innovation and collaboration. Strategic planning should focus on leveraging digital technologies to enhance economic competitiveness and sustainability, ensuring that benefits are widespread and contribute to long-term regional resilience and growth.

The analysis demonstrates that while there are robust contributions from technologically advanced nations, emerging economies like Kazakhstan are also making significant strides. This global collaboration and knowledge sharing are vital for realizing the full potential of digital transformation in enhancing regional economic growth and sustainability.

This research holds significant value for policymakers, business leaders, and academic communities, as it elucidates the role of digital transformation in regional economic sustainability. Insights derived from this study can guide strategic planning, policy formulation, and academic inquiry into optimizing digital initiatives to foster economic growth while maintaining environmental integrity across different regions.

Future Directions:

Based on the trends and findings, future research should focus on the evolving nature of digital technologies and their integration into various economic sectors. There is a need for continuous monitoring of the impacts of digital transformation to refine policies and strategies that support sustainable development goals, particularly in regions that are currently underrepresented in the research.

5 Conclusion

This study provides a comprehensive bibliometric analysis of the impact of digital transformation on sustainable economic growth within regional ecosystems, utilizing the Scopus database and VOSviewer for detailed data visualization and analysis. The findings underscore the significant role of digital transformation in driving economic development, enhancing resource efficiency, and fostering innovation across various sectors.

The temporal analysis revealed a marked increase in publications from 2013 to 2023, highlighting the growing recognition of digital transformation as a pivotal factor in achieving sustainable economic practices and resilience in regional economies.

The keyword analysis identified key themes and areas of focus, such as technological foundations (e.g., IoT, blockchain), applications in public and commercial sectors (e.g., e-government, fintech), economic and industrial impacts (e.g., economic growth, supply chains), and sustainability (e.g., sustainable development, regional planning). These interconnected themes illustrate the multifaceted nature of digital transformation research and its integration into diverse areas of economic and social development.

Geographic analysis pinpointed the leading contributors to research on digital transformation and sustainable economic growth, with significant contributions from China, the United States, and the Russian Federation. Emerging economies like Kazakhstan are also making notable strides, indicating a global collaborative effort in harnessing digital technologies for sustainable growth.

Overall, this research provides valuable insights for policymakers, business leaders, and academics, emphasizing the importance of fostering digital innovation and collaboration to enhance economic competitiveness and sustainability. The findings suggest that while advanced nations lead in research contributions, emerging economies are actively engaging in digital transformation, highlighting the necessity for inclusive and tailored digital strategies to ensure equitable regional development. Future research should focus on the evolving nature of digital technologies, continuous monitoring of their impacts, and refining policies to support sustainable development goals, especially in underrepresented regions.

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ENERGY EFFICIENCY AND RENEWABLE ENERGY SOURCES IN KAZAKHSTAN: PROBLEMS AND PROSPECTS

Bakhyt Baitanayeva*
Al-Farabi Kazakh National University, Almaty, Republic of Kazakhstan
*E-mail: baytanaevab@mail.ru

Abstract. The energy sector is the base for the economy of Kazakhstan, on the level of development of which depends not only the competitiveness of products, but also the energy security of the country. To increase the energy efficiency of industry, it is necessary to modernize large enterprises to reduce the energy intensity of products and emissions of harmful substances**.**

The purpose of the study is to analyze the current state of energy efficiency of renewable energy production and use in Kazakhstan, identify problems and consider the prospects for the development of the country's energy sector.

The following methods were used in the course of the study: informational-descriptive, analytical, systematic, comparative, dialectical and expert.

The result of the study is an analysis of the main consumers of electricity in Kazakhstan – large industrial enterprises, revealing an increase in the energy intensity of GDP, twice the global average.

In conclusion, proposals are made to expand the use of renewable energy in Kazakhstan, taking into account the identified problems and foreign experience.

Keywords. energy efficiency,energyaudit, renewable energy sources, tariffs.

1 Introduction

The Sustainable Development Goals 7 specifically aims to improve the access to afford able, reliable, sustainable, and modern energy. One of the underpinned targets under SDG 7 is to improve the energy efficiency and the goals are inextricably connected to significant reductions in air pollution.

The directions of "green growth" and low-carbon economy as a tool for sustainable development are laid down in all strategic policy documents and international initiatives. Without a transition to a "green" economy, it is impossible to achieve a reduction in the energy intensity of GDP, resource conservation, and compliance with international environmental conventions and agreements. Therefore, modernization and improvement of Kazakhstan's energy system should be carried out in parallel with the expansion of the use of renewable energy sources (RES).

It should be noted that the transition to a "green" economy requires significant investments, while investment projects must be payback.

In this regard, in order to implement an energy efficiency policy, special attention should be paid to the issues of economic incentives for energy conservation and attracting investments in this area.

This study analyzes the energy efficiency of industrial production, the state of renewable energy use, and provides recommendations for reducing energy intensity and stimulating a "green" economy, taking into account foreign experience.

2 Literature review

When studying the problem of energy intensity and energy efficiency, the authors define these concepts, in particular, that energy intensity is the ratio of the total volume of energy supply to the annual GDP created – in fact, the amount of energy used per unit of created wealth. In general, In general, energy intensity decreases as energy efficiency increases [3]. Improving energy efficiency is one of the important tasks in the countries of the European Union. The targets adopted by the European Parliament in July 2023 provide for a collective reduction of energy consumption by at least 11.7% at the EU level by 2030 (compared with the forecasts of the baseline scenario for 2020). EU countries should save an average of 1.5% per year [1].

In Kazakhstan, the problems of reducing energy intensity and improving energy efficiency are given great importance at the legislative level [18]. The energy intensity of GDP in 2022 amounted to 0.32 toe/ $ thousand dollars in 2015 prices (the global average is about 0.17 toe) and increased by 6.7% compared to 2015 [8]. An analysis of energy consumption in Kazakhstan shows an annual increase, while imports from neighboring countries exceed exports [11]. In order to increase energy efficiency and energy security for industrial enterprises, the Rules for Conducting Energy Audits have been approved [10].As a result of the energy audit in 2015-2022, it was possible to reduce the energy intensity of the industrial sector by 39%, which led to savings of 105 billion tenge over 7 years [13]. The result of the energy saving policy in 2022 was a reduction in the energy intensity of the country's economy by 11% and the task was set to reduce it by 15% by 2030 in accordance with international OECD standards [9]. This site outlines the main energy saving measures [12].

Improving energy efficiency is closely related to the use of renewable energy sources, among which the most common are solar, wind, and hydropower [5]. In Kazakhstan, the most common renewable energy sources are solar and wind. The development of renewable energy sources, especially at the initial stage, is a capital-intensive process. The main owners of renewable energy sources in Kazakhstan are investors from Germany, China, Great Britain, Russia, as well as domestic companies [7].Thus, developed and emerging countries are attracting foreign direct investment (FDI) renewable and sustainable technologies. Fan and Hao [2] suggested that FDI is essential for renewable energy development.Financing of "green" projects in Kazakhstan is carried out mainly by commercial banks, since about 70% of investments are borrowed funds [6]. In addition, the government can provide subsidies to consumers of electricity from renewable energy sources [14,15]. In this regard, the experience of European countries (Poland, etc.) in providing subsidies to private consumers – low-income citizens is interesting [16,17].

3 Methodology

The following methods were used in the course of the study: informational and descriptive, as well as a systematic method for analyzing various aspects of reducing energy intensity and using renewable energy in their close relationship as elements of one complex economic system. . The comparative method was used to compare the level of energy intensity and the state of use of wind and solar energy in Kazakhstan in comparison with other countries. The dialectical method allowed us to consider the dynamics, peculiarities of transformation, and cause-and-effect relationships between economic and social trends and processes. The methods of analysis and synthesis made it possible to consider certain aspects of energy efficiency and renewable energy in the context of economic sectors, countries, etc., to identify factors and problems on the basis of which it is possible to identify general trends and prospects for improving energy efficiency and the use of renewable energy in Kazakhstan.

4 Result and Discussion

The energy industry is one of the basic industries of Kazakhstan, the level of development of which largely determines the competitiveness of the country's products on the world market.

Currently, about 67% of electricity in Kazakhstan is generated from coal, 7.3% from hydro resources, 21.5% from gas and 4.5% from renewable energy sources.

Thus, the country's economy is heavily dependent on fossil fuels, as almost two thirds of electricity is generated by coal - fired power plants. At the same time, the share of renewable energy sources in electricity production (excluding large hydroelectric power plants) was only 4.5%.

Currently, Kazakhstan ranks 7th in the world in terms of carbon intensity. This is due to the fact that the main export item of Kazakhstan's economy is mining. It should be taken into account that achieving the goal set by the Government of the country - carbon neutrality by 2060, is impossible without diversifying the economy and switching to the production of high-value-added goods.The main consumers of electricity, in addition to the housing sector, are large industrial enterprises, most of which use equipment from the time of the Soviet Union, wear is at least 50% (Table 1).

Table 1. Final energy consumption in Kazakhstan's industry by subsector in 2022

Industry sector	Energy consumption,%
Ferrous metallurgy	30,1
Non-ferrous metallurgy	26,4
Mining industry	14,4
Production of non-metallic products	10,4
Chemical industry (including petrochemical)	7,0
Production of food, beverages and tobacco products	4,9
Other industrial sectors	3,7
Construction	3,1
Total:	**100**

Source: Bureau of National Statistics of the Agency for Strategic Planning and reforms of the Republic of Kazakhstan

According to Table 1, ferrous metallurgy occupies the largest share in the structure of final consumption of the industrial sector – 30.1%, non–ferrous metallurgy – 26.4% and mining industry - 14.4% of the final consumption of the industrial sector.

Thus, the largest share of electricity consumption in the structure of the manufacturing industry is occupied by metallurgical enterprises – 56.5%, including: Aksus Ferroalloy Plant JSC, Aktobe Ferroalloy Plant, Qarmet JSC (former ArcelorMittal Temirtau), Kazzinc LLP, Kazakh Electrolysis Plant JSC, etc.

One of the important tasks of improving the energy efficiency of the Kazakh economy is to reduce energy intensity, which affects the reduction of prices for manufactured products and, accordingly, to increase its competitiveness in the world market.

Kazakhstan is a full member of the United Nations and in this regard, in addition to solving the tasks of improving the efficiency of the national economy, it is necessary to actively participate in solving world problems. SDG 7 commits the world to ensuring universal access to affordable, reliable, sustainable and modern energy sources. In accordance with this goal, target 7.3 provides for global progress in energy efficiency by doubling the global rate of increase in energy intensity compared to the average rate for 1990-2010. It is necessary to ensure an improvement in energy intensity by 2.6% per year. Какизвестно, Energy intensity is the ratio of the total energy supply to the annual GDP created – in essence, the energy used per unit of wealth created. In general, energy intensity declines as energy efficiency improves [3].

Improving energy efficiency is one of the important tasks in the countries of the European Union. For example, energy efficiency laws have been revised since 2018 to achieve the EU's new ambitious climate goals set as part of the 2021 European Green Deal, the European Commission's strategy aimed at turning Europe into the first climate–neutral continent. In addition, changes to the laws will help reduce the dependence of European countries on fossil fuel imports from Russia. The targets adopted by Parliament in July 2023 envisage a collective reduction in energy consumption by at least 11.7% at the EU level by 2030 (compared with the forecasts of the baseline scenario for 2020). EU countries should save an average of 1.5% per year [1].

Improving energy intensity in the 20 largest energy-consuming countries is essential for achieving SDG target 7.3, as these countries account for about three quarters of global GDP. During the period 2010-2020, 14 of these 20 countries achieved an improvement in energy intensity compared to the previous decade. Only five countries (China, Great Britain, Indonesia, Japan and Germany) exceeded the required level of 2.6% [3].

In connection with the above, Kazakhstan is improving the legislative framework for fulfilling the tasks of improving the energy efficiency of the country's economy. A major role in this direction is assigned to the Law of the Republic of Kazakhstan "On Energy Saving and Energy Efficiency Improvement" dated 01/13/2012 No. 541 – IV [18], which provides for specific legal,

economic and organizational measures to reduce the energy intensity of GDP and increase energy efficiency, as well as mechanisms for their control and monitoring.

One of the important indicators characterizing the final result of economic activity is the Gross Domestic Product (GDP). The volume of GDP produced in Kazakhstan in 2022 amounted to 103.7 trillion tenge and increased by 23.6% compared to 2022. The main share in GDP production is industry (29.5%).

The energy intensity of GDP in 2022 amounted to 0.32 toe/$ thousand in 2015 prices (the global average is about 0.17 toe) and increased by 6.7% compared to 2015. According to the Global Carbon Atlas platform, Kazakhstan ranks 24th among 221 countries in terms of carbon dioxide emissions, 14th in terms of per capita emissions and 11th in terms of carbon intensity of GDP by the end of 2022 [8]. At the same time, it should be noted that the demand for electricity in Kazakhstan will increase.

Currently, 222 electric power plants operate as part of the Unified Electric Power System of Kazakhstan, of which 146 are renewable energy facilities with a capacity of 2.88 megawatts. In general, as of January 1, 2024, the total available capacity was 20.4 GW, the maximum consumption in the current autumn-winter period was 16.6 GW. In 2023, the volume of electricity consumption amounted to 115 billion. kWh (in 2022 -112 billionkWh). At the same time, production amounted to 112.8 billion. kWh, electricity imports from neighboring countries – 3.4 billion kWh, exports – 1.4 billion kWh [11] .

In his Message, the Head of State instructed to ensure the commissioning of capacities in the amount of at least 14 GW. It is also necessary to achieve the set goal – GDP growth by 2 times by 2029. In general, by 2035, it is planned to introduce approximately 26 GW into the Unified Electric Power System of Kazakhstan. With the successful implementation of the planned plans by 2030, the country's needs will not only be fully satisfied, but its reserve will also be provided. The introduction of additional capacities will also ensure the country's energy security, which is important given the difficult geopolitical situation in the world.

It is also necessary to actively work on energy conservation and energy efficiency improvement, given the significant potential for reducing the energy intensity of GDP. As you know, the Rules for conducting energy audits have been approved in Kazakhstan [10].

According to the results of the audit [13], over the past 5 years, there has been an increase in energy consumption in general by 12%, mainly in the residential sector (33%), industry (30%). At the same time, thanks to the energy audits conducted in 2015-2022, it was possible to reduce the energy intensity of the industrial sector by 39%, which led to savings of 105 billion tenge over 7 years. Significant results in improving energy efficiency in the country were announced at the V International Energy Saving Forum, held in November 2023 in Astana. The event was organized in terms of implementing the Address of the Head of State "The Economic Course of a Fair Kazakhstan", aimed at significantly updating the current energy efficiency policy in accordance with the standards of the Organization for Economic Cooperation and Development (OECD).

The Forum was organized by JSC "Institute for the Development of Electricity and Energy Supply" together with the Ministry of Industry and Construction of the Republic of Kazakhstan with the support of the United Nations Development Program in Kazakhstan, the European Union Project "Sustainable Energy Links in Central Asia (SECCA), the German Society for International Cooperation (GIZ), the United States Agency for International Development (USAID) and the German energy Agency DENA.

The Forum also reported on the introduction of new amendments to the Law in 2022, on improving the norms of the state energy register, the energy audit market and monitoring of the budget sector. For example, to ensure energy efficiency in the public sector, the concept of "energy efficient public procurement" was introduced. Monitoring the heat consumption of budget buildings makes it possible to identify inefficient purchases. Thus, the results of the energy saving policy in 2022 made it possible to achieve an 11% reduction in the energy intensity of the economy and set the task of reducing it by 15% by 2030. in accordance with the international standards of the OECD [4].

Thus, the practical stage of the implementation of all legal, economic and organizational measures for energy conservation and energy efficiency improvement provided for by the Law of the country is currently underway [18]. These measures are aimed primarily at stimulating the replacement of outdated equipment with more energy-efficient, modernization and improvement of technological processes, thermal insulation of buildings, renewal of the transport fleet and other energy-saving and energy-efficient measures. These activities are usually financially costly. In this regard, in order to implement an energy efficiency policy, special attention should be paid to the issues of economic incentives for energy conservation and attracting investments in this area.

Currently, an energy management system has been implemented at all large industrial enterprises in Kazakhstan (consuming energy resources in the amount of more than 1,500 tons of conventional fuel per year). In addition, all of them, with the exception of government agencies, must undergo a mandatory energy audit at least once every 5 years. Based on the results of the energy audits conducted, the subjects of the State Energy Register (SER) are required to develop an action plan for energy conservation and energy efficiency improvement.It is also necessary to ensure, within 5 years after passing the energy audit, an annual reduction in the volume of consumption of energy resources and water per unit of production, the area of buildings, structures and structures to the values determined by the results of the audit. The operator of the SER (JSC Institute for the Development of Electricity and Energy Supply), in turn, monitors and analyzes the submitted action plans, and based on the data obtained, predicts a decrease in the energy intensity of GDP [9].

Tasks and functions of the center [8]:

- Analysis of conclusions on energy saving and energy efficiency improvement of SER subjects at the time of compliance with their established requirements and the effectiveness of measures in order to improve the quality of energy audits.
- Conducting an assessment and analysis of the effectiveness of energy saving and energy efficiency measures carried out by SER entities based on the results of an energy audit.
- Analysis of the practical implementation of the Law "On Energy Saving and Energy Efficiency Improvement".
- Recommendations on the implementation of the state policy in the field of energy conservation and energy efficiency improvement of the Republic of Kazakhstan.
- Provision of information assistance and advice to the subjects of the SER.
- Development and submission to the authorized body of proposals, recommendations on amendments and additions to legislative, regulatory and legal acts of the Republic of Kazakhstan in the field of energy conservation and energy efficiency improvement.
- Preparation of analytical notes, reports, articles, presentations.

According to the Institute for the Development of Electricity and Energy Conservation, the following energy-saving measures have been implemented in the subjects of the SER since 2014 [12] :

- Invested in energy saving - 335 billion tenge.
- The economic effect is 88 billion tenge.
- Reduction of energy consumption – 2.6 million tons of conventional fuel.
- Share of energy consumption – 4.8%.

According to experts, the main measures ensuring the full economic security of the country are the development of maneuverable capacities, as well as the development of modern centralized dispatch control in the Unified Electric Power System of Kazakhstan, as well as the use of modern technical solutions (energy storage system, etc.). It is also necessary to take economic measures and mechanisms to smooth peaks. For example, demand management of electricity consumption or the application of differentiated energy supply tariffs.

In order to accelerate the implementation of measures in the strategically important energy sector of the economy for the country, the Concept of development of the energy supply and energy efficiency of the Republic of Kazakhstan for 2023-2029 was approved. (Resolution of the Government of the Republic of Kazakhstan dated March 28, 2023 No. 264). Implementation of planned measures to stimulate energy saving, improve the tariff system for asset renewal, etc. They

will reduce the energy intensity of the industrial sector and the energy intensity of GDP by 10% in 2029 compared to 2021.

Modernization and improvement of Kazakhstan's energy system should be carried out in parallel with the expansion of the use of renewable energy sources (RES).

Solar energy has a significant impact on the transition to energy. This renewable energy source is widespread and virtually limitless in supply, despite the uneven distribution in certain geographical areas. Among other renewable energy sources, hydropower and wind are the most exploited [5].

According to analysts, the following types of renewable energy sources are the most promising for the territory of Kazakhstan: wind power, small hydroelectric power plants, and solar installations for the production of thermal and electric energy. For example, according to expert estimates, the potential of alternative and renewable sources is 1 trillion. kWh per year.

The potential of solar energy in the southern regions of the country reaches 2200-3000 solar hours per year, and the energy of solar radiation is about 1620 kWh per 1 sq. m per year. However, according to experts, the utilization rate of installed capacity of solar power plants will not exceed 20-21%. Therefore, experts believe that from an economic point of view, it is more profitable to build solar power plants in Turkestan, Zhambyl, Kyzylorda and Almaty regions.

The possibility of using wind energy is about 14.8 GW with an average wind speed of more than 8 meters per second with a total area of 1400 square kilometers. At the same time, the installed capacity utilization rate is 31-50%. In general, Kazakhstan ranks first in the world in terms of the number of wind energy resources per capita. The greatest potential for the development of wind energy has the Almaty region, Akmola, North Kazakhstan, Mangystau, Turkestan regions.

As of 01.01.2024, there are 146 "green" energy facilities in Kazakhstan: wind-59, solar – 45, mini-HPPs – 39, biogas – 3. The total capacity of all stations is 2,880 megawatts, the share of renewable energy is 5.9% in total generation. Zhambyl region is the leader in the country in terms of the number of "green" energy facilities, followed by Akmola, Almaty, and Turkestan regions.

It should be noted that the transition to a "green" economy requires significant investments, while investment projects must be payback. It requires attracting not only public but also private investments, and for this, investors need government guarantees to purchase electricity generated from renewable sources at fixed prices, as well as tax incentives. It is also necessary to provide insurance in the field of environmental safety.

At the first stages, the involvement of renewable energy requires significant investments, but in the future the costs will decrease.

The main owners of renewable energy sources in Kazakhstan are investors from Germany, China, Great Britain, Russia, as well as Kazakhstani companies. For investors, the construction of a renewable energy source in Kazakhstan of 1 megawatt of a solar power plant costs about $ 700 thousand, a wind power plant costs $ 1 million 200 thousand. [7]. Thus, developed and emerging countries are attracting foreign direct investment (FDI) renewable and sustainable technologies. Fan and Hao [2] suggested that FDI is essential for renewable energy development.

The successful implementation of tasks to expand the use of renewable energy is facilitated by the adoption of appropriate legislative and regulatory acts. For example, the Law of the Republic of Kazakhstan "On Amendments and Additions to Certain Legislative and Regulatory Acts of the Republic of Kazakhstan on support and use of renewable Energy sources" dated 07/06/2013 approved a provision under which electricity produced by renewable energy sources is purchased by a Single Settlement and Financial Center (SFC) established under a system operator.The SFC should further redistribute the purchased energy to all consumers who are part of the Unified Energy System of the Republic of Kazakhstan to equalize electricity tariffs, as well as its uniform use in various regions of the country. According to the legislation, the introduction of fixed tariffs for electricity from renewable energy sources is provided for a long-term period (15 years).So, in May 2014, the government approved tariffs for renewable energy sources: 22 tenge for wind power, 33 tenge for electricity from solar power plants. The same fixed tariffs are provided for biogas and hydroelectric power plants. According to these prices, the SFC buys electricity from suppliers, while the difference in tariffs for consumers will be subsidized by the state. Thus, high prices have

no effect on consumers, in addition, these prices are acceptable for investors. This will give investors additional guarantees for the repayment of invested funds, given the high capital intensity of the use of renewable energy sources.

Since 2018, the tariff setting mechanism has become more transparent, as open electronic auctions have been held in Kazakhstan, the winners of which have the opportunity to build renewable energy facilities at the right point in the country. In practice, this happens as follows: the Ministry of Energy of the Republic of Kazakhstan, through the Settlement and Financial Center for Renewable Energy Support, announces auctions according to the annually developed bidding schedule, and puts up for auction about 250 MW of the required capacity. At the same time, the SFC acts as a single energy buyer and puts up for auction the corresponding contract. Next, the SFC announces that it is necessary to build a wind farm or a power plant with a capacity of, for example, 100 megawatts at a certain point in Kazakhstan. The winners of the auctions are the participants who offered the lowest tariffs.

The very first record for cost reduction was set by an investor, the Italian company Eni, which won an auction for the construction of a 50 MW solar power plant on terms of electricity supply at a price of 12.5 tenge per 1 kilowatt hour. Currently, this facility operates in the Shaulder district of Turkestan region. In 2023, the above-mentioned record for reducing the price of solar electricity was broken by another investor who offered at auction a tariff of 10.38 tenge per 1 kilowatt-hour for the wind farm project. An annual indexation of auction prices is carried out taking into account inflation and changes in the exchange rate. Thus, if relatively recently renewable energy sources were considered the most expensive, at present the sun and wind provide the cheapest electricity in the country.At the same time, the highest indicator - the installed capacity utilization factor - among the already commissioned wind farms turned out to be in the Atyrau region -45%, for solar power plants -25% in Almaty. The average figure for the country: for wind power – 24%, for solar -16%. According to the terms of the auction, the winner of the auction must invest his own investments in the construction of the facility, its further operation within the time specified in the contract and supply electricity for at least 15-20 years at the price specified in the contract. During the specified period, the investor pays back his expenses. At the same time, 2 years are provided for the construction of a solar power plant, and 3 years for a wind power plant. Investors of renewable energy projects are exempt from customs duties, VAT on imports, property, land and corporate income taxes, and they are also provided with state in-kind grants.

The largest creditor is the EBRD, with the Development Bank of Kazakhstan in second place. At the same time, the most common financing scheme is when 70% of the project cost is realized at the expense of borrowed funds. Approximately two thirds of the projects in 2011-2020 were implemented by Kazakhstani investors (41% of the total installed capacity) – [6]. The largest renewable energy facilities are installed in three regions (Table 2).

Table 2. Large renewable energy facilities operating in the Republic of Kazakhstan

Region	Total, MW	Including:	
		Wind Energy	Solar Energy
Akmola region	508	408	100
Zhambyl region	441	>250	176
Almaty region	371	160	146

Source: compiled by the author based on [6].

Despite the undoubted advantages, the use of renewable energy has a number of disadvantages. The most important thing is that they are not stable, given the winter period, fog, precipitation, etc. It is necessary to create reserve capacities in the form of creating a balancing capacity market and an electricity storage system. Experts believe that it is necessary to develop maneuverable capacities, increase flexible sources (gas and hydroelectric power plants) or build electricity storage facilities. With the increase in the share of renewable energy sources in the energy balance, the need for reserve capacities capable of covering demand with a decrease in

energy production from renewable sources is also increasing. Currently, the KEGOK system operator, when connected to networks, requires investors-owners of renewable energy sources to find balancing capacities themselves (build storage units), although this is not provided for in the country's legislation. According to the experience of foreign countries, the problem of shortage of reserve capacities can also be solved by stimulating conscious consumption. Large consumers, in exchange for economic incentives (monetary rewards), limit their electricity consumption for a certain number of hours per day. The mechanism for reducing the load on capacity is a cheaper method compared to the construction of maneuvering stations.

It should be noted that the growth of tariffs for renewable energy is inevitable. Therefore, the state needs to provide measures to support low-income citizens.

Another form of government support for the construction of renewable energy sources is subsidies. A subsidy is closely related to financing and refers to a form of support, assistance, or financial assistance, often coming from a government or public supplier to an individual or company, with the most prominent and common form being a grant, but there are many other types, including tax incentives, price controls, and discounts [15]. Subsidies, for example, are widely used policy mechanisms that can channel public resources in the field of infrastructure and development, accelerate innovation, or achieve various social or technological goals including assistance to the poor or the provision of social protection systems [14].

Poland's experience in finding market investment models is interesting. In 2019, the country introduced a number of incentives for individuals wishing to invest in photovoltaic micro-installations. To this end, in July 2019, the Ministry of Energy and Environment launched the "My Electricity" program aimed at households. This government subsidy program, managed by NFEPWM, is funded by the Green Investment Program. Under this program, individuals had the opportunity to receive the subsidy of PLN 5000 for 1.5 years (~ 1200 EUR) for a small (2 kW–10 kW) installation of PV on their own roof or grounds. Until October 2020, 173,000 applications have been submitted, with an average number of 800 applications per day. This has seen solar energy grow in Poland significantly [16,17]. This experience is interesting for Kazakhstan, as 10% of electricity consumers in the country are the population (households).

Investment in the green economy is also stimulated through green bonds (GB), which are a type of bonds issued to finance environmentally friendly enterprises or investments.

Thus, Kazakhstan has all the necessary capabilities to achieve its goals: to achieve the level of renewable energy in total energy consumption in 2030 – 15%, in 2050 – 50%. In addition, the achievement of carbon neutrality by 2060, in accordance with the approved strategy.

5 Conclusions

The energy sector is the basic branch of the national economy, on the condition of which the competitiveness of products on the world market and, in general, the energy security of the country depend. In Kazakhstan, about 70% of electricity is generated from coal, which affects the environment. The country is a party to international agreements and conventions on achieving economic sustainability and carbon neutrality, and contributes to the fight against climate change and its warming.

Currently, the energy intensity of the country's GDP is 2 times higher than the global average. The reason for this trend is the high share of large industrial enterprises (especially metallurgical ones) in energy consumption, These enterprises are characterized by high depreciation of fixed assets (more than 50%), requiring modernization in accordance with the digitalization of the economy as a whole. In this regard, the country has introduced an energy audit for large enterprises.To reduce energy consumption and increase energy efficiency, it is necessary to expand the use of renewable energy sources. Kazakhstan has great potential for solar and wind energy. The large territory and low population density make it unprofitable to stretch power lines across the vast steppe to remote sparsely populated areas. In this regard, it is economically feasible to use alternative energy sources.At the same time, the use of renewable energy requires significant investments, both public and private. Given the relatively high tariffs for renewable energy, especially in the initial period, it is necessary to provide various benefits for both investors and direct consumers. Also, the

disadvantage of renewable energy sources is their instability. Therefore, based on foreign experience, it is necessary to provide for the creation of reserve capacities in the form of creating a market for balancing capacity and an electricity storage system capable of covering demand while reducing energy generation from renewable sources. In addition, it is advisable to use methods to stimulate conscious consumption.

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ECO-URBAN DYNAMICS: URBANIZATION, GREENHOUSE GASES, AND ECONOMIC GROWTH IN KAZAKHSTAN

Bekturganova Makpal Sattikulovna*
Institute of Economics Science Committee MSHE RK, Almaty, Kazakhstan
*E-mail: bekturganova_makpal@ieconom.kz

Abstract. This study explores the intricate relationship between urbanization, greenhouse gas emissions, and economic growth within the context of Kazakhstan, highlighting the critical balance necessary for sustainable development. The research places the issue of urban expansion and its environmental impacts, particularly greenhouse gas emissions, within the broader context of economic efficiency and sustainable urban planning. Employing a multifaceted methodology, this study analyzes greenhouse gas emission trends from 1990 to 2021, correlating these trends with economic development phases and technological advancements in Kazakhstan. Results indicate a complex interplay between urbanization and greenhouse gas emissions, with economic activities significantly influencing the country's environmental footprint. Notably, the research identifies key periods of emission fluctuations corresponding to economic transitions, policy implementations, and technological innovations. Conclusions drawn from the study emphasize the necessity of integrating economic growth with environmental sustainability through innovative urban planning, green technologies, and policy frameworks aimed at reducing emissions and promoting sustainable development. This work contributes to the global discourse on sustainable urbanization, offering insights into balancing economic prosperity with environmental integrity in the face of challenging climate goals.

Keywords. Urbanization, greenhouse gases, economic efficiency, sustainable development, urban planning.

JEL codes: Q54, Q56, R11.

Introduction

Urbanization, greenhouse gases, and economic efficiency present a triad of interconnected themes pivotal to the discourse on sustainable development. At the heart of sustainable development lies the challenge of balancing economic growth with the imperative to protect our environment and ensure equitable social outcomes. Urbanization, a hallmark of modern civilization, brings with it both opportunities and challenges. As cities expand, they become engines of economic growth, innovation, and cultural exchange. However, this urban expansion also leads to increased demand for energy, transportation, and buildings, contributing significantly to the emission of greenhouse gases, which are the main drivers of global climate change.

The relationship between urbanization and greenhouse gas emissions is complex. On the one hand, densely populated urban areas can lead to more efficient resource use and lower per capita greenhouse gas emissions, as seen in scenarios where public transportation is favored over individual car use. On the other hand, if not managed wisely, urban growth can lead to sprawling developments that increase energy consumption, emissions, and environmental degradation. Thus, the challenge lies in harnessing the benefits of urbanization while minimizing its environmental footprint.

Economic efficiency plays a crucial role in this equation. It entails optimizing resources so that the economic outputs from cities and industries are maximized while minimizing waste and emissions. This concept is crucial for sustainable development, as it emphasizes the need for green technologies, renewable energy sources, and sustainable urban planning. By integrating economic efficiency with environmental sustainability, it is possible to achieve a win-win scenario where economic growth does not come at the expense of the planet.

In the context of sustainable development, therefore, urbanization, greenhouse gases, and economic efficiency are not just interrelated themes; they are the battlegrounds on which the future of our planet will be decided. The challenge is to innovate, plan, and govern in ways that promote

sustainable urban growth, reduce emissions, and enhance economic efficiency, all within the framework of ensuring a just and equitable society for all.

For Kazakhstan, understanding the dynamics of urbanization, greenhouse gases, and economic efficiency within the context of sustainable development involves analyzing a range of data sources and research findings. Here are key insights and data points derived from recent publications and reports:

1. **Urbanization and Its Environmental Impact**: According to a blog post by the United Nations Development Programme (UNDP) in Kazakhstan, the main urban sectors generating indirect greenhouse gas emissions in Kazakh cities include heat and power supply. This underscores the environmental challenges associated with urbanization, highlighting the need for eco-friendly urban planning and infrastructure to reduce carbon footprints.
2. **Greenhouse Gas Emissions**: A report by the Asian Development Bank (ADB) notes that per capita annual greenhouse gas emissions in Kazakhstan are significantly higher than those of its neighbors and countries with comparable GDP levels. This indicates the substantial environmental footprint of Kazakhstan's energy sector, emphasizing the importance of transitioning towards more sustainable energy sources.
3. **Economic Growth, Energy Use, and Sustainability**: Research published in ScienceDirect explores the dynamic impacts of urbanization, agricultural productivity, and forested area on CO2 emissions in Kazakhstan. This study represents a pioneering attempt to analyze how various factors contribute to the country's greenhouse gas emissions, offering insights into potential areas for policy intervention to promote sustainability.
4. **Path to Carbon Neutrality**: A presentation referenced by UNCTAD outlines Kazakhstan's goal to achieve carbon neutrality by 2060. To reach this ambitious target, the country aims to meet the conditional Nationally Determined Contribution (NDC) target of a 25% reduction in greenhouse gas emissions by 2030. This reflects Kazakhstan's commitment to international climate goals and the need for comprehensive strategies to reduce its carbon footprint.
5. **Economic and Sustainable Development Insights**: The UNDP's Integrated SDG Insights reports moderate growth in Kazakhstan's economy in 2023, with projections indicating a transition to acceleration in 2024 before a stabilization in 2025. This economic trajectory must be aligned with sustainable development goals, particularly in addressing the challenges of urbanization and environmental sustainability.

The interplay of urbanization, greenhouse gas emissions, and economic efficiency within the purview of sustainable development presents both a formidable challenge and a tremendous opportunity for Kazakhstan. The insights derived from various reports and research underscore the pressing need for the country to navigate these interconnected themes wisely. As Kazakhstan continues to urbanize, the imperative to minimize the environmental impacts associated with this growth becomes increasingly critical. The challenge is not merely in managing urban expansion but in reimagining it in ways that foster sustainability, innovation, and inclusivity.

Kazakhstan's substantial greenhouse gas emissions underscore the urgency of transitioning towards renewable energy sources and implementing more stringent environmental protections. Achieving carbon neutrality by 2060 is a bold aspiration that reflects Kazakhstan's commitment to global climate goals. This endeavor requires not only national resolve but also international cooperation, technological innovation, and a steadfast commitment to green policies and practices.

The dynamic impacts of urbanization, economic activities, and environmental sustainability on Kazakhstan's development trajectory highlight the complex but indispensable nature of sustainable planning and governance. As the country stands at the crossroads of economic growth and environmental stewardship, the path forward necessitates a harmonious integration of economic efficiency with ecological preservation.

In conclusion, Kazakhstan's journey towards sustainable development is emblematic of the broader global challenge of balancing economic prosperity with environmental integrity. The nation's efforts to address the intricacies of urbanization, reduce greenhouse gas emissions, and enhance economic efficiency serve as a microcosm of the global endeavor to achieve a more sustainable, equitable, and prosperous future. As Kazakhstan endeavors to fulfill its sustainable

development goals, the lessons learned and the successes achieved will undoubtedly contribute to the global discourse on sustainability, offering valuable insights and strategies for other nations grappling with similar challenges.

Literature review

Urbanization is a defining global trend of the 21st century, marked by its profound implications for economic development, environmental sustainability, and social equity. This phenomenon is intrinsically linked with increased greenhouse gas (GHG) emissions, which pose significant challenges to the achievement of the United Nations' Sustainable Development Goals (SDGs). However, urbanization also presents unique opportunities to enhance economic efficiency through innovation and smart urban planning. The complexities of urban growth, its environmental impacts, and the potential for sustainable development form the core of this literature review, which delves into the nexus of urbanization, GHG emissions, and economic efficiency.

The process of urbanization, while a catalyst for social and economic progress, contributes markedly to the concentration of GHG emissions. The sprawling urban landscapes, characterized by their intense energy consumption and reliance on fossil fuels, exacerbate the global environmental crisis. Yet, this urban expansion also harbors the potential for transformative change. Through strategic urban design and the adoption of green technologies, cities can become the forefront of sustainable development, reducing their carbon footprint while fostering economic growth.

Recent empirical studies, theoretical contributions, and policy analyses offer a nuanced perspective on addressing the environmental challenges posed by urbanization. These sources underscore the importance of integrating economic efficiency with environmental stewardship to forge a path towards sustainable urban development. Innovations in urban planning, such as the implementation of sustainable transportation systems, energy-efficient buildings, and urban green spaces, demonstrate the potential to significantly lower urban GHG emissions.

Moreover, the literature highlights the role of economic efficiency in sustainable development, advocating for a broader interpretation that encompasses the valuation of ecosystem services and the external costs of environmental degradation. True economic efficiency, therefore, involves reducing waste, promoting the use of renewable resources, and ensuring equitable access to natural assets. This redefined concept of economic efficiency calls for a shift in policy-making, emphasizing the need for sustainable economic models that account for both environmental and social dimensions.

Policy frameworks play a crucial role in mediating the relationship between urbanization and sustainable development. Effective policies must operate on both global and local scales, integrating local actions with international agreements like the Paris Agreement to combat climate change comprehensively. This necessitates a polycentric approach to governance, wherein cities not only adhere to global climate goals but also innovate locally tailored solutions to environmental challenges.

Urbanization accelerates economic growth and social development but also contributes significantly to the global environmental footprint, particularly in terms of GHG emissions. A study by Seto et al. (2012) in "Proceedings of the National Academy of Sciences" outlines how urban areas, though occupying only 2% of the Earth's surface, are responsible for over 70% of GHG emissions. The research emphasizes the need for integrated urban planning to mitigate environmental impacts.

The transition to sustainable economies necessitates rethinking economic efficiency in the context of environmental constraints. Costanza et al. (2017) in their work published in "Global Environmental Change" discuss how traditional measures of economic growth, such as GDP, fail to account for environmental degradation and resource depletion. They advocate for alternative metrics that incorporate ecological and social well-being.

Adopting green technologies and renewable energy sources is pivotal for reducing urban GHG emissions and enhancing economic efficiency. A review by Kammen and Sunter (2016) in

"Science" highlights innovative urban energy solutions, including solar power and energy-efficient buildings, demonstrating their potential to significantly lower urban carbon footprints.

Achieving sustainable urban development requires concerted efforts from policymakers, businesses, and communities. Integrating economic efficiency with environmental sustainability necessitates innovative policies that promote green infrastructure, renewable energy, and efficient resource use. The work of Gupta et al. (2019) in "Environmental Science & Policy" discusses policy frameworks that can support cities in transitioning towards sustainability, emphasizing the role of governance, public participation, and international collaboration.

Urbanization is recognized as a double-edged sword in terms of sustainable development. McGranahan and Satterthwaite's work (2014) in the "Urbanisation Concepts and Trends" examines how urban areas, while being hubs of economic activity and innovation, are also significant contributors to global greenhouse gas emissions. Their analysis emphasizes the need for strategic urban planning that prioritizes low-carbon growth and sustainable infrastructure.

The transition towards sustainable development demands a reevaluation of economic efficiency, incorporating environmental and social dimensions. In the "Review of Environmental Economics and Policy", Heal and Millner (2014) argue for a broader definition of economic efficiency that includes the valuation of ecosystem services and the external costs of environmental degradation. Their framework suggests that true economic efficiency should reduce waste, promote renewable resources, and ensure equitable access to natural resources.

The role of cities in mitigating greenhouse gas emissions is critical, given their high concentration of population, resources, and economic activities. A pivotal study by Gurney et al. (2015) highlights the potential for urban areas to lead in the reduction of GHG emissions through innovative policy measures, technological advancements, and changes in consumption patterns.

The intersection of urbanization, economic activities, and greenhouse gas emissions necessitates an approach that considers the socio-economic dimensions of sustainability. In their work, Gouldson et al. (2015) explore how low-carbon urban initiatives can lead to job creation and economic opportunities, thus providing a more holistic understanding of economic efficiency within the context of sustainable urban development.

Addressing the challenges of urbanization, greenhouse gas emissions, and economic efficiency requires robust policy frameworks that operate at both international and local levels. Jordan et al. (2018) in "Nature Climate Change" discuss the significance of integrating local actions with global agreements, such as the Paris Agreement, to effectively combat climate change while fostering sustainable economic growth and development.

Soltangazinov et. al. (2020) develops a methodological approach to enhance the sustainable development of Kazakhstan through energy efficiency. It analyzes Kazakhstan's energy market, aiming to bolster sustainable growth.

Sergeyeva et al. (2022) explores the potential of cross-border tourism on the Kazakhstan-Uzbekistan border as a condition for sustainable development. It evaluates the conceptual framework for sustainable development in the border area, highlighting the economic and political impacts of tourism development.

This literature review underscores the intricate relationship between urbanization, greenhouse gas emissions, and economic efficiency within the context of sustainable development. While urbanization poses significant environmental challenges, it also offers a unique opportunity for transformative change through innovative urban planning and green technologies. The reviewed studies highlight the necessity of redefining economic efficiency to include environmental and social dimensions, advocating for policies that promote sustainable economic models. Achieving sustainable urban development requires a concerted effort from global to local levels, integrating economic growth with environmental stewardship to ensure a sustainable future for all.

Methodology

The methodology for analyzing the trajectory of greenhouse gas emissions from 1990 to 2021, as derived from the provided text, involves a multi-faceted approach that integrates data analysis, economic review, and technological assessment to understand the trends and implications

of greenhouse gas emissions on the climate. This approach is structured around several key components:

Data Collection and Normalization: The first step involves gathering comprehensive emissions data for key greenhouse gases, including CO2, CH4, N2O, and fluorinated gases, over the specified period. This data is normalized to ensure consistency and comparability over time, accounting for changes in measurement techniques and reporting standards.

Trend Analysis: Utilizing statistical tools, the data is analyzed to identify overall trends, significant peaks, and fluctuations in emissions. This analysis aims to highlight periods of increased or decreased emissions, correlating these changes with known economic, technological, or policy-driven events.

To align the text with the data analysis process, the following revisions are made to ensure clarity and accuracy:

(1) **Data Collection**: Gather annual average concentrations of particulate matter across various cities from 1990 to 2021, utilizing diverse sources such as environmental monitoring agencies and official reports from the Bureau of National Statistics of the Republic of Kazakhstan.

(2) **Data Visualization**: Employ data visualization tools to generate comprehensive graphs, maps, and infographics, effectively highlighting the study's key insights on air quality trends and their correlation with urbanization and greenhouse gas emissions.

(3) **Interconnectivity Analysis**: Develop a conceptual map that delineates the relationships among urbanization, greenhouse gas emissions, and economic growth, specifically within the framework of Kazakhstan's environmental and urban development challenges.

This methodology outlines a comprehensive approach to analyzing the trajectory of greenhouse gas emissions from 1990 to 2021, emphasizing the importance of data integrity, analytical precision, and contextual understanding. By systematically collecting and normalizing emissions data, employing advanced data visualization techniques, and exploring the interconnections between urbanization, economic activities, and environmental impacts, this study aims to provide a nuanced understanding of the factors driving changes in air quality. The integration of economic reviews and technological assessments further enriches the analysis, offering insights into the effectiveness of policies and innovations in mitigating emissions. Ultimately, this methodology underscores the complexity of environmental challenges while highlighting potential pathways towards sustainable urban development in Kazakhstan and beyond.

Results and Discussion

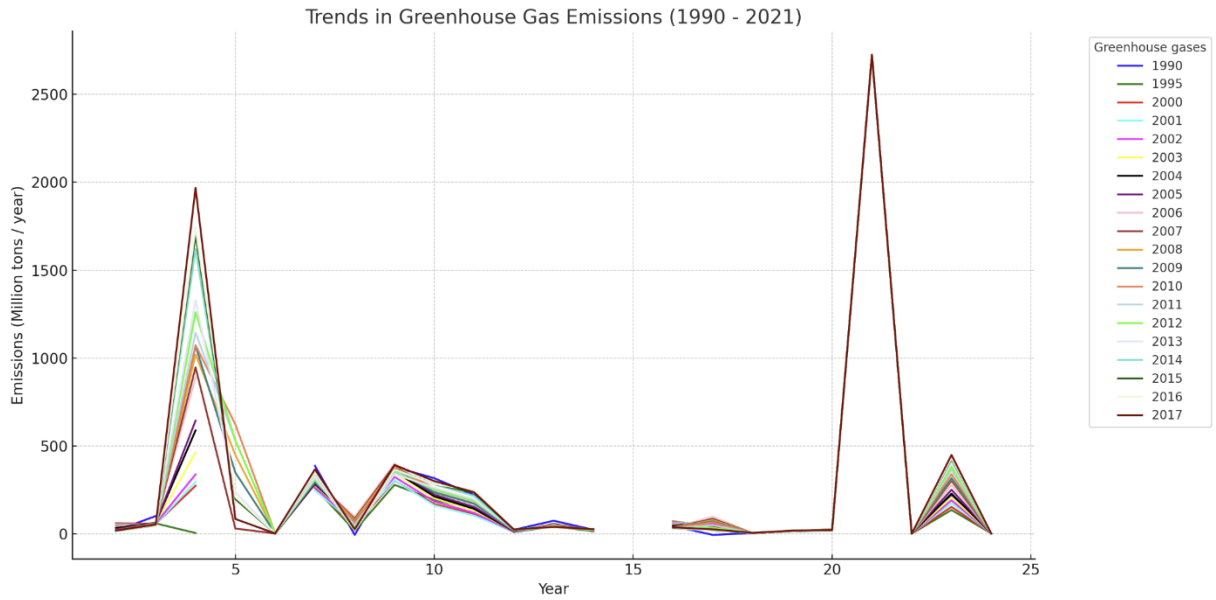

Figure 1 – Trends in Greenhouse Gas Emissions (1990-2021) in Kazakhstan
Note – compiled with the data source stat.gov.kz

On the presented diagram (figure 1), the trajectory of greenhouse gas emissions from 1990 to 2021 is displayed. These data are critically important for understanding trends in atmospheric processes that affect our planet's climate system. Greenhouse gases such as carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and other fluorinated gases play a significant role in enhancing the greenhouse effect, which in turn leads to global warming.

The graph presents a complex picture with several peaks, which may indicate anomalous events or changes in industrial activity, energy, and land use. The most pronounced peak at the beginning of the period may reflect a high level of industrial emissions during an economic transition period, while subsequent fluctuations may be due to various environmental initiatives and the introduction of emission reduction technologies.

Interestingly, after the year 2000, there is a general trend of increasing emissions for certain gases, which may be associated with increased use of fossil fuels on a global scale and economic growth. However, in some years, a retreat from this trend can be seen, which may reflect the impact of international climate agreements and improvements in energy efficiency.

It is also worth noting significant fluctuations in the data for individual gases, emphasizing the heterogeneity of emission sources and the diversity of potential pathways for their reduction. Analysis of these data requires detailed consideration in the context of specific economic conditions and technological changes in production processes.

The overall emission trend shows a correlation between economic development and the level of greenhouse gases in the atmosphere, highlighting the importance of transitioning to more sustainable and environmentally friendly production methods. Emissions of some gases show a gradual increase, which may be associated with the intensification of the agricultural sector, the development of livestock, and the growth of waste. Others show a decrease, which may reflect the improvement of capture technologies and subsequent utilization or transformation of these gases.

A noticeable decrease in emissions in certain years may be related to global economic crises or the adoption of new technologies that have led to reduced use of fossil fuels and increased energy efficiency. At the same time, subsequent increases in emissions indicate an economic recovery after periods of crisis.

It is also important to note that the analyzed data emphasize not only problems but also potential opportunities to address climate change issues. They allow for the identification of effective measures and strategies that can be applied in various sectors for sustainable development and minimizing impact on the climate.

In conclusion, the dynamics of greenhouse gas emissions are a key indicator in assessing environmental policy and the effectiveness of measures taken. Continued monitoring and analysis of emission data, their sources, and consequences for the climate are necessary to form an adequate response to climate challenges at national and global levels.

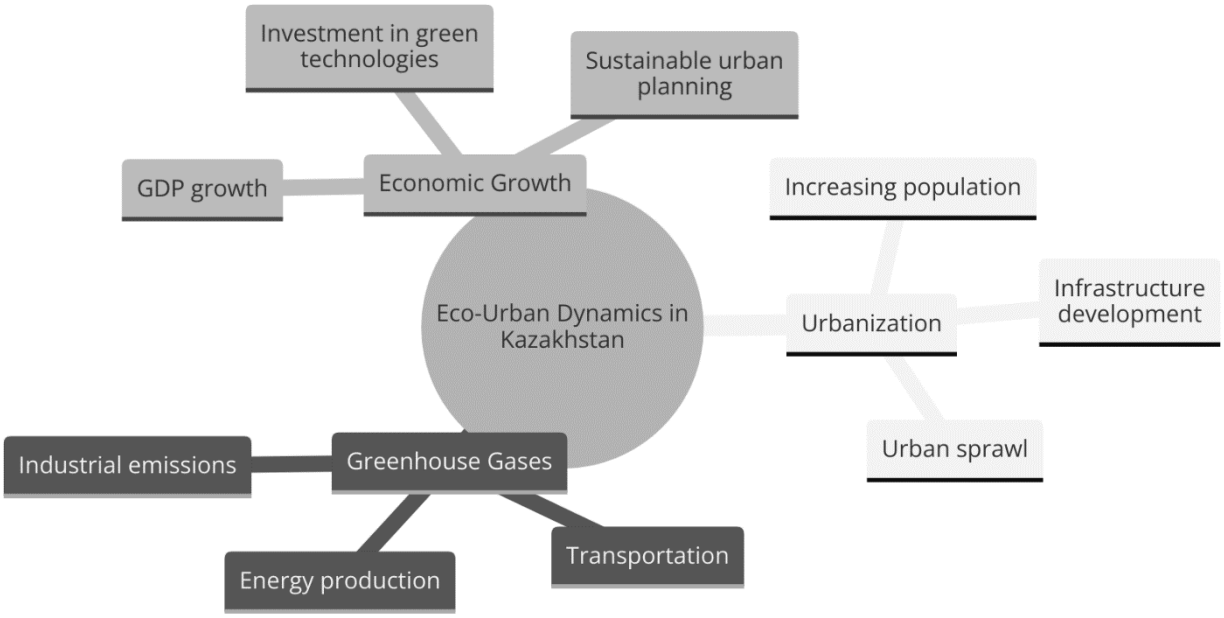

Figure 2 – Eco-Urban Dynamics in Kazakhstan
Note –compiled with the data source of the author.

The mindmap diagram titled "Eco-Urban Dynamics in Kazakhstan" (figure 2) illustrates the interconnectedness between urbanization, greenhouse gas emissions, and economic growth within the context of Kazakhstan's ecological and urban development. At the center of the diagram, the root node represents the overarching theme of Eco-Urban Dynamics, branching out into three primary nodes: Urbanization, Greenhouse Gases, and Economic Growth.

The Urbanization branch delves into the factors driving the growth of urban areas, highlighting the increasing population, infrastructure development, and urban sprawl. These elements underscore the challenges and opportunities posed by urban expansion, including the need for sustainable city planning and the potential for innovation in public services and housing.

The Greenhouse Gases section addresses the environmental impact of urbanization, focusing on industrial emissions, transportation, and energy production. This branch brings attention to Kazakhstan's carbon footprint, emphasizing the urgency of transitioning to cleaner energy sources and implementing policies for reducing emissions in major sectors.

Lastly, the Economic Growth branch explores the relationship between environmental policies and economic development. It points to GDP growth, investment in green technologies, and sustainable urban planning as critical factors that can drive economic prosperity while ensuring environmental sustainability. This segment suggests that economic development in Kazakhstan can be aligned with ecological goals, promoting a green economy.

Overall, the diagram visually represents the dynamic interplay between urbanization, environmental health, and economic prosperity in Kazakhstan, highlighting the importance of integrated approaches for sustainable development.

Conclusions

The research on "Eco-Urban Dynamics: Urbanization, Greenhouse Gases, and Economic Growth in Kazakhstan" underscores the intricate nexus between urban development, environmental sustainability, and economic progress. It brings to light the critical challenge of balancing rapid urbanization and economic growth with the imperative to mitigate environmental impacts, particularly greenhouse gas emissions. The study highlights the significant environmental footprint of Kazakhstan's urban and economic activities, emphasizing the need for innovative urban planning, green technologies, and robust policy frameworks to promote sustainable development.

Kazakhstan faces a unique set of challenges and opportunities in its journey towards sustainability. The country's substantial greenhouse gas emissions, driven by urban expansion,

industrial activities, and energy production, underline the urgency of transitioning towards renewable energy sources and implementing more stringent environmental protections. Achieving carbon neutrality by 2060, as outlined by Kazakhstan's commitment to international climate goals, requires a concerted effort encompassing national resolve, international cooperation, technological innovation, and a steadfast commitment to green policies and practices.

The study's findings indicate that sustainable urban development in Kazakhstan is not merely a matter of environmental stewardship but also a prerequisite for economic prosperity and social well-being. The dynamic interplay between urbanization, greenhouse gas emissions, and economic efficiency necessitates a holistic approach, integrating economic growth with ecological preservation. This involves reimagining urban expansion in ways that foster sustainability, innovation, and inclusivity, ensuring that economic development does not come at the expense of the environment.

In conclusion, the path forward for Kazakhstan, and indeed for the global community, lies in harmonizing economic activities with environmental sustainability. This research contributes valuable insights into the mechanisms through which urbanization and economic activities influence environmental outcomes, offering strategies for sustainable development that are applicable not only to Kazakhstan but to countries worldwide facing similar challenges. As the global endeavor towards a sustainable future continues, the lessons learned from Kazakhstan's experience will undoubtedly enrich the discourse on urban sustainability, offering guidance for achieving a balance between economic growth, environmental integrity, and social equity.

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THE ROLE OF INVESTMENT IN HUMAN CAPITAL FOR THE SOCIO-ECONOMIC DEVELOPMENT OF THE COUNTRY: KAZAKHSTAN AND CHINA STUDIES

Ruan Diyun*, Laila Bimendiyeva
Al-Farabi Kazakh National University, Almaty, Kazakhstan
E-mail: ruandiyun2904@gmail.com

Abstract

Investment in human capital is widely recognized as an important driver of economic growth. With the development of knowledge-based and innovation-driven economies, human capital investment has increasingly become a central element of economic growth in all countries. This paper provides insights into the central role of human capital investment in the economic and social development of countries and social regions. This study first describes the significant impact of public and private human capital investment on economic growth and social development. Public human capital investment drives economic growth by improving the quality of education and skills training, while private investment drives business growth by improving employee skills and efficiency. This paper assesses the contribution of these two types of investment to regional economic development using a combination of quantitative analysis and case studies. Specifically, through the construction of a multivariate linear regression model and an empirical analysis of Kazakhstan's national data, it is found that investment in education, health and skills training has a significant positive impact on economic growth. In addition, the operations of two Chinese firms in Africa are analyzed through case studies, which provide insights into the firms' human capital investment strategies in the areas of education, institutions, trust, culture, and community investment, as well as the impact of these investments on firm development and regional economic growth. The results of the study show that human capital investment has a positive impact on business performance and regional economic development. Therefore, governments should continue to increase investment in education and health and encourage firms to invest more in human capital. In summary, in the current era of rapid economic development, effective investment in human capital is conducive to enhancing national competitiveness, promoting regional economic development, realizing sustainable economic growth, and enhancing social resilience.

Keywords. human capital, investment, economic growth
JEL codes: 3-5

1 Introduction

It is widely acknowledged that human talent constitutes the primary resource and innovation serves as the primary driving force. The innovative development of talent endeavors is akin to an invigorating stream, converging its focus on the human capital investment industry under the impetus of contemporary dynamics. In the era of economic globalization, the transformative impact of scientific and technological advancements, coupled with the reallocation of industrial structures, is profoundly influencing the economic progress of nations. Talent investment has emerged as a pivotal catalyst for technological innovation and economic growth in the development trajectories of numerous countries, garnering increasing attention from all sectors of society. In this epoch characterized by a knowledge-based and innovation-driven economy, human capital has become inextricably linked to the economic development of national and societal regions.

Traditionally, the concept of human capital has predominantly encompassed educational and health capital as its integral components, with investment in human capital primarily directed towards these two domains. As pivotal modes of human capital investment, their developmental levels are closely associated with the advancement of societal and regional economies.

In conventional research, human capital investment is commonly categorized into two types based on the investing entity: public and private human capital investment. Public human capital investment typically entails governmental efforts to enhance the quality and transformative potential of human capital through investments in education, skill training, and health care, thereby

propelling economic growth and societal development. The government generally allocates substantial resources to the educational domain of human capital to augment its quality. By elevating educational resources and cultivating talents in technological innovation, the government fosters innovative economic development, thereby enhancing economic prosperity. Given that fiscal policy constitutes a fundamental pillar and a critical foundation of national governance, its role in the accumulation of human capital is indispensable. This study, therefore, analyzes the impact of public human capital investment on the economic development of national regions through an examination of fiscal expenditures and policies at the national and societal levels. Private human capital investment, on the other hand, refers to investments made by individuals, families, or enterprises in education, skills, health, and production to facilitate personal or organizational development. Investments by individuals and families in human capital can facilitate career advancement, increase personal income, and enhance overall quality of life. Corporate investment in human capital can augment employees' capacity for complex tasks, improve the efficiency and quality of their work, and contribute to the enhancement of product quality and the transformation of the labor force structure. This paper focuses on corporate investments in private human capital to quantify and highlight its role in the economic development of national and societal regions, exploring whether such investments enhance corporate operational capabilities, thereby enabling firms to fulfill their social responsibilities in areas such as technology transfer, employee training, and local development, thereby promoting local economic and social progress.

In the context of the new normal, cutting-edge technologies such as big data and artificial intelligence are revolutionizing the labor market, investment strategies, and the overall trajectory of national economies in unprecedented ways. As human capital is internalized within talent and serves as a primary driver of economic growth in many nations, it is imperative to prioritize research in this domain. Hence, this study aims to delve into the roles of public and private human capital investment in the economic development of national and societal regions, thereby facilitating more effective development of human capital investment.

2 Literature review

The impact of human resource investment on the socio-regional economic development across countries has been a significant subject of inquiry in economics. The origins of human capital investment can be traced back to the seminal works of Schultz and Becker, who posited that education, health, and skill training are pivotal in enhancing individual productivity and fostering economic growth. Subsequently, Romer (1990) and Barro (1991) elucidated that human capital serves as a dynamic source for economic development. Berhabi and Spiegel (1994) further corroborated the proposition that human capital contributes to enhancing societal productivity by examining the correlation between the stock of human capital and a nation’s total factor productivity.

As socio-economic landscapes evolve, a plethora of novel economic factors have emerged, deepening our comprehension of economic theories. Francesco and Jochen (2017) highlighted that human capital can catalyze economic growth through its influence on labor productivity and investment in technological innovation. Lin Ling and Hayatkhan, among others, have identified that corporate investment in human capital can augment employee marginal productivity and expand labor demand. Axunova (2022) provided further insight into how institutionally embedded human capital directly impacts labor productivity, concluding that higher levels of human capital correspond to increased productivity. Regarding the facilitation of technological innovation, the consensus among scholars is that it emanates from investments in education and talent development. Ma Ru (2019) discovered that technological talent constitutes the primary impetus for high-quality economic development through autonomous innovation capabilities. Irina (2020) underscored the critical role of educational systems in the formation of human capital, emphasizing the importance of educational investment for the accumulation of human capital.

From the synthesis of the literature, it is evident that diverse human capital investments play a pivotal role in the socio-regional economic development of nations. Seshadi (2005) posited that human capital, irrespective of the national context, positively influences wealth distribution.

Government investment in educational human capital can significantly stimulate economic growth, while corporate investment in private human capital can optimize talent structures, thereby enhancing innovation and development capabilities, and fostering economic growth. This study employs quantitative analysis and case studies to examine the roles of public and private human capital in regional economic development.

3 Methodology

This study aims to explore in depth the role of human capital investment in the country's socio-economic development. In particular, the country's human capital investment in education not only promotes the transformation of old and new kinetic energy, but also cultivates a talent pool in several fields, thus leading and accelerating the development of science and technology. In terms of research methodology, this paper first adopts quantitative analysis, collects and organizes public human capital investment data, and uses statistical software to conduct empirical analysis to assess the contribution of public human capital to regional economic development. Then, through the case study method, several representative enterprises are selected to analyze their private human capital investment behavior in order to explore the impact of private investment on regional economic development.

In terms of quantitative analysis, this paper constructs a multiple linear regression model based on a theoretical framework and takes Kazakhstan's national data as the object of investigation and research, aiming to analyze the impact of public human capital investment on its regional economic development. The main independent variables of the model include key human capital investment indicators such as the Kazakhstan government's investment in education, health expenditures, and fiscal expenditures, and the dependent variables include economic development indicators such as Kazakhstan's GDP growth rate and total GDP. The model also incorporates other variables that may affect the economic development of Kazakhstan, such as the development of the country's infrastructure, the standard of living of the population and the level of development of foreign trade. Subsequently, the model is estimated using statistical software to determine the specific impact of each human capital investment indicator on regional economic development. Through these impact coefficients, this study is able to quantitatively assess the specific contribution of public human capital investment to regional economic development.

In the case study, the paper defines "human capital" as the intangible resources provided by employees to their employers, including their intrinsic abilities, intellectual agility and personal energy. Second, the production and operation of two representative Chinese enterprises in Africa are selected as case sources, and the case enterprises emphasize on enhancing the core competitiveness of their enterprises by improving human capital. Human capital investment in firms focuses on employee training, which aims to reduce skill mismatches and production costs, improve operational efficiency and market competitiveness, and thus promote firms' economic development. This study collects and organizes textual data from the case companies to analyze the different human capital investment strategies they employ and the impact of these strategies on their own development and regional economic development. Textual data were collected from company websites, social media, and news reports, with a special focus on interviews with company founders and executives responsible for human resource management about human capital investments.

4 Results and Discussion

Investment in human capital is of great significance for national social and regional development and, as a form of investment aimed at meeting the diversified needs of societies and individuals and at integrating knowledge and skills, it has become a key factor in competition among countries in the context of economic globalization. A large body of literature points out that investment in human capital is adapting to the changes in the new economic paradigm and plays an important role in regional economic development. This paper examines the impact of public human capital investment in Kazakhstan on the economy by constructing a fixed-effects economic model and the role of private human capital investment in the economic development of the African region by analyzing the case of two representative Chinese companies.

After building a multiple regression model in this study, it was found that the areas of investment in education, health expenditures, and the standard of living of the population have a significant positive impact on regional economic development. Specifically, government investment in education promotes regional economic growth; health expenditures help maintain and promote regional economic development; and they laterally contribute to skills training and scientific research, enabling the government to pay more attention to science, technology, and innovation capabilities. And through the power of science, technology and innovation, the government is able to promote the structural development and upgrading of the labor economy and the transformation of the regional industrial structure. In addition, government investment in education and health improves local education and living standards, improves the employability and quality of the labor force, which in turn improves the willingness and ability of workers to start their own businesses, increases the employment rate in the local market, reduces the unemployment rate, further reduces the poverty rate, and improves the overall economic level. On this basis, the following multiple regression model was established:

$$GDP = \alpha_0 + \alpha_1 PHL + \alpha_2 Wage + \alpha_3 Trade + \alpha_4 Str + \varepsilon$$

Variable Description		
Name of the indicator	Variable	Variable interpretation (unit)
Economic growth	GDP	Gross domestic product by the production method, at current prices（trillion.tenge)
Public human capital investment	PHCI	Fiscal education and health expenditures as a percentage of GDP（%）
Income level	Wage	Nominal wage index in percentage to the previous year（%）
The level of foreign trade	Tra	Foreign trade turnover as a percentage of the previous year（%）
The level of infrastructure construction	Str	The percentage of individuals using the Internet as a percentage of the population（%）

Figure 1. Multiple regression model

This study provides an in-depth analysis of the role of public human capital investment in regional economic development by constructing a multiple regression model. The model shows that key areas of public human capital investment, such as investment in education, health expenditures, and government fiscal expenditures, have a significant positive impact on economic growth in Kazakhstan as a whole. Specifically, government investment in education has a significant contribution to the country's economic growth, suggesting that investment in educational capital plays an important role in increasing human capital and labor productivity. On the other hand, healthcare expenditures are crucial for sustaining and promoting regional economic development, reflecting the fact that a good public health system is the basis for economic development. The combination of the first two can lay a solid foundation for the training of skills and investment in scientific research, and can also play a positive role in the improvement of scientific and technological innovation capacity, thus further promoting the structural development and upgrading of the labor economy, and realizing the optimization and transformation of the country's regional industrial structure.

Government investment in education and health not only improves local education and living standards, but also enhances the employability and quality of the labor force. This enhancement not

only increases the entrepreneurial willingness and ability of laborers, but also promotes the employment rate in the local market and reduces the unemployment rate, which further reduces the poverty rate and enhances the overall economic level.

In the model construction, GDP is used as an explanatory variable, and the national GDP value is used for measurement. Public human capital investment (PHCL) serves as the core explanatory variable, measured by fiscal education and health expenditures as a percentage of GDP. In addition, the model incorporates control variables such as income level, foreign trade level and infrastructure construction level. The level of income is expressed as the ratio of the national nominal wage index to the previous year, the level of foreign trade is expressed usingForeign trade turnover as a percentage of the previous year, and the level of infrastructure development is measured as the percentage of individuals using the Internet as a percentage of the population (As shown in Figure 1).

Linear regression analysis results (n=24)							
	Uunstandardized coefficient		Standardized coefficient	t	p	Collinearity Diagnosis	
	B	Standard error	Beta			VIF	Tolerance
Constant	-132.296	49.955	-	-2.648	0.016*	-	-
PHCI	10.590	3.071	0.266	3.449	0.003**	1.773	0.564
Wage	0.622	0.529	0.111	1.175	0.254	2.643	0.378
Tra	0.048	0.102	0.035	0.468	0.645	1.634	0.612
Str	0.821	0.071	0.908	11.539	0.000**	1.843	0.543
R^2	0.936						
AdjustmentR^2	0.923						
F	F (4,19)=69.584,p=0.000						
D-W	1.005						
Dependent variable:GDP * p<0.05 ** p<0.01							

Figure 2. Linear regression analysis

Prior to conducting the regression analysis, this study determined the use of a fixed effects model through the Hausman test. Regression analysis based on the national sample shows that public human capital investment has a significant positive impact on economic growth (As shown in Figure 2). The regression coefficient of public human capital investment is 10.590 (t=3.449, p=0.003<0.01), which indicates that it has a significant positive effect on GDP.

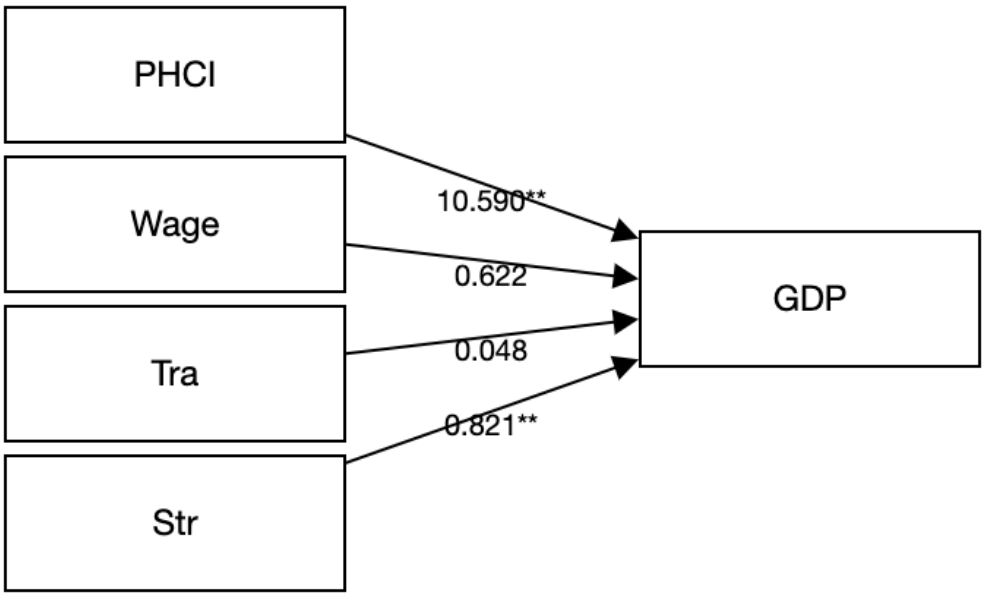

Figure 3. The regression coefficients

However, the results of the analysis of the control variables show that the level of income does not have a significant effect on economic growth, which may reflect the effect of widening income disparity. The impact of foreign trade on economic growth is again insignificant, probably due to the vulnerability of foreign trade to fluctuations in the global economy, especially in times of crisis such as the New Crown Epidemic. On the contrary, the level of infrastructure development has a significant contribution to economic growth, which suggests that urbanization and infrastructure improvement are important factors in improving the quality of economic growth (As shown in Figure 3、4).

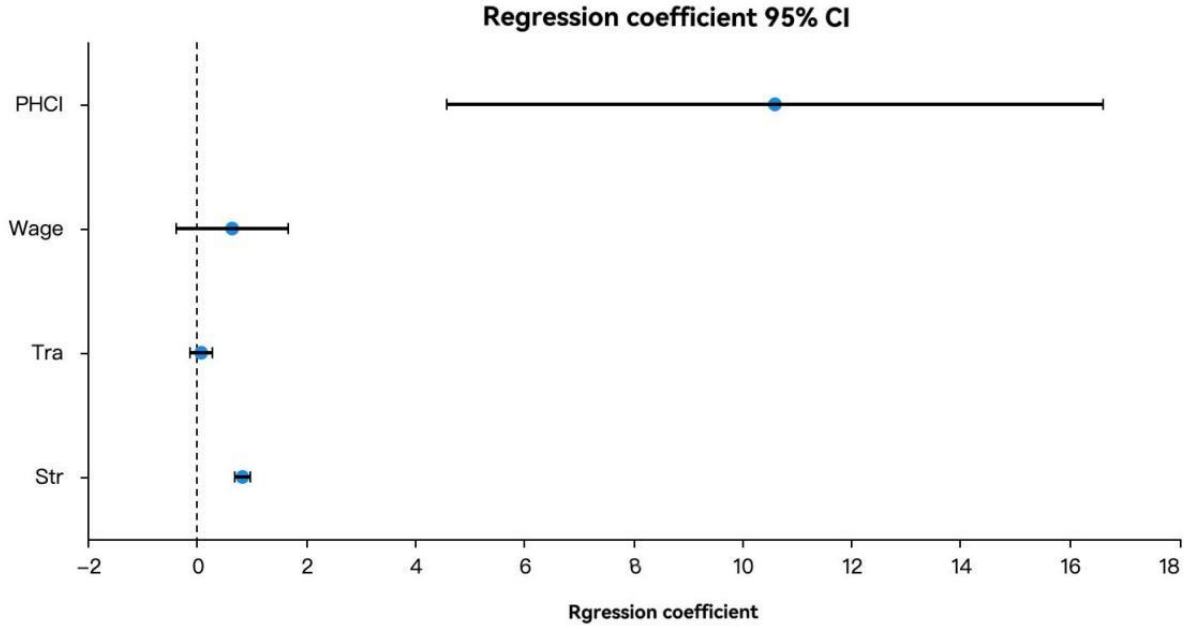

Figure 4. The regression coefficient

ANOVAForm (intermediate process)					
	Sum of square	df	Mean square	F	p
Return	23823.317	4	5955.829	69.584	0.000
Residual	1626.253	19	85.592		
Total	25449.570	23			

Figure 5. ANOVAForm (intermediate process)

In conclusion, public human capital investment has a significant positive impact on national economic growth. This finding emphasizes the importance of government investment in education and health in promoting economic growth. Future research could further explore the specific mechanisms by which different types of human capital investments affect economic growth and how this varies across countries and regions (As shown in Figure 5).

In terms of case studies, two Chinese firms operating in Africa are selected as case studies to explore the five dimensions of investment patterns they cover when implementing human capital investment management practices. These modes include not only the traditional investment in education, but also "institutional investment", "trust investment", "cultural investment" and "community investment". ". These investment modes are closely linked to the enterprises' human capital core system concepts, which fulfill their human capital investment needs and play an important role in their development. Based on this methodology, this study will analyze the selected cases in detail to test the research hypotheses.

1) The case of TS Communications

The case of TS Communications TS Communications is a company specializing in the design, R&D, production, sales, and brand operation of smart terminals centered on cell phones. The company is listed on the Shanghai Stock Exchange's Kechuang Edition and has been honored as one of the "Top 500 Chinese Enterprises". In the African smartphone market, TS Communications has a market share of more than 40%, ranking first, and is known as the "king of the African cell phone market". The company operates in more than 40 countries in Africa, with divisions and factories in Nigeria and Ethiopia and a total of over 10,000 employees. In Africa, local employees account for more than 90% of the workforce, mainly engaged in sales, production, and after-sales service. With about 10% Chinese employees, mainly responsible for technology development, new product maintenance, training, and management, the leadership of TS Communications firmly believes that by combining the strengths of local and Chinese employees, the work can be accomplished more efficiently and the company can run efficiently. However, due to the high degree of localization of employees, cultural differences between Chinese and African employees became a problem that the company had to solve.

To solve the cultural differences, TS Communications has taken a series of measures. In addition to regular training and learning, the company is committed to mitigating cross-cultural differences between Chinese and African employees. The company has made it clear that all employees are treated equally, regardless of race or color. In addition, the company has set up a training school independent of the HR department, encouraging experienced employees to develop their own training courses on the training school's online platform to share and exchange experiences. At the management level, the company has implemented a dual-appointment system, i.e., local African employees and expatriate Chinese employees share leadership positions, learn from each other, supervise each other, and work together in management and cooperation.

To sum up, TS Communications has adopted a variety of human capital investment methods in its operation and management in Africa to realize an integrated investment management of human capital. First, by investing in systems, the company has established standardized operating procedures, fostered industrial thinking and work behaviors among its employees, and developed a

set of highly efficient production models to increase labor productivity. Secondly, by investing in trust, the company gives local employees the opportunity to take up important positions, building trusting relationships and efficiently utilizing human resources. In addition, the company is committed to cultural investment and has established a multi-party cultural exchange platform, which reduces the negative consequences of cultural conflicts and promotes the smooth operation of the company in Africa and the cross-cultural training of local employees.e company in Africa and the cross-cultural training of local employees.

2) The Case of CG Agrobiology Company

CG Agrobiologics, a leading company in the global plant extraction industry, has entered the African market since 2018, investing in Zambia and continuing to expand its production scale. The company has remarkable achievements in the field of natural plant pigments, and has twice won the Second Prize of National Scientific and Technological Progress. Its sales of chili red, chili essence, and lutein are ranked first in the world, significantly increasing the share of China's independently produced chili red pigment in the international market from less than 2% to more than 80%.CG has a total workforce of about 10,000 employees in Africa, of which 300 are a formal team of locals with local university students and farm management experience who are responsible for leading the entire team's operation, and about The 8,000 local workers are mainly engaged in field operations.

CG Agri-Bio's investment in human capital not only focuses on the basic training of its employees, but also radiates to the surrounding communities, contributing significantly to community building. The company's investment in human capital not only includes investment in systems, trust and culture, but also involves investment in the community, and CG's Chairman emphasized that the company's core cultural philosophy is "people and the company develop together", where "people" not only refers to the company's employees, but also the local communities in which the company is located. local communities in which the business is located. Therefore, CG's operations in Zambia have been committed to promoting the development of the local economy, supporting the infrastructure of the local community by improving the quality of life of the locals, solving the housing problems of the employees, installing lighting systems and other behaviors, and paying attention to the disadvantaged groups of the local children and the elderly in order to help the local people lead a happier life.

By analyzing the above two cases in depth, we can draw the implications of these findings for theory and practice. Human capital has a direct impact on business performance, including productivity, market share, profitability, customer satisfaction, and innovative work processes and skills development. Human capital is also a key resource of an enterprise and is closely related to its ability to achieve its goals. Therefore, the human capital investment program has become an important direction for enterprise decision-making, which not only relates to the development of employees' abilities and influences enterprise cohesion, but also determines the performance and growth potential of the enterprise, and indirectly plays a role in regional economic development. In regional economic development, enterprises take human capital investment as the core, formulate distinctive business strategies to meet their own needs, skillfully utilize human capital investment and actual resources, optimize the industrial structure, and make the business model more conducive to the development of the enterprise. Starting from "education investment", enterprises gradually expand to in-depth investment in system, trust, culture and community, and eventually return to basic education investment, forming a complete investment cycle. This human capital investment model not only improves the labor skills and productivity of enterprises, but also lays a solid foundation for the sustainable development of the regional economy.

5 Conclusions

This study provides an in-depth examination of the critical role of public and private human capital investment in national and regional economic and social development. Synthesizing empirical studies and case studies, we find that public and private human capital investments have a positive impact on national and regional economic and social development. Specifically, investment in education is an important contributor to economic growth, while health expenditures play an important role in the sustainability and dynamics of economic growth. In addition, investment in

public human capital, which includes investment in skills training and scientific research, has an equally positive impact on improving science, technology and innovation capacity. In terms of private human capital investment, case studies in non-Chinese firms show that firms can directly improve their performance, optimize their talent structure, and enhance their innovation and development capabilities through multidimensional capital management behaviors, such as education and training, institutional investment, fiduciary investment, cultural investment, community investment, and so on, which in turn drive economic growth. Therefore, governments should continuously increase capital investment in education and health, and encourage and guide enterprises to invest more in human capital. This strategy not only improves the performance of individuals and firms, but also contributes to the sustained economic and social development of the region.

In conclusion, in this era of rapid economic development, the optimal use of investment in human capital is conducive to improving national competitiveness, developing socio-regional economies, promoting sustainable economic growth and enhancing social resilience.

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ANALYSIS OF THE ECONOMIC EFFICIENCY OF INVESTMENTS IN HIGHER EDUCATION IN THE REPUBLIC OF KAZAKHSTAN

Karakoz Kaiyrbek, Zhuldyz Kurmanbekova, Saltanat Kondybayeva*, Assem Kaliyeva
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail:saltanat.kondybaeva@kaznu.edu.kz

Abstract. This article undertakes a comparative analysis to assess the impact of higher education outcomes, as defined by international organizations ranking higher educational institutions, on government spending in this domain. The analysis involves a comparison of four key indicators: international student ratio, staff-to-student ratio, number of employed graduates, and number of employees engaged in research and development activities. The primary objective is to ascertain the indicator that exhibits the strongest correlation with the investments made in higher education, thereby evaluating the effectiveness of these investments. Through correlation analysis, the study unveils that two indicators, namely the staff-to-student ratio and the number of employees conducting research and development work, display a positive dependency on investment levels. This scientific inquiry provides valuable insights into the nuanced relationship between higher education outcomes and government expenditure, contributing to a deeper understanding of the efficiency of investment strategies in the higher education sector.

Keywords. Higher education, investment, world ranking of universities.
JELcodes:I22

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1 Introduction

Economic efficiency refers to the optimal allocation of resources to maximize the production of goods and services within an economy. It is typically evaluated in terms of achieving the highest possible output with the lowest possible input or cost. This article undertakes a rigorous examination of the economic efficacy of investments in higher education within the dynamic educational framework of the Republic of Kazakhstan. Kazakhstan's strategic emphasis on bolstering its higher education sector is evidenced by a series of policy interventions and financial commitments aimed at fortifying educational infrastructure, widening access to education, and augmenting the caliber of teaching and research. These initiatives are grounded in Kazakhstan's overarching vision of transitioning towards a knowledge-driven economy, fostering industry diversification, and enhancing its international competitiveness.

The analysis conducted here encompasses a comprehensive exploration of the economic dimensions inherent in investing in higher education in Kazakhstan. It delves into critical metrics such as the return on investment in education, the development of human capital, and the broader socio-economic ramifications stemming from an educated workforce's engagement.

Moreover, this study assesses the challenges and prospects associated with optimizing the economic effectiveness of investments in higher education in Kazakhstan.

By delving deeply into these facets, this analysis endeavours to offer valuable insights into the efficacy of past and ongoing investments in higher education in Kazakhstan, pinpoint areas necessitating enhancement and propose actionable recommendations for policymakers, educators, and stakeholders. These recommendations are geared towards augmenting economic dividends and societal advantages derived from investments in higher education.

In essence, the exploration of the economic efficacy of investments in higher education in Kazakhstan is not only timely but also pivotal in shaping evidence-based policies and strategies.

Such initiatives hold the potential to significantly contribute to Kazakhstan's sustainable development trajectory and bolster its global competitiveness in the contemporary era.

2 Literature review

The global competitive landscape hinges significantly on a nation's capacity for innovation and knowledge acquisition. This underscores the heightened significance and redefined importance of education, research, and technological advancement in contemporary contexts. Knowledge has emerged as a pivotal factor of production within national economies, underscoring its critical role in driving economic growth and competitiveness on the global stage [1]. The government assumes a crucial role in shaping the quality of education through its formulation of education development policies and its primary role as a key investor in training professionals. These professionals are poised to contribute significantly not only to the advancement of economic endeavours but also to the socio-cultural evolution of the nation in the foreseeable future. Stryhul et al. (2019) cite George Spring's assertion that investments in education foster economic growth, mitigate income disparities, and bolster employment rates. The authors underscore the significance of state educational policies as integral components of broader social policies, highlighting their instrumental role in shaping the formation of societal structures [2].

However, basically, in developed countries, the costs of education no longer comes first, so how in such states there is extensive base - education is already at a high level, therefore, its increase requires even greater investments; the labor market is filled with great number of highly qualified specialists, which sometimes complicates the search jobs for educated people [3].

The authors Psacharopoulos and Patrinos (2018) present a literature review of returns to investment in education over the past decade. Based on an analysis of global research, the authors discuss important aspects of the cost-effectiveness of education. Their research focuses on assessing the return on investment in education as a means to achieve economic efficiency and growth. The authors explore how education influences human capital, labor productivity, and socioeconomic development. They also review various methods for assessing return on investment, including income analysis, labor markets, and social and economic indicators [4].

The article holds significant practical and theoretical significance for researchers making decisions in the field of education and economics. It provides an extensive overview of current trends and research findings to better understand the impact of education on economics and social well-being.

The article "Human Capital and Economic Growth" by J. Mincer (1989) represents a significant contribution to the field of human capital and its influence on economic growth. Mincer delves into crucial aspects of how investments in education correlate with economic advancement. It elaborates on the concepts of human capital, providing definitions and explaining its role in molding economic development processes. Mincer conducts an analysis of how investments in human capital, particularly through education, impact gains in productivity, spur innovation, and contribute to overall economic growth [5].

One of the focal points of the article is the methodology used to assess the influence of human capital on economic growth. This includes examining studies related to wage trends, educational attainment levels, professional skills, among others. Additionally, the article delves into discussions about educational policies, the effects of technological advancements, and the government's role in fostering the development of human capital.

A review of Mincer's work from 1989 is crucial for gaining insights into the importance of investing in education and nurturing human capital within the broader context of achieving economic progress and enhancing the quality of life. This research carries practical implications for formulating educational strategies, shaping economic policies, and making informed decisions regarding education and workforce development initiatives.

3 Methodology

This article employs correlation analysis to demonstrate the impact of investment in higher education on four key indicators. Additionally, a graphical representation using geometric

illustrations was created to analyze the correlation among these four parameters. A comparative analysis was conducted based on the correlation coefficients to further understand the relationships between investment and the specified indicators in higher education.

In the context of assessing the impact of investment in higher education on four key indicators, correlation analysis can provide valuable insights into the degree and direction of the relationship between these variables. A high positive correlation suggests that as investment increases, the indicators also tend to increase, while a high negative correlation indicates the opposite trend. By plotting the data points or using graphical representations like scatter plots, it visually identifies any patterns or trends in the relationship between investment and the indicators. It led to understand how changes in investment levels affect the indicators over time or across different scenarios.

4 Results and Discussion

Economic efficiency in the context of investment in higher education is delineated by the correlation between outcomes achieved and incurred costs. Specifically, the economic efficiency of investing in higher education hinges on the relationship between government expenditures on higher education and the resulting outcomes. However, numerous assessment criteria influence these outcomes, notably the efficacy of the higher education system encompassing universities, institutions, academies, and colleges.

For instance, esteemed global rating organizations such as Times Higher Education and QS World University Rankings utilize various metrics to evaluate the effectiveness of higher education institutions. These metrics include the staff-to-student ratio, total income per student, percentage of international students, gender distribution among students, and other pertinent factors. These comprehensive evaluation criteria contribute to a more nuanced understanding of the overall effectiveness and efficiency of investments in higher education [9].

The presented table provides data regarding investments in higher education across various types of assets (foreign, state-owned and private) and funding sources (foreign investment, borrowed funds, own financing). This metric serves as a representation of government expenditure on higher education within the model.

Determining the outcomes of higher education lacks a singular solution as it encompasses various aspects such as the number of university graduates, the average income of graduates, the faculty size, graduates' employment rates, among others. Given the absence of a universal standard for assessing higher education outcomes globally, this study relies on criteria established by prominent world rating organizations to evaluate higher education institutions.

Four key indicators serve as outcomes of investing in higher education. First is the international student ratio, which is a component of the QS World University Rankings methodology, carrying a 5% weight in the evaluation. This metric gauges the proportion of international students to the total student population, reflecting the appeal of higher education institutions in the country and fostering knowledge exchange across diverse cultures.

The staff-to-student ratio is another crucial indicator, measured by the ratio of teaching staff to students. This metric, included in the teaching performance indicators of Times Higher Education with a 4.5% weight, signifies the density of teaching staff at universities. A higher ratio implies better teaching conditions, potentially enhancing the quality of education due to smaller class sizes and more effective teaching.

The number of employed graduates indicates the market demand for university graduates, reflecting the balance between theoretical knowledge and practical skills acquired during their education. Adequate material and technical resources, including modern equipment and laboratories, contribute to graduates' practical knowledge and employability.

Lastly, the count of employees engaged in research and development activities fosters scientific and innovative advancements within higher education institutions, contributing to overall progress in these domains.

Table 1. Data on investments in higher education and performance indicators of higher education institutions

Years	Investment in fixed capital for higher education, thousand tenge	International student ratio, %	Staff-to-student ratio	Number of employed graduates, human	Number of employees carrying out research and development work, human
2013	24.377.518	3,3	0,07897	105.468	23.712
2014	44.180.181	1,9	0,08446	99.623	25.793
2015	40.530.146	2,4	0,082912	95.397	24.735
2016	56.000.821	2,7	0,080157	88.273	22.985
2017	53.780.920	2,8	0,077008	90.113	21.295
2018	30.079.517	4,0	0,070558	88.450	21.456
2019	33.659.720	6,5	0,063656	88.634	21.843
2020	16.228.397	5,0	0,062972	87.896	22.665
2021	22.278.191	4,9	0,06321	92.735	21.617
2022	31.647.031	3,9	0,062957	93.355	22.456
Source: bureau of national statistics agency for strategic planning and reforms of the republic of Kazakhstan [6-8]					

Below are four indicators used to assess the effectiveness of universities and determine the economic efficiency of investment in higher education based on the relationship between government expenditures and outcomes.

1) Investment in higher education andinternational student ratio. The relationship between them can be expressed by the equation of a straight-line regression of Y on X: $\overline{y_x} = ax + b \rightarrow \overline{y_x} = -5.73x + 56.706$. The correlation coefficient is- 0.20787997.

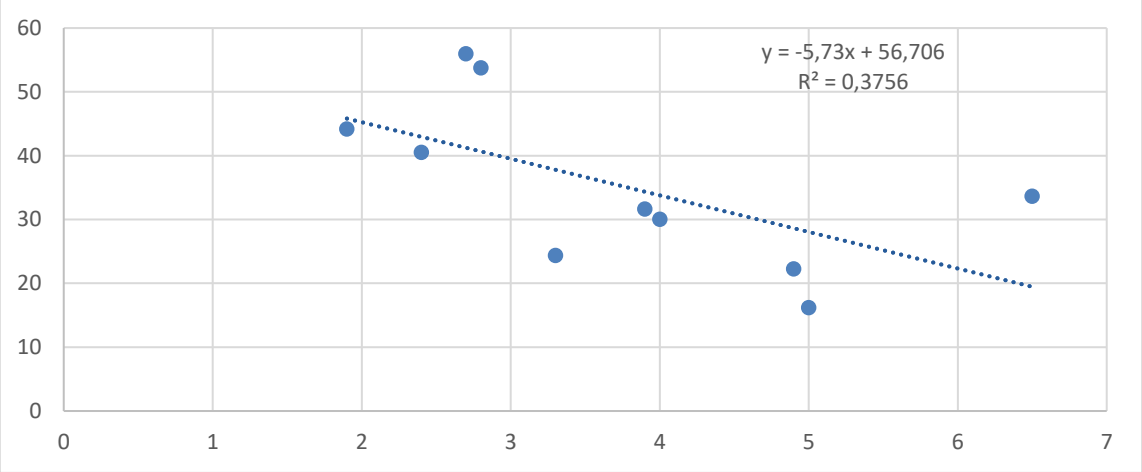

Figure 1. Analysis of the correlation between investment in higher education andinternational student ratio

The data depicted in the graph reveals a negative correlation between investments in higher education and the international student ratio. This implies that factors other than investment levels primarily influence the international-student ratio in educational institutions such as universities or colleges. These factors include: a) Government policies: Policies related to immigration, visas, work permits, and quotas for international students can exert a significant impact on the number of international students enrolled in institutions within a country. b) Economic factors: Strong economies may attract a higher number of international students due to perceived educational and

employment opportunities. c) Language requirements: The language proficiency prerequisites and the availability of language support services can influence an institution's appeal to international students, especially those whose first language differs from the language of instruction.

2) Investment in higher education andstaff-to-student ratio. The relationship between them can be expressed by the equation of a straight-line regression of Y on X: $\overline{y_x} = ax + b \rightarrow \overline{y_x} = 961.21x - 34.59$. The correlation coefficient is0.65.

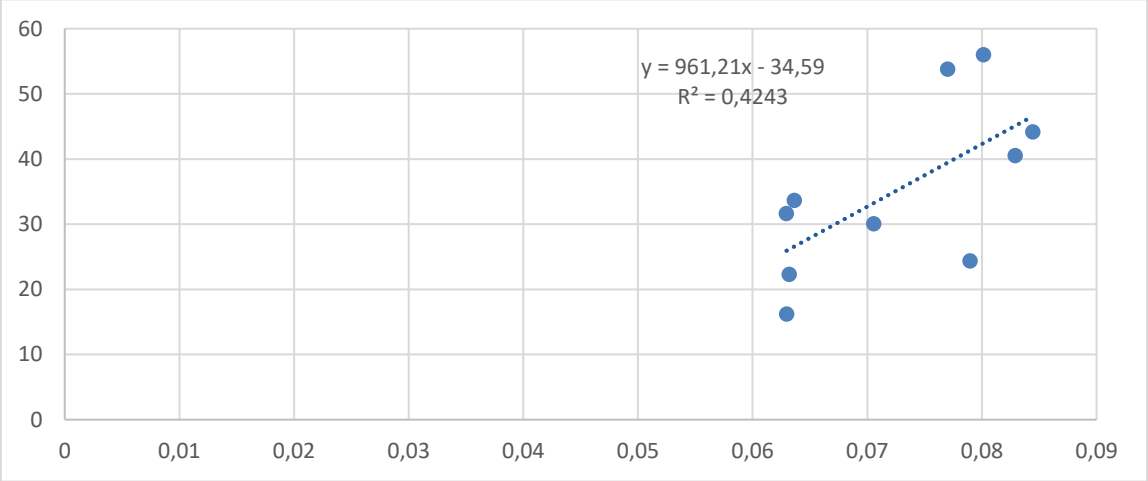

Figure 2. Analysis of the correlation between investment in higher education andstaff-to-student ratio

As depicted in the graph, there exists a strong positive correlation (close to 1) between investments in higher education and the international student ratio, indicating a robust connection between these two variables. When investment in higher education increases, there is a corresponding increase in the ratio of teachers to students, and vice versa. This relationship is influenced by several mechanisms: a) Recruitment and training of teachers: Investments can be allocated towards recruiting new teachers and offering additional training programs. This initiative can lead to a rise in the number of faculty members, thereby improving the student-to-faculty ratio by reducing the workload per faculty member. b) Development of infrastructure and learning technologies: Investments directed towards modernizing infrastructure and introducing innovative learning technologies can enhance resource utilization efficiency. This can result in faculty members being able to accommodate a larger number of students, thereby improving the student-to-faculty ratio. c) Academic support and mentoring programs: Investments in creating student support programs like mentoring, tutoring, and career guidance can facilitate effective learning and adaptation to the educational environment. Consequently, this may reduce the necessity for additional faculty members. d) Enhancement of education quality: Investments aimed at elevating the quality of education can attract more students to the institution. This influx may necessitate an increase in the number of faculty members to deliver adequate training and support. e) Research initiatives: Investment in research endeavors can attract exceptional scientists and researchers, consequently drawing more students to the institution. This can require additional faculty members to maintain quality teaching and research leadership.

In summary, investments in higher education can significantly impact faculty-to-student ratios, leading to improved education quality and support for students, thereby enhancing overall institutional performance.

3) Investment in higher education and number of employed graduates. The relationship between them can be expressed by the equation of a straight-line regression of Y on X: $\overline{y_x} = ax + b \rightarrow \overline{y_x} = -0.3003x + 63.11$. The correlation coefficient is-0,12763848.

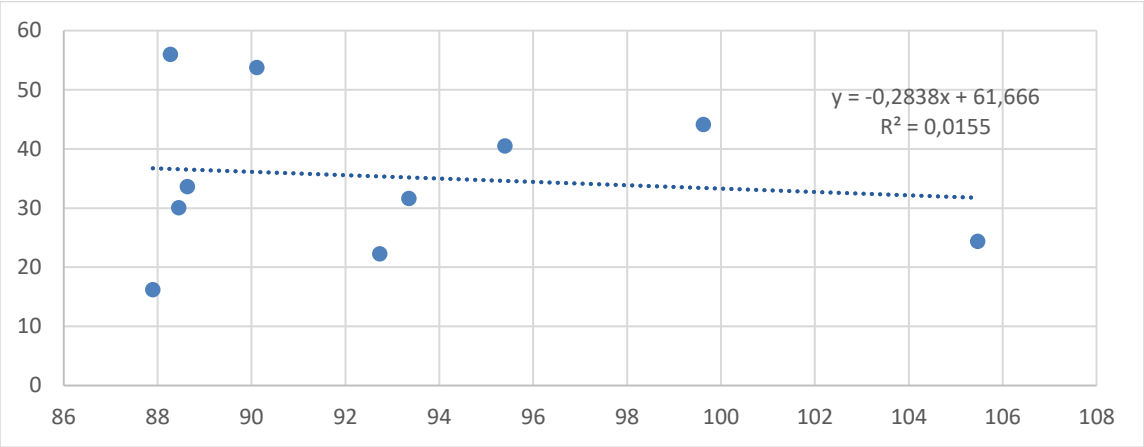

Figure 3. Analysis of the correlation between investment in higher education and number of employed graduates

The graph indicates a negative correlation between investments in higher education and the number of employed graduates, suggesting that the employment rate of graduates is influenced by multiple factors beyond investment in higher education. These factors include: a) Specialization and labor market demand: Certain specializations and professional domains may experience varying levels of demand in the labor market, impacting the employment rate of graduates. b) Networking and connections with employers: Educational institutions that actively cultivate relationships with employers and organize networking events for students often provide enhanced job opportunities to graduates. c) Career development support: Access to career counseling programs, assistance with resume building, interview preparation, and post-graduation employment support can positively influence the employability rate of graduates. d) Economic conditions: The economic climate of a country or region can significantly affect labor demand and, consequently, the availability of employment opportunities for graduates. e) Personal attributes of graduates: Individual qualities such as professional skills, communication abilities, adaptability, and entrepreneurial mindset also play a pivotal role in determining the employability of graduates.

These factors, to varying extents, contribute to the proportion of graduates who secure employment and are important considerations when selecting an educational institution.

4) Investment in higher education and number of employees carrying out research and development work. The relationship between them can be expressed by the equation of a straight-line regression of Y on X: $\overline{y_x} = ax + b \rightarrow \overline{y_x} = 1{,}2367x + 7{,}0013$. The correlation coefficient is0,139323544.

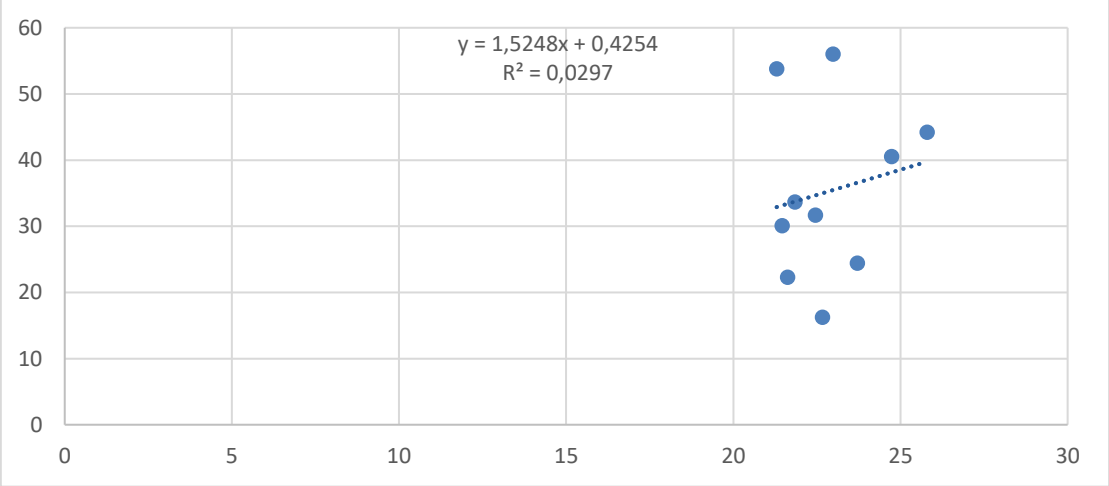

Figure 4. Analysis of the correlation between investment in higher education and number of employees carrying out research and development work

The graph depicts a positive correlation between investments in higher education and the number of employed graduates, suggesting a relationship exists between these variables. However, it's important to note that while this correlation is positive, it is relatively weak. This means that while there may be some influence of higher education investments on the employment rate of graduates, other factors likely play a more significant role in determining graduates' employability.

In addition, many other factors such as age, gender, cultural differences, personal interests and passions can also influence a person's decision to become a scientist or researcher.

5 Conclusion

The assessment of the economic efficiency of higher education is a multifaceted process influenced by various factors. Higher education investments may yield differing levels of effectiveness depending on the economic development status of a country and the demand for specific skills within certain regions. Additionally, considerations such as the cost of education and potential student debt are vital in evaluating economic efficiency.

As previously mentioned, the economic efficiency of any endeavor is determined by a cost-income ratio exceeding one. In this context, investments in higher education within the Republic of Kazakhstan serve as input parameters, while the outcomes of higher education—reflecting the effectiveness of domestic institutions—are the output parameters under scrutiny. International rating organizations like QS World University Rankings and Times Higher Education employ diverse criteria to evaluate universities, each carrying a specific weight in their overall rankings.

For instance, QS World University Rankings employs several criteria to assess universities, with each criterion contributing to the universities' overall rankings. Some of these criteria align with the indicators analyzed in this article, thereby providing a tangible reflection of higher education outcomes. By considering these indicators within the broader context of international ranking methodologies, we can derive meaningful insights into the efficacy of higher education investments in Kazakhstan.

As the results of the correlation analysis showed, 2 of the indicator: staff-to-student ratio and number of employees carrying out research and development work, 65 and 14 % depend on investment in higher education, respectively.

In conclusion, the analysis of the economic efficiency of investments in higher education in the Republic of Kazakhstan reveals a multifaceted landscape with various interlinked factors at play. Kazakhstan's commitment to enhancing its higher education sector is evident through strategic policy initiatives and financial investments aimed at improving infrastructure, expanding access, and enhancing teaching and research quality. These efforts align with the country's aspirations for economic diversification, innovation, and global competitiveness.

The examination of investment in higher education efficiency delved into critical metrics. While investments in higher education have shown positive correlations with certain outcomes, it's crucial to acknowledge the complexity of factors influencing these relationships.

Moving forward, policymakers, educators, and stakeholders in Kazakhstan must collaborate to address these challenges and capitalize on opportunities to maximize the economic efficiency and societal impact of investments in higher education. By fostering a conducive environment for knowledge exchange, skills development, and research innovation, Kazakhstan can position itself as a hub of educational excellence and economic prosperity in the global arena.

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ASSESSMENT OF THE IMPACT OF STATE SOCIAL ASSISTANCE ON THE STANDARD OF LIVING OF THE POPULATION

G.R.Dauliyeva, A.G. Sagynbay*
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail:sagynbayasel@gmail.com

Abstract. The purpose of the study is to analyze the social protection of the population in Kazakhstan and develop the main ways to solve the problems in this area. During the research, such methods as absolute and relative changes in indicators, comparative analysis of indicators by region, graphical method, deduction and induction, economic and statistical method were used. Conclusions and recommendations based on the results of the conducted research are aimed at further development and improvement of the economic development of the country and regions in order to improve the standard of living of the population. According to the results of the conducted research, measures to improve the standard of living of the population are proposed, which include: increasing the income of the population as one of the main criteria; support and development of the social sphere, reducing the level of poverty of the population; provision of the country's population with high-quality and affordable food and clothing, etc.

Keywords: social security of the population, standard of living, development indicators, unemployment rate, subsistence minimum, economic development

Introduction

The international Agenda believes that extreme poverty is one of the global problems of the international community. It should be emphasized that the last three decades have contributed to a decrease in the number of people living in extreme poverty. These populations are defined as people living at purchasing power parity in 2017 of less than $ 2.15 per person per day. However, this favorable trend changed course during the covid-19 pandemic and in the world geopolitical situation: the global level of extreme poverty in 2020 was 9.3%, compared with 8.4% in 2019 (World Bank, 2022). The negative consequences of extreme poverty are the possibility of its recurrence and the impact on access to a wide range of benefits, including education and health care, which have led to a deterioration in the quality of life of the population, a decrease in employment potential and a decrease in life expectancy [1].

Today, the social protection system of Kazakhstan has encountered serious difficulties, which has had a negative impact on the level of social protection of the population. In particular, they are caused by insufficient funds for the social protection of the population, a limited network of social service institutions and an insufficiently developed legislative and regulatory framework, including the distribution of power between administrative entities. This situation strongly requires improving the mechanisms of social protection of the population at national and regional level. At the same time, the most important question is to what extent the country's social protection policies have influenced the growth of the population's well-being and poverty reduction.

The World Bank recognizes that developing digital skills is a way to reduce poverty. Within the framework of the social integration project developed by the World Bank in Pakistan, the integration of the young digital economy in the Khyber province of Pashtun is underway. The World Bank is helping one of the poorest regions of Pakistan implement digital skills acquisition programs for young people, such as youth employment programs, with the aim of creating a public space for Youth Cooperation and for young people.

Objectives of the social protection system:

- providing assistance taking into account the necessary needs of a particular citizen or his family;
- create conditions that allow able-bodied citizens to maintain their well-being through their own labor

The social protection system of the population is a very complex manifestation of socio-economic reality. The degree of social tension, the level and quality of life of the population of the

region depend on the effectiveness of its functioning. In this regard, there is an urgent need to study the genesis of the theoretical provisions of social protection in the main foreign economic and sociological theories and schools.

Literature review

The problem of the system of social protection of the population, which is one of the main factors of economic development of various countries, is reflected in the work and research of many domestic and foreign economists. The British economist Malthus "Experience of Population Law" in his work pointed out that uncontrolled population growth can lead to a decrease in population well-being or mass hunger, and also revealed the problem of population, pointing out that the author, as a result of his research, believes that the populations of different countries are limited in survival, and also pointed out that the population can be reduced due to various factors such as epidemics, wars and famines, which leads to a decrease in the standard of living of the population (Malthus, 2023)

In her work "factors of life expectancy growth in modern Russia", the Russian scientist Kossova T.V. reflects on the main socio-economic factors that affect the life expectancy of the population, including: the level of well-being of the population, the quality of nutrition, and the post also discusses issues related to the increase in health care costs (Kossova, 2020).

Economist Elakhovsky in his book "measuring differences in the standard of living in Russian regions" paid much attention to improving the standard of living of people, using cash income and final consumption per capita as the main indicators reflecting the quality of life. The author pointed out that the standard of living of the population varies from region to region and is influenced by various factors, including: the economic conditions of each region, geographical location, climatic conditions, etc. (Elakhovsky, 2020).

Kolosnitsyna M.G., Kossova T.V., and Shelontsova M.A. also paid much attention to the issue of improving the standard of living and the quality of the population in their work "factors for the growth of life expectancy: a cluster analysis of countries around the world." In order to establish the dynamics of changes in the level of life expectancy of the population, the author conducted the following types of analyzes: correlation, cluster analysis, the results of which show that the level of life expectancy depends on the level of economic development of each country. The author pointed out that the standard of living of the population in developed countries is higher than that of developing countries and underdeveloped countries. The economic state, the level of Health, the percentage of urbanization, the quality of nutrition, lifestyle and other levels of these countries differ (Kolosnitsyna et al., 2022).

In his book "Analysis and evaluation of the impact of Eurasian Economic Integration on the income of the population, inequality, level and quality of life," economist Mukhamadiev B.M. pays special attention to the impact of Eurasian Economic Integration on the income of the population. The author also reflects the causes and sources of inequality that affect the level of the population and the quality of life, using various coefficients for calculating inequality (Mukhamediev, 2016).

Kazakh writers Kuzembekova R.A. and Zhanbyrbayeva A.N. paid special attention to the influence of socio-economic factors on the level of rural poverty in their work "socio-economic factors of rural poverty in the Almaty region and their organizational prospects." Based on the results of the research, the author suggests the main ways to solve the problem of poverty reduction, especially in rural areas, and the prospects for regulating these problems (Kuzembekova & Zhanbyrbaeva, 2022).

Materials and methods

In the research process, economic and statistical methods are used in the work, including the following: identification of phenomena and processes, synthesis and analysis, statistical analysis of economic indicators, induction and deduction, absolute and relative indicators. When applying economic factors, it is necessary to take into account the following factors: economic activity, investment attractiveness of the region or industry, competitiveness of the region, etc. one of the main factors that have a significant impact on the standard of living of the population is the social

population: the share of income and expenditure of the population, the level of poverty, employment, education, population potential, etc.

The study of social protection systems of the population should begin with the study of territorial characteristics, since they differ according to natural and climatic characteristics, geographical location, economic conditions and other criteria. In this regard, it can be emphasized that Kazakhstan has a vast territory, and each region has different geographical and climatic characteristics, which affects the economies of individual regions. For example, there are agricultural areas that are mainly engaged in agriculture, so the level of income of the population in these areas is lower than in industrial areas. Therefore, when studying the differentiation of the standard of living, it is necessary to adopt a systematic approach that takes into account regional characteristics.

The system of social protection of the population is influenced by various factors, in particular, the poverty of the population. When determining the level of poverty, it is necessary to use the grouping of subjects under study, since the criteria for classifying a particular type of person in different regions differ depending on the economic level. Therefore, in developed countries, the poor include a class of people who do not have any special problems with food, clothing and medical care, but still cannot bear higher desires, such as access to higher education and cultural entertainment. This part of the population in developed countries is classified as poor, while in less developed countries this category of people belongs to the richer population. In this regard, it can be said that when classifying certain sections of the population as unemployed, it is necessary to apply methods at different levels of economic development in different countries (Okunev et al, 2021).

Results anddiscussion

The system of social protection of the population can be studied with the help of official statistical indicators, which are compiled according to the purpose and economic content. The main indicators that reflect the standard of living include: monetary income of the population, personal income of the population, savings of the population, purchasing power, security, quality of Health Care, Quality of Social Services, average income and average salary, and average pensions (Surinov et al,2021).

To determine the level of social protection of the population, various indicators are used. These indicators are indicators of the standard of living: the income of the population, the percentage of the population whose income is below the minimum cost of living, the average household income per capita, the nominal monetary income per capita, the depth of poverty, etc.

The decline in the standard of living has led to an increase in the number of poor people, and its growth is influenced by various factors, the main factor of which is the socio-economic situation of the country and the region (Koval et al., 2022).

Table 1 shows the monitoring of the main indicators of the standard of living of the population of Kazakhstan in the period 2018-2022.

According to the data presented in Table 2, it can be noted that the per capita household income in 2018 was 48 619 tenge, while in 2022 it was 69 038 tenge, an increase of 20 419 tenge or 42%. Household income per capita has increased in both urban and rural areas.

As income increases, the per capita monetary expenditure of the population also increases. For example, per capita spending in 2018 was 46,319 tenge, while in 2022 it was 67,440 tenge, an increase of 21,121 tenge or 45.6%. Monetary expenditure per capita in cities increased by 21,930 tenge, and per capita expenditure in villages increased by 19,103 tenge.

The nominal monetary income of the population per capita has also increased in recent years, so that in 2018 it was 83,710 tenge, and in 2022 it was 131,797 tenge, an increase of 48,087 tenge.

According to Table 1, Figure 2 is produced, which shows the per capita household income for the period 2018-2022.

One of the indicators that affect the standard of living is the poverty rate of the population. The main reasons for this are the decline in the nominal and real income of people. Absolute, relative and subjective methods are used to determine the poverty rate of the population.

Table 1. Indicators of the standard of living of the population of Kazakhstan from 2018 to 2022

	2018	2019	2020	2021	2022
The proportion of the population with incomes below the subsistence level (poverty level), %	2,7	4,3	4,3	5,3	5,2
City	1,2	2,5	2,7	3,7	3,8
Village	4,6	6,7	6,6	7,6	7,2
The proportion of the population with incomes below the cost of the food basket, %	0,1	0,1	0,1	0,2	0,1
City	0,1	0,1	0,1	0,1	0,1
Village	0,3	0,2	0,2	0,2	0,2
Depth of poverty, %	0,4	0,7	0,7	0,8	0,8
Severity of poverty, %	0,1	0,2	0,2	0,2	0,2
Household income (used for consumption), on average per capita, tenge	48 619	53 224	57 725	61 358	69 038
City	54 659	60 034	66 207	67 591	76 024
Village	40 502	43 919	45 829	52 398	58 863
The ratio of income used for consumption to the subsistence minimum, %	204,4	196,6	195,7	185,8	185,3
Per capita nominal monetary income of the population, tenge	83 710	93 135	104 282	116 126	130 616
Index of real monetary income, %	101,8	105,0	106,4	104,3	104,1
Monetary expenditures of the population on average per capita, tenge	46 319	51 198	55 791	59 701	67 440
City	53 753	59 296	64 128	67 229	75 683
Village	36 331	40 132	44 097	48 878	55 434
The ratio of 10% of the most and 10% of the least well-off population (fund ratio), times	5,9	6,0	6,0	5,9	6,0
Income concentration coefficient (Gini index)	0,287	0,289	0,290	0,291	0,294
Average household size, person	3,4	3,4	3,4	3,4	3,4
City	3,1	3,1	3,1	3,1	3,1
Village	4,0	3,9	3,9	3,9	3,9
The proportion of the population with incomes below 60% of the median income level, %	10,1	10,0	9,7	9,9	9,3
Note – compiled by the authors according to the source [4]					

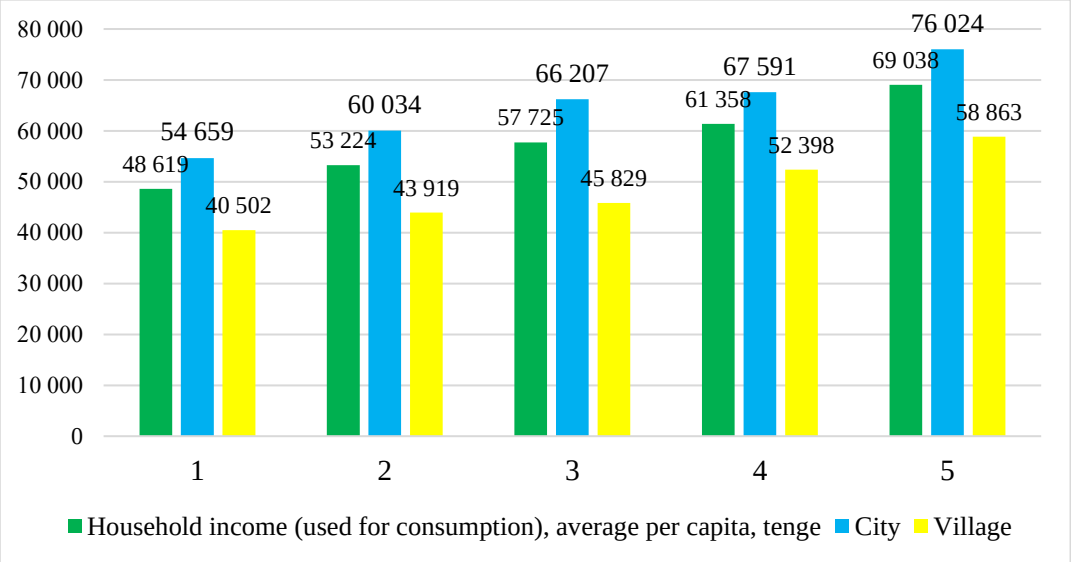

Figure 1 - Household incomes on average per capita,tenge
Note – compiled by the authors according to the source [4]

The level of poverty in Kazakhstan has increased over the past five years. At the same time, indicators such as household income per capita and nominal monetary income of the population per capita also increased. For example, household per capita income in 2018 was 48,619 tenge,

compared to 69,038 tenge in 2022, an increase of 20,419 tenge or 42%. The increase in per capita income occurred in urban and rural areas, which is a positive factor. According to Table 2, Figure 3 is formed, which clearly shows the dynamics of changes in the level of poverty in Kazakhstan in the period 2018-2022.

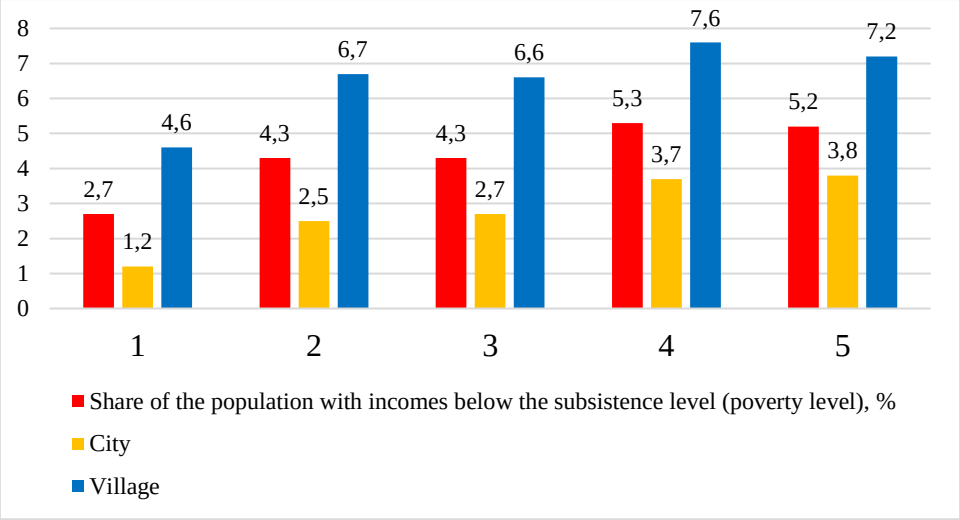

Figure 2 - Poverty level in Kazakhstan 2018-2022, %
Note – compiled by the authors according to the source [4]

According to figure 3, the following conclusions can be drawn: over the past five years, the poverty rate in the country has increased from 2.7% in 2018 to 5.2% in 2022, an increase of 2.5%, of which in cities the indicator has increased from 1.2% in 2018 to 3.8%. In recent years, the unemployment rate in the country also tends to grow, so in 2022 this figure was 7.2%, while in 2018 it was 4.6%, that is, an increase of 2. 6%.

The increase in poverty can be influenced by various factors, in particular:

- The number of households with incomes below the subsistence minimum has increased, that is, the number of extended families has increased, while the level of income has remained at the same level or slightly increased. Compared to urban areas, poverty rates have increased in rural areas in particular. One of the indicators that reflect the standard of living of the population is the ratio of income and expenditure per capita. Based on the data in Table 1, Figure 3 is formed, which clearly shows the share of income and expenditure of households and residents in the country in the period 2018-2022.

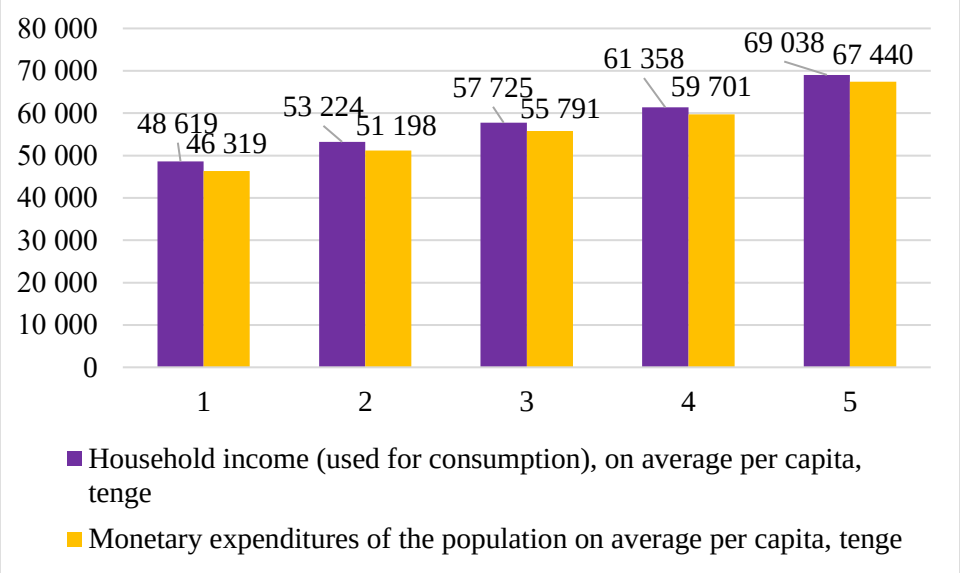

Figure 3 - Share of income and expenditure of the population of Kazakhstan, %
Note – compiled by the authors according to the source [4]

Figure 3 shows that the share of household income and expenditure is slightly different from the share of the population. Thus, in 2022, the amount of household income exceeded the monetary expenditure of the population by 1598 tenge, while in 2018 this amount was 2300 tenge, which means that in 2022, compared with 2018, the per capita income decreased by 702 tenge. Although the incomes and expenditures of households and the population have increased in recent years. One of the main methods used in international practice to take into account the standard of living of the population is the poverty line, which is calculated by calculating the minimum standard of living per capita.

When determining the minimum living conditions, a minimum set of products, commodities and services was formed, including the fulfillment of minimum human needs, taking into account various factors: the climatic conditions of the country, traditions, national characteristics and other factors. If the income of people is below the subsistence minimum, then this category is classified as poverty (Chulanova, 2022).

For example, the poverty line in Kazakhstan is calculated on the basis of the minimum cost of living. Therefore, in 2023 the cost of living is 37 389 tenge. 70% of this amount is deducted from the cost of living-26 172 tenge. People with a monthly income of less than 26,172 tenge are classified as people living below the poverty line and are included in the poor. Table 3 shows data on the cost of living per capita in Kazakhstan for the period 2018-2022.

Table 2 - The cost of living in Kazakhstan on average per capita

The cost of living, in tenge	2018	2019	2020	2021	2022	Growth rate in %, 2022 to			
						2018	2019	2020	2022
	23 783	27 072	29 342	33 015	37 579	158,0	138,8	128,1	113,8
as a percentage of the previous year	110,0	113,8	108,4	112,5	113,8	103,5	100,0	105,0	101,2
The cost of the food basket, in tenge	14 270	14 890	16 138	18 158	20 669	144,8	138,8	128,1	113,8
Note – compiled by the authors according to the source [7]									

The country recalculates the cost of living per capita every year, including the most necessary expenses: useful and affordable food, household goods, medicines and others. As the prices of food, non-food products and services increase every year, the cost of living has increased accordingly. According to Table 3, it can be noted that the cost of living in 2022 was 37 579 tenge, compared with 23 783 tenge in 2018, that is, the increase in this indicator was 13 796 tenge or 58%, an increase of 4 564 tenge or 13,8% from 2021.

One of the components of the minimum cost of living and the impact on their value is the volume of the food basket, which includes a set of the most necessary and affordable food. The number of food baskets is also increasing every year, so if it reaches 14,270 tenge in 2018 and - 20,669 tenge in 2022, the increase reached 6,399 tenge, or 44.8%.

Based on the analysis, it can be concluded that when calculating the size of the consumer basket, which affects the cost of living, it is not recommended to use the smallest, but to use the optimal size of the consumer basket, which must be calculated for each region. The optimal volume of the consumer basket should include the number of necessary and affordable food products, depending on their cost in a particular region.

Although the size of the Food Basket and the cost of living are growing every year, it can be pointed out that this is not enough to improve the standard of living of the population. This is the reason for the increase in the percentage of the population whose income in recent years is below the subsistence minimum, as can be emphasized in Table 3.

Table 3 - Proportion of the population with incomes below the subsistence level (poverty level)

	2018	2019	2020	2021	2022	Growth rate in %, 2022 to			
						2017	2018	2019	2020
The Republic of Kazakhstan	2,7	4,3	4,3	5,3	5,2	192,6	120,9	120,9	98,1
Akmola	2,9	4,2	4,3	5,9	6,4	220,7	152,4	148,8	108,5
Aktobe	1,9	2,9	3,0	3,5	3,7	194,7	127,6	123,3	105,7
Almaty	2,4	3,7	2,9	4,0	4,2	175,0	113,5	144,8	105,0
Atyrau	2,8	2,5	2,5	3,0	3,3	117,9	132,0	132,0	110,0
West Kazakhstan	2,7	3,2	3,7	3,9	4,4	162,9	137,5	118,9	112,8
Zhambylskaya	3,5	4,6	4,8	5,8	5,3	151,4	115,2	110,4	91,4
Karaganda	1,6	2,3	2,5	3,0	3,2	200,0	139,1	128,0	106,7
Kostanay	2,4	4,1	3,4	3,5	3,4	141,7	82,9	100,0	97,1
Kyzylorda	3,0	4,9	4,9	5,8	5,5	183,3	112,2	112,2	94,8
Mangystau	3,3	4,9	4,3	5,7	8,6	260,6	175,5	200,0	150,9
South Kazakhstan	5,0	-	-	-	-	-	-	-	-
Pavlodar	1,7	3,1	3,8	3,9	3,9	229,4	125,8	102,6	100,0
North Kazakhstan	3,3	4,7	5,6	6,7	5,5	166,7	117,0	98,2	82,1
Turkestan	6,6	10,6	10,8	12,2	9,8	148,5	92,5	90,7	80,3
East Kazakhstan	1,8	6,3	6,2	6,5	5,5	305,6	87,3	88,7	84,6
Astana city	0,8	0,9	1,1	1,5	2,2	275,0	244,4	200,0	146,7
Almaty city	1,0	2,8	2,8	4,9	5,2	520,0	185,7	185,7	106,1
Shymkent city	0,2	2,5	2,8	5,0	5,5	2 750	220,0	196,4	110,0
Note – compiled by the authors according to the source [4]									

According to the analysis, Table 3 shows that in Kazakhstan, the share of the population whose income is below the subsistence minimum has increased from 2.7% in 2018 to 5.2% in 2022, an increase of 2.5% and a growth rate of 192.6%. In 2022, the largest share of the low-income population appeared in Turkistan (9.8%), Mangystau (8.6%), Akmol (6.4%), South Kazakhstan (5.5%), East Kazakhstan (5.5%) and other regions.

In the same areas as Karaganda, Kostanay, Aktobe Region and Astana city, the share of low-income residents ranges from 2.2% to 3.7%. In recent years, household income has increased, and a large part of it is occupied by wages. Nominal wages of employees in the country have increased, which shows a positive trend. Table 5 shows the dynamics of changes in nominal monetary income per capita in the period 2018-2022.

Table 4 - The amount of per capita nominal monetary income, tenge

	2018	2019	2020	2021	2022	Growth rate in %, 2022 to 2018
The Republic of Kazakhstan	83 710	93 135	104 282	116 126	130 616	156,0
Abayskaya	-	-	-	-	118 180	-
Akmola	72 866	80 809	91 933	107 224	122 039	167,5
Aktobe	74 092	80 967	92 696	98 360	115 009	155,2
Almaty	64 072	69 652	79 528	86 606	97 519	152,2
Atyrau	156 392	185 036	212 571	215 076	251 597	160,9
West Kazakhstan	84 971	95 621	107 202	112 319	128 077	150,7
Zhambylskaya	54 564	61 301	70 330	80 516	90 255	165,4
Zhetysuskaya	-	-	-	-	96 190	-
Karaganda	82 299	94 738	106 481	130 552	140 882	171,2
Kostanay	75 923	82 093	92 543	105 856	122 249	161,0
Kyzylorda	62 630	66 924	76 971	85 142	92 531	147,7
Mangystau	122 306	131 667	137 539	141 506	156 740	128,2
South Kazakhstan	42 684	-	-	-	-	-
Pavlodar	85 714	93 162	106 226	119 334	138 244	161,3
North Kazakhstan	71 402	78 967	88 229	103 292	117 275	164,2
Turkestan	-	43 937	52 650	63 443	69 105	-
Ulytau	-	-	-	-	162 397	-
East Kazakhstan	74 594	85 630	97 835	111 6320	133 823	179,4
Astana city	138 711	147 548	162 400	174 396	194 398	140,1
Almaty city	130 268	138 927	150 380	164 721	179 554	137,8
Shymkent city	-	58 470	70 202	75 725	81 714	-
Note – compiled by the authors according to the source [4]						

According to the analysis in Table 4, it can be noted that the range of nominal monetary income per capita of the country's population increased from 83,710 tenge in 2018 to 130,616 tenge in 2018-2022, an increase of 46,906 tenge or 56.0%. Nominal per capita income has increased in almost all regions. Thus, the largest growth occurred in the following regions: in East Kazakhstan-79.4%, Karaganda-71.2%, Akmola region-67.5%, Zambales region-65.4%. One of the economic indicators that reflects the standard of living and quality is the income of the population in the form of an average monthly salary (Nurmukhametov et al., 2022).

Table 5 shows the average monthly salary data for each region of the Republic of Kazakhstan for the period 2018-2022. According to the analysis, Table 6 shows that in recent years the average monthly wage in the Republic has increased from 150,827 tenge in 2018 to 250,405 tenge. The average monthly salary in almost all regions of the country has increased. In Atyrau, Mangisto, Astana, Almaty and other regions, the average monthly salary is the highest. Thus, in the Atyrau region in 2018, the average monthly salary was 264,850 tenge, while in 2022 it was 410,951 tenge, an increase of 146,101 tenge.

In the Mangystau region, the average monthly salary in 2018 was 259,672 tenge, while in 2022 it was 356,681 tenge, an increase of 97,009 tenge. In Astana in 2022, the average monthly salary from 2018 increased by 18 447 tenge to 346 450 tenge. The reason for the greatest wage growth in the Atyrau and magistau regions is that these regions are areas where oil fields are located, and the main activity is oil production. The reason for the growth of wages in Astana and Almaty is that these are large megacities, where there are many large domestic and foreign companies, so the level of wages is higher than in other regions.

Table 5 - Average monthly salary by regions of the Republic of Kazakhstan, tenge

	2018	2019	2020	2021	2022	Growth rate in %, 2022 to 2018
The Republic of Kazakhstan	150 827	162 673	186 815	233 136	250 405,2	166,0
Akmola	110 776	121 361	140 272	168 302	200 821,5	181,3
Aktobe	126 640	137 039	156 595	182 923	216 764,7	171,2
Almaty	110 378	115 101	136 357	168 313	209 333,7	189,7
Atyrau	264 850	293 572	351 103	367 799	410 591,7	155,2
West Kazakhstan	144 175	153 782	183 914	195 410	226 829,5	157,3
Zhambylskaya	100 536	109 720	127 043	156 846	195 104	194,1
Karaganda	134 494	149 916	172 239	203 806	241 055,2	179,2
Kostanay	116 640	125 995	145 890	171 319	202 439	173,6
Kyzylorda	124 107	130 391	152 086	178 174	210 982,5	170,0
Mangystau	259 672	275 679	294 099	317 611	356 681,3	137,4
Pavlodar	131 706	141 915	160 670	187 427	220 059,7	167,1
North Kazakhstan	104 139	110 686	130 233	157 497	187 220	179,8
Turkestan	-	104 136	123 853	158 762	195 250	187,5
East Kazakhstan	125 594	140 136	162 182	190 287	225 496,7	180,0
Astana city	227 003	240 320	266 796	302 504	345 450,2	152,2
Almaty city	190 875	200 919	224 158	247 951	294 306	154,2
Shymkent city	-	115 574	136 995	161 329	194 473,2	168,3
Note – compiled by the authors according to the source [4]						

Average monthly wages in regions such as Shymkent, Turkistan, North Kazakhstan and the Zhambyl region have fallen. Thus, in the North Kazakhstan region, the average monthly salary in 2018 was 104,139 tenge, while in 2022 it was 187,220 tenge, an increase of 83,081 tenge.

In the Zhambyl region, the average monthly salary in 2018 was 100,536 tenge, and in 2022 it was 195,104 tenge, an increase of 94,568 tenge. The lowest wages are observed in areas that belong to agriculture: Zhambyl region, Turkistan, North Kazakhstan. According to Table 6, Figure 5 is formed, which clearly shows the average monthly salary scale in Kazakhstan in 2022.

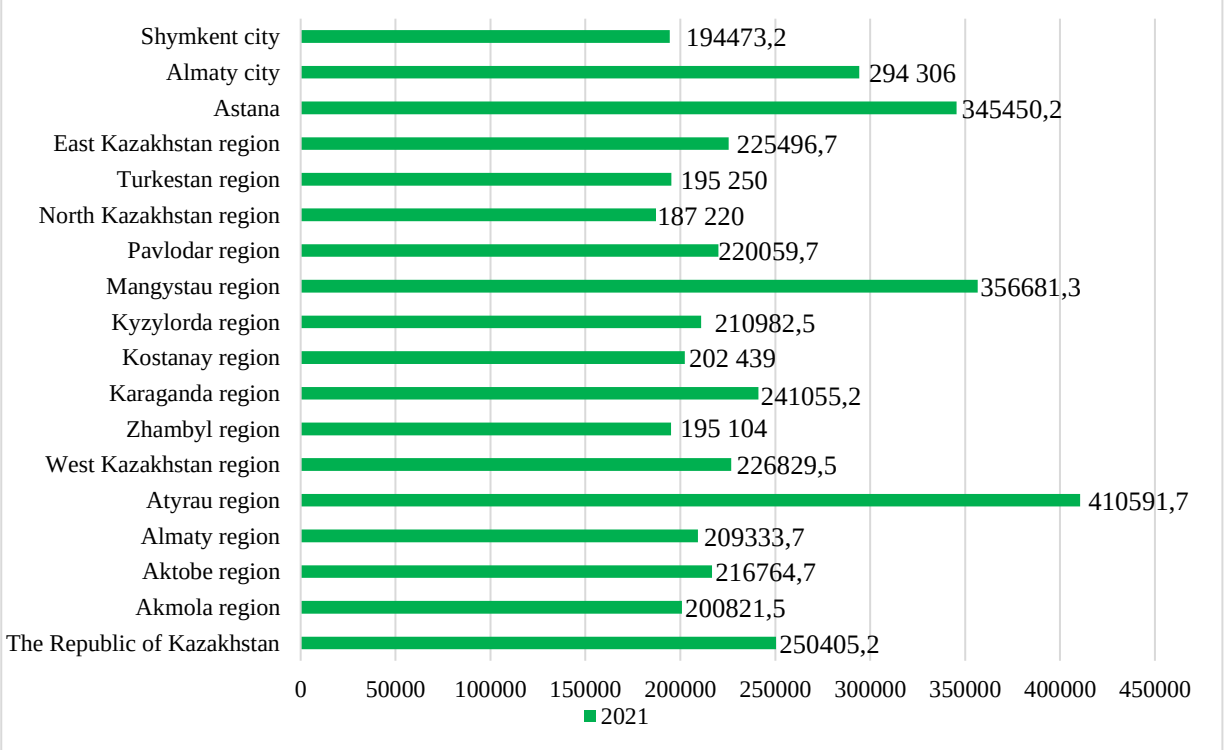

Figure 4 - Average monthly salary by regions of Kazakhstan in 2022, tenge
Note – compiled by the authors according to the source [4]

Based on the results of the analysis of the main indicators, it can be concluded that it is necessary to adopt several methods for studying the standard of living, the main of which are: economy, socio-economy and environment. In modern conditions, the main factor affecting the standard of living of the population is the creation of the necessary conditions for the implementation of work that will help develop the personality of employees, increase interest in career development, improve skills and increase participation. All this will ultimately affect the level of income of employees and improve the well-being of employees and the standard of living of the population (Kuznetsova, 2019).

Conclusions

Ensuring a decent standard of living and quality of life is one of the priorities of all countries. The subject of research has always been relevant, especially in recent years associated with the global crisis, the result of which is a decrease in indicators of the level of population and quality of life. This article analyzes the system of social protection of the population on the basis of the application of economic and social indicators such as income and expenditure of the population, the level of poverty of the population and the level of wages.

One of the most important measures aimed at improving the standard of living and quality of people is ensuring employment and reducing poverty. On the basis of the conducted research, the main methods of improving the standard of living of the population were identified, including the following:

1. Provide decent and paid work to the population of the country, which will help improve the standard of living of the population. In order to implement this procedure, Kazakhstan participated in many government programs, one of which is the Business Roadmap 2025.

2. Strengthen synergies between activists and communities through targeted and digital transformation training courses, raise wages and thereby increase the income level of the population.

3. According to foreign experience, to improve the standard of living of the population, it is necessary to increase spending on education to 10% of GDP.

4. To ensure the necessary and affordable food for the population of countries and regions, it is necessary to attach great importance to the development and improvement of economic and agricultural sectors.

5. In addition, commit to the formulation of various social programs to support the most vulnerable parts of the population: provide housing, provide free access to education and health services, increase pensions, allowances and scholarships, targeted social assistance,

6. According to the supply and demand of Labour, the unemployment rate can be reduced by further improving the labour market.

7. Create targeted programs to support small and medium-sized enterprises as the main drivers of the country's socio-economic development, in which a significant part of the economically active part of the population participates.

Although the country is doing a lot of work to improve the level of the population and the quality of life in all aspects, this problem is still related and has not been solved to the end. Finally, it can be emphasized that the introduction of a set of economic and social measures will help to develop a system of social protection of the population. Improving the standard of living of the population, reducing poverty and reducing the level of social differentiation are the main conditions for economic and food security of the country.

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SMALL AND MEDIUM-SIZED BUSINESSES IN THE REPUBLIC OF KAZAKHSTAN

Dauliyeva G.R., Tolbassy A.A.*
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail:Adel.tolbasy.01@mail.ru

Abstract. Small and medium-sized enterprises (SMEs) Between 2020 and 2022, SMEs around the world were one of the main sources of support during the crisis caused by the decline in consumer demand because of the pandemic. In most developed and developing countries with market economies, SMEs constitute a significant share of GDP and provide employment to a large part of the population. Overall, it is important analyze the development of SMEs and assess their current state. This is since SMEs contribute to the well-being of the country, improve the financial situation of the state and develop international relations.

Government support for SMEs in Kazakhstan has developed and improved over many years. This allows entrepreneurs to more effectively develop their businesses and contribute to the economic development of the country. The main factors for increasing the number of SMEs in developing countries are active government support, the formation of an effective infrastructure and the reduction of administrative barriers that impede the development of SMEs. Countries are introducing state support subsidies, benefits, various programs and laws for the development of SMEs. They are aimed at the development of SMEs in the region. This work examines the development of SMEs and their state support in Kazakhstan. The purpose of the article is to analyze the current situation and development of SMEs in the Republic of Kazakhstan, as well as the impact of state support. To achieve the objectives set in the article, the author analyzed collected statistical data and built a regression model. As a result, the article created a regression model that allows us to trace the influence of several variables on the development of SMEs and determine which factors have the greatest influence on the development of SMEs. The study was carried out based on indicators of the last decade and showed that the number of employees has a significant impact on the share of SMEs in total GDP.

Keywords: Economics, entrepreneurship, government program, model, small and medium-sized businesses, econometric model, multiple models, regression, correlation, covariance, Fisher model, Student model, law, tax.

Introduction

SMEs play an important role in the development of the economy of any country and its rapid growth. They create new jobs, stimulate innovation, increase the competitiveness of the market, and improve the quality of life of the population.

However, there are many problems and limitations that inhibit the development of SMEs. These problems include limited access to financial resources, complex registration and licensing procedures, high tax rates, etc.

As a result of the global economic crisis after the COVID-19 pandemic, the development of SMEs in the country began to change dramatically. If we look at the statistical indicators, after 2020, the development of small and medium enterprises have increased. In addition to the development of SMEs, all manufacturing enterprises and service industries were digitized after the economic crisis, and new technologies were developed. With the development of technologies, the country's entrepreneurship has reached an optimal level, and the number of people engaged in entrepreneurship in the country has increased. In addition, the state began to introduce many supports and non-refundable subsidies to further increase entrepreneurship.[1]

State support for small and medium-sized businesses is of great importance for the development of Kazakhstan's economy. It allows entrepreneurs to effectively use their resources

and unlock their potential, which in turn contributes to the growth of the economy and the improvement of people's well-being.

Literature review

SMEs in the economy of Kazakhstan play a key role in stimulating economic growth and social development in Kazakhstan.They are the main source of new jobs and contribute to reducing unemployment, especially in the regions of the country.

Problems faced by SMEs in Kazakhstan limited access to financing is one of the main problems faced by SMEs in Kazakhstan, and most small and medium-sized enterprises experience difficulties in obtaining loans from banks due to high interest rates and collateral requirements.

Bureaucratic procedures and a complex legislative environment also create obstacles for the development of SMEs in Kazakhstan.

Inadequate infrastructure and technical support can also hinder the development of SMEs, especially in remote regions.

Support for SMEs from the state:

The Kazakh government is taking steps to support SMEs, including simplifying business registration procedures, reducing the tax burden, and creating financial instruments to promote business development.

Support programs, such as soft loans and subsidies, are aimed at stimulating the development of SMEs and increasing their competitiveness in the market.

Prospects for the development of SMEs in Kazakhstan:

The rapid development of the digital economy and electronic commerce opens up new opportunities for SMEs in Kazakhstan.[1]

Participation in international exhibitions and fairs can also help small and medium-sized enterprises to expand their markets and attract foreign partners and investors.

This literature review can serve as a basis for a deeper analysis of the topic of small and medium-sized business in Kazakhstan and for the formulation of recommendations for the development of this sector of the economy.

Methodology

Small and medium-sized enterprises (SMEs) in Kazakhstan play an important role in contributing to the country's economic prosperity, job creation and innovative growth. Studying the indicators of the NSK (National Statistical Service) of the Republic of Kazakhstan, in 2022, SMEs accounted for about 28% of the gross domestic product and about 33% of the workforce.

Our country has many programs aimed at supporting small and medium-sized businesses. These are: financial assistance, tax incentives, infrastructure development, training and consultancy.

One of the most important steps in the development of SMEs in Kazakhstan is the creation of a favorable business climate that can contribute to the attraction of investors and the growth of SMEs. For example, the country's government has been systematically carrying out reforms that simplify business registration and licensing procedures, as well as reduce the tax burden on entrepreneurs.

In 2021, the number of operating SMEs increased by 5.5%. By the end of 2022, the value of this indicator was 1,432 thousand units. 84.5% of the registered SMEs are active, which is 0.2% higher than in 2021. In terms of organizational and legal forms, the number of legal entities in the structure of SMEs increased by 19,500 units. Their share in the total structure of SMEs increased to 20.9%.[3]

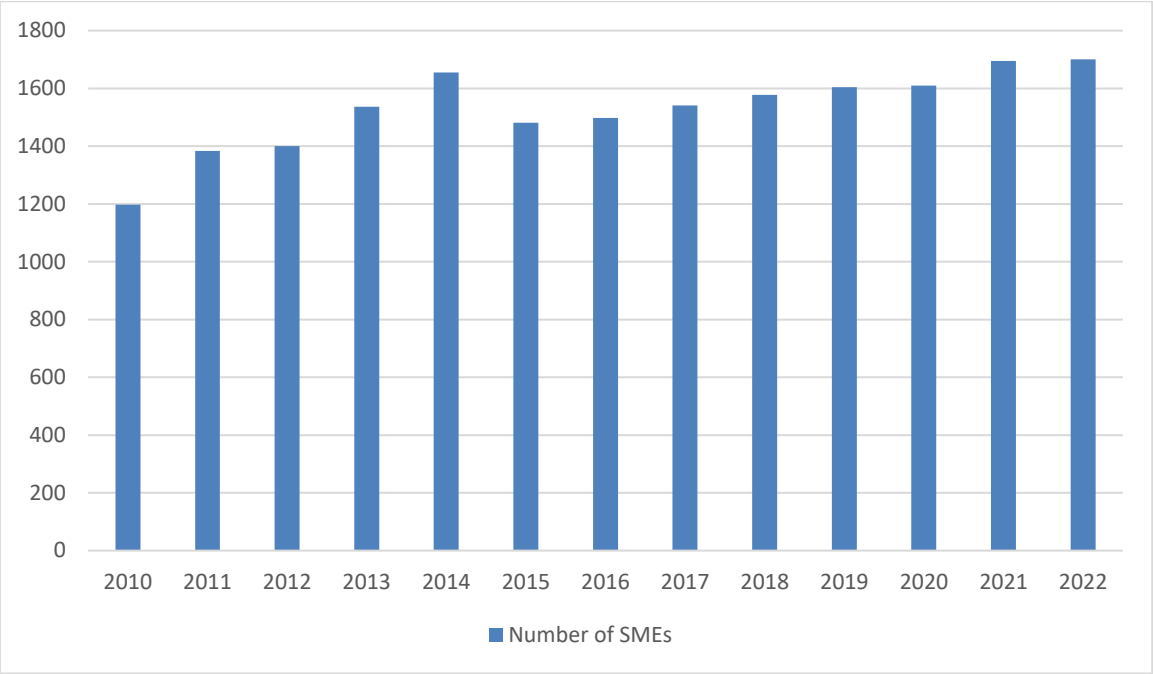
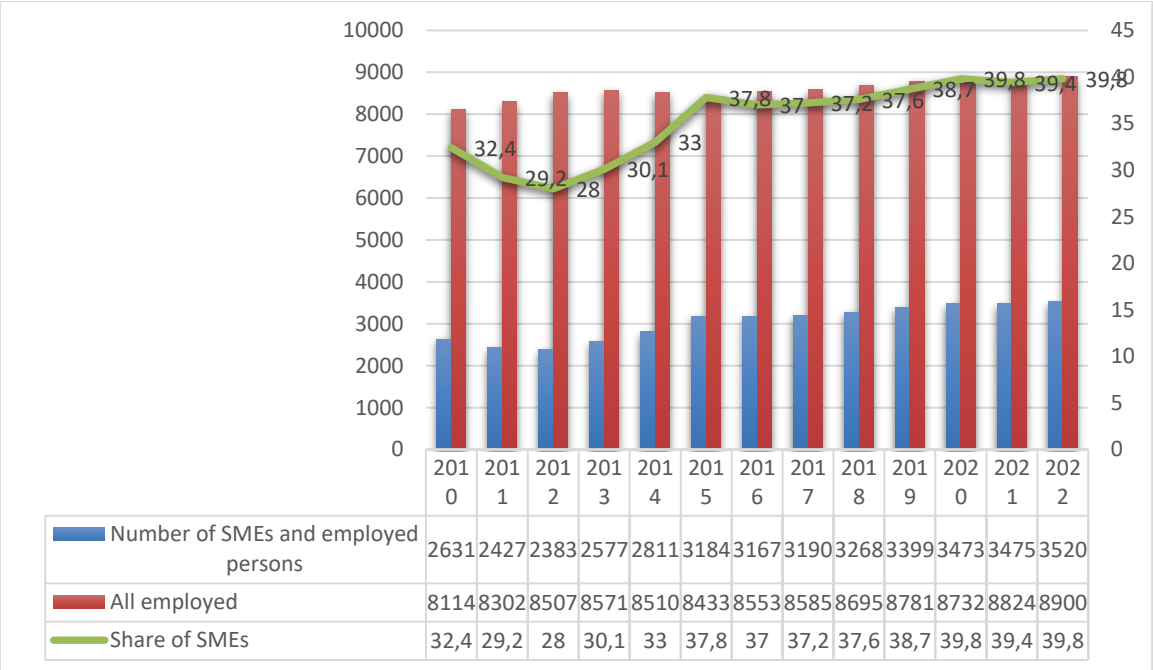


Figure 1. Changes in the number of SMEs in the period 2010-2022.[3]

The number of people employed by SMEs increased by 0.1% and reached more than 3,000 people in 2022. According to the indicator of 2022, the share of the population employed in the SME sector3 was 9.5%. In 2021, the output of SMEs exceeded 42.8 trillion tenge.



	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Number of SMEs and employed persons	2631	2427	2383	2577	2811	3184	3167	3190	3268	3399	3473	3475	3520
All employed	8114	8302	8507	8571	8510	8433	8553	8585	8695	8781	8732	8824	8900
Share of SMEs	32,4	29,2	28	30,1	33	37,8	37	37,2	37,6	38,7	39,8	39,4	39,8

Figure 2. The number of SMEs employed and the total number of employees in the period 2010-2022[3]

In real terms, production increased by 18 percent in one year. The share of small and medium-sized enterprises in the country's GDP will be 33.3% at the end of 2022, which is an increase of 1.7 percentage points compared to 2020. According to the data for the four quarters of 2022, the income from small business entities from KTS payments amounted to 1,301 billion tenge. Thus, their share in the total volume of KTS revenues was 32.1%. Compared to 2022, the growth of KTS from small business entities was 194%. Loans to micro, small and medium-sized businesses amounted to 5.5 trillion tenge in the beginning of 2022, in accordance with the growth rate of general lending to the

economy. As a result, their share in the total volume of loans to the economy was at the level of 27.2%. In the sectoral structure of the SME sector, there has been a decline in trade since 2010 according to five main indicators: the share of enterprises in the loan portfolio has also decreased significantly. In absolute terms, the growth of manufacturing enterprises is observed (since 2010, the number of subjects has doubled, the number of employees has increased by 25.6%, production has increased by 3.3 times, the income of commercial enterprises has increased by 3.4 times, and loans have increased since 2010. 6 , 4 times).[5]

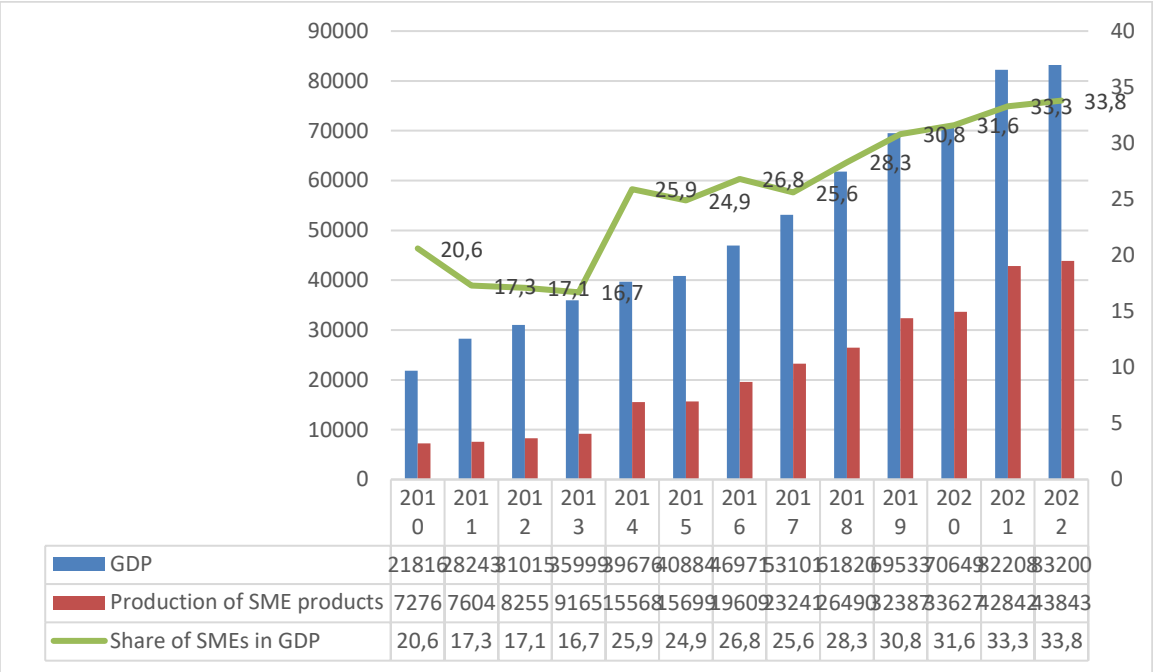


Figure 3. Share of SMEs in GDP in 2010-2022[6]

From 2010 to 2022, there is an increase in the share of SHOCs in GDP. Despite the epidemic in 2020, the figure increased by 1.6% in 2022.

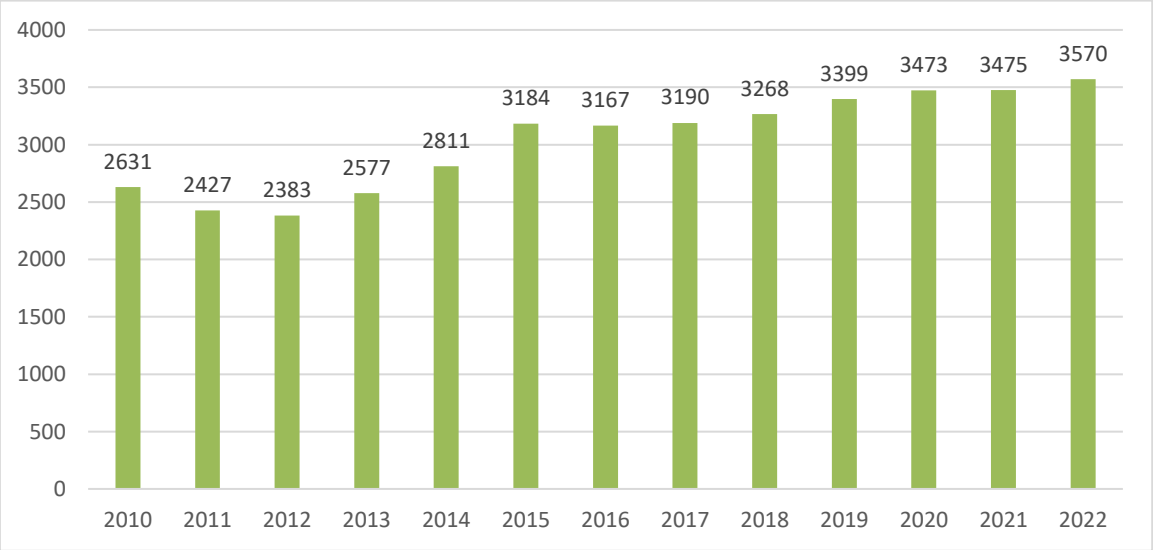


Figure 4. Credit fund provided by the state for the work of SMEs in the period 2010-2021[6]

Now let's take the data on the share of small and medium-sized enterprises in the gross domestic product (GDP), the share of the number of small enterprises in their total number (ZS), the share of tax revenues in the total amount of tax revenues of small business entities (SK) for each

region. We, JSC Damu, take these indicators from the report "On the state of development of SMEs in Kazakhstan".

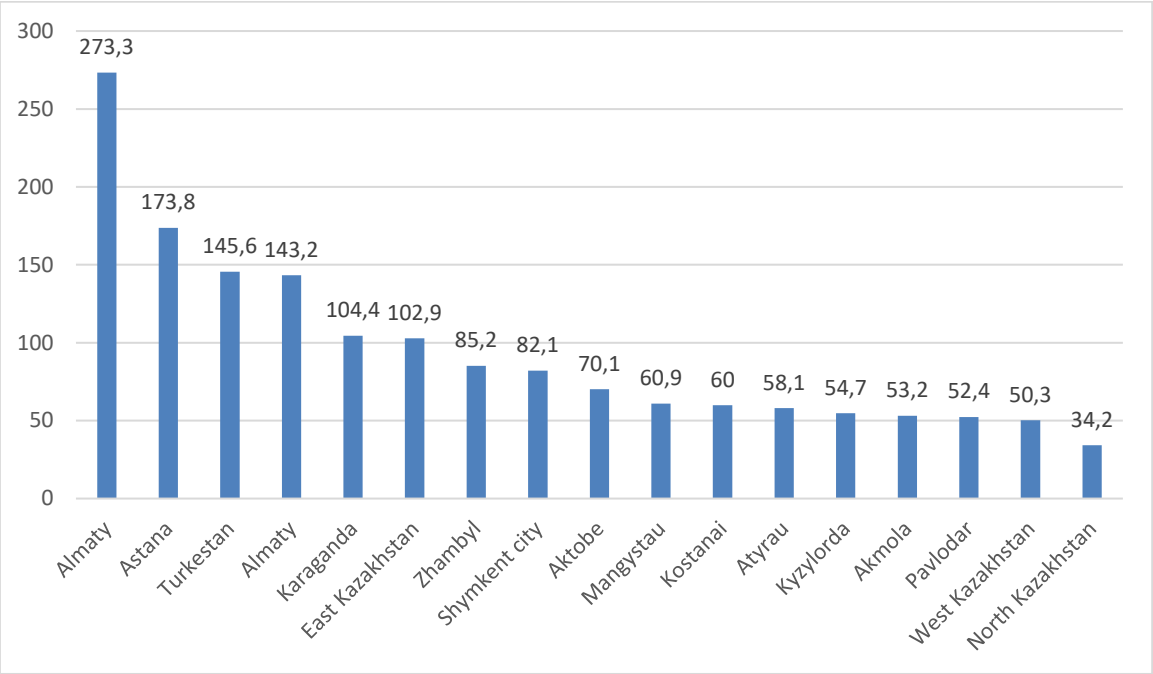


Figure 5. Number of SMEs in 2021 by region[6]

In terms of the number of SMEs, the city of Almaty is the highest (273.3 thousand units), the second place is occupied by the capital of our country (173.8 thousand units), and the third place is occupied by the city of Turkestan (145.6 thousand units). The smallest region in terms of the number of subjects is our North Kazakhstan region (34.2 thousand units).

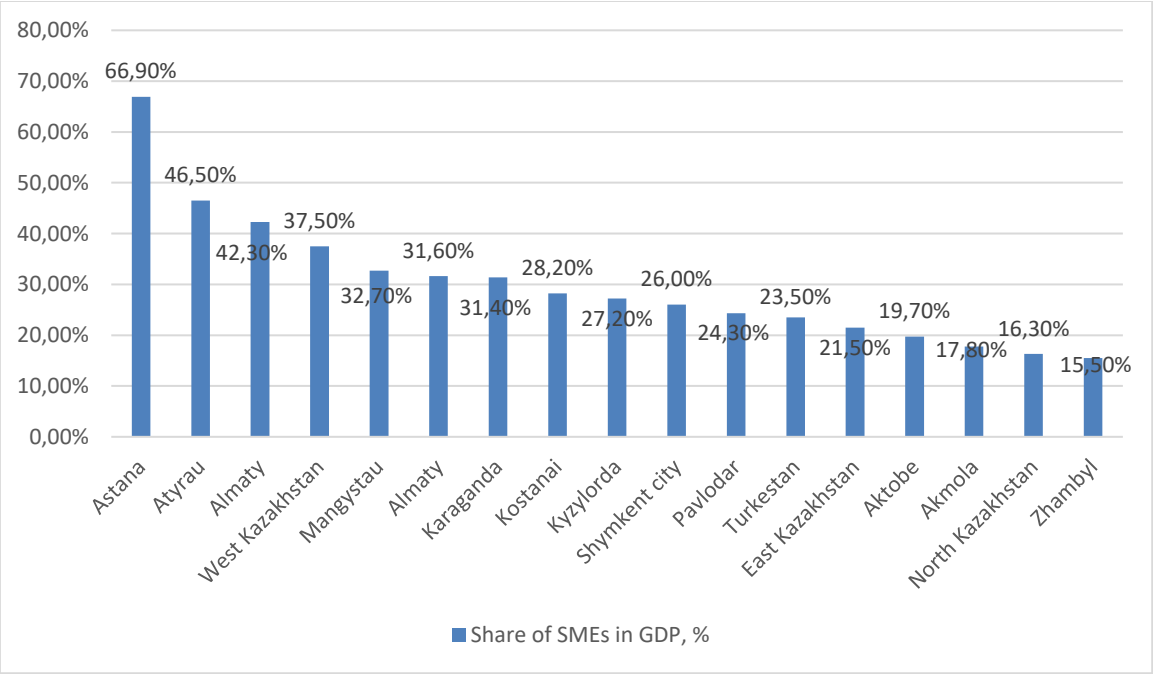


Figure 6. Share of SMEs in GDP in 2021 by region[6]

This indicator shows how many products are produced by the regions of Kazakhstan. The first place in terms of the share of SMEs in the GDP is occupied by the city of Astana, 66.9%, and the region with the smallest share is the Karaganda region, 15.50%.

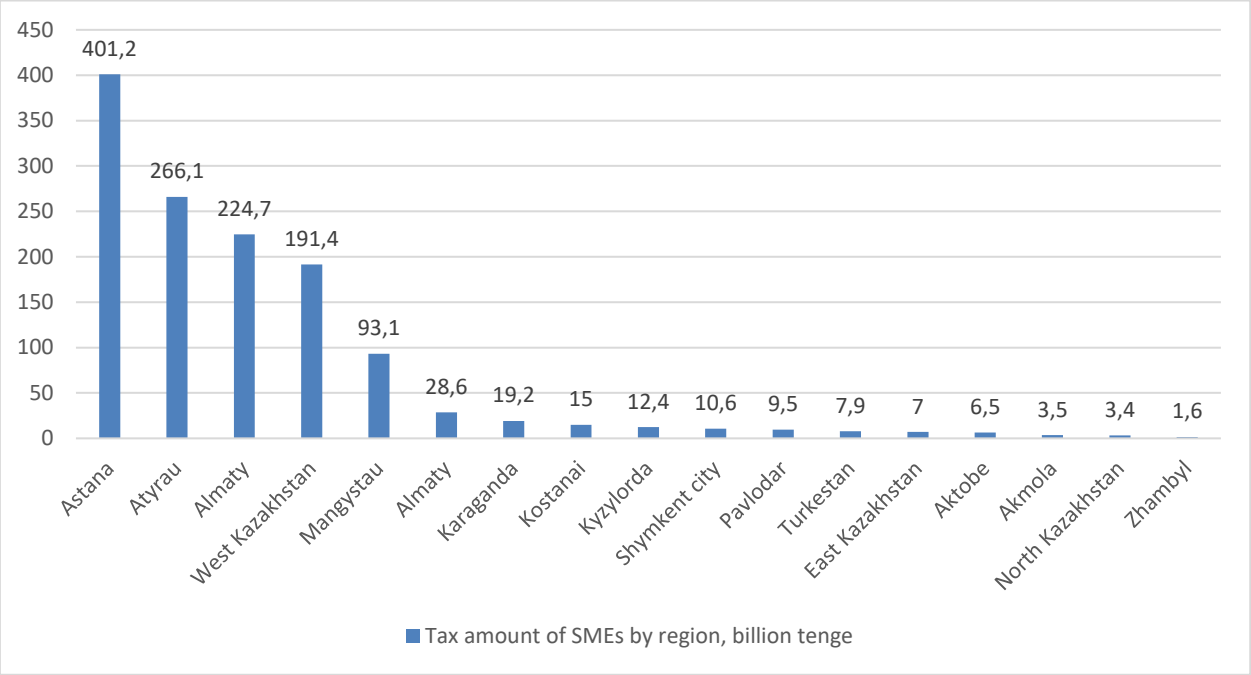


Figure 7. Amount of SHOC CTS in 2021 by region[6]

Small and medium-sized enterprises of each region must pay a certain amount of tax to the state. Astana city, Atyrau region, Almaty city and West Kazakhstan region are the regions that pay the most taxes according to the tax rate. Zhambyl region is considered to be the least tax-paying region.

Based on these obtained data, we perform a multiple regression analysis.

Results and discussion

The paper assesses the impact of small and medium-sized businesses on economic growth. Regression modeling methods, including autoregressive analysis, were used to identify relationships between SMEs in GDP and other indicators. Statistical data for the period 2010-2021 were used when creating the model.

To create a mathematical model, we used the method of least squares, which allows us to get the most efficient and most accurate model of dependence that has one value from others. This method is automated in the Microsoft Excel data analysis application package.

$$y = b_0 + b_1 * x_1 + b_2 * x_2 + b_3 * x_3 \textbf{(1)}$$

With the help of the created model, the impact of one or other factors on the contribution of SMEs to GDP was estimated.

Statistics for the period 2010-2021 were considered according to the following indicators:

x1 - number of small and medium-sized organizations (at the end of the year), unit;

x2 - indicator of employees engaged in SMEs, unit;

x3 - investments in SMEs, billion tenge;

y1 is the share of SMEs in GDP, %.

Table 1. A set of variables used to analyze the drivers of SME growth in Kazakhstan for the period 2010-2021.

n	y	x1	x2	x3
2010	20.6	1197	2631	1658
2011	17.3	1384	2427	1750
2012	17.1	1400	2383	1871
2013	16.7	1536	2577	2342
2014	25.9	1655	2811	3248
2015	24.9	1481	3184	4242
2016	26.8	1498	3167	5002
2017	25.6	1541	3190	4665
2018	28.3	1578	3268	4567
2019	30.8	1604	3399	3962
2020	31.6	1610	3473	4246
2021	33.3	1695	3475	5488
Amount	298.9	18179	35985	43041
AVERAGE	24.9083333	1514,917	2998.75	3586.75
Source: [6]				

The results of the regression analysis:

First of all, we determined the parameters of the multiple linear regression equation using the coefficient of covariance and coefficient of variation.

In this case, the coefficient of covariance (measure of connection) is highly correlated with all indicators, including the indicator of employees engaged in SMEs and investments in SMEs.

Table 2. Correlation matrix.

	Share of SMEs in GDP, %.	number of small and medium-sized organizations (at the end of the year), unit;	Employed people engaged in SMEs, indicator, unit	Investments in SMEs, billion tenge;
Share of SMEs in GDP, %.	1			
number of small and medium-sized organizations (at the end of the year), unit;	0.696038	1		
Employed people engaged in SMEs, indicator, unit;	0.953539	0.65935	1	
Investments in SMEs, billion tenge;	0.859455	0.709387	0.913863	1

We have found that there is a positive, close relationship between GDP and employment, as well as a positive relationship between GDP and investments. And we have noticed that the level of employment affects the GDP indicator more than the amount of investment.

H0: no multicollinearity

If we analyze the correlation matrix between the explanatory variables x1, x2, x3, the correlation coefficient of the employed and investment volume is higher than 0.8. That is, there is multicollinearity between them, the H0 hypothesis is rejected.

And the correlation coefficient between the volume of SMEs and the volume of GDP is lower than 0.8. That is, there is no multicollinearity between them, the H0 hypothesis is accepted.

$y = b_0 + b_1x_1 + b_2x_2$We create a linear regression equation of the form

Then our equation is:

$$\hat{y} = -25{,}222455 + 0{,}00640906x_1 + 0{,}01434868x_2 - 0{,}0007267x3 \textbf{(2)}$$

The coefficient of determination shows how close the dependence of GDP on the three factors is to the selected type. The dependence on the coefficient of determination is close to the linear model. The standard error of the simulation represents the difference between the actual GDP and the average value estimated by the model.

This model is a regression, that is, it is incomplete and does not take into account all factors affecting GDP, but the study and model did not set the task of covering all factors, only small and medium-sized enterprises were considered. In the resulting model, the indicators of the first and second factors are positive, which means that the indicator of the degree of these factors of GDP increases (dependency is direct), and the indicator of the third factor increases. negative, that is, when this factor of GDP increases, on the contrary, it decreases (inverse dependence). In the derived degree model, the economic logic is mathematically correct.

Table 3. Dispersion analysis

	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	342,0921946	114.0307	31.2874	9.06E-05
Remainder	8	29,15697204	3.644622		
General	11	371,2491667			

In regression analysis, significance of linear regression models is assessed using Fisher's F-test.

The significance of linear regression is evaluated according to the following algorithm: the null hypothesis H0 about the non-significance of the equation R2=0 is proposed according to the level of significance α.

$$H0 : R2 = 0 \quad (3)$$

$F_{kp}\,(3; 12) = 3.49$**(4)**

$F_{\text{ст}} > F_{kp}$ the condition is fulfilled, that is, the null hypothesis $H_0$is rejected, the coefficient of determination is significant, the quality of the regression equation is high.

Student ratio

t_{kp}= 2.306 **(5)**

$t_{b0} < t_{kp}$since the null hypothesis $H_0$is accepted, the coefficients are statistically insignificant at 5%, random.

$t_{b1} < t_{kp}$since the null hypothesis $H_0$is accepted, the coefficients are statistically insignificant at 5%, random.

$t_{b2} > t_{kp}$since the null hypothesis $H_0$is rejected, the coefficients are statistically significant at 5%, not random.

$t_{b3} < t_{kp}$since the null hypothesis $H_0$is accepted, the coefficients are statistically insignificant at 5%, random.

As a result of creating a pairwise regression equation, leaving one significant factor: we can see that the number of employed persons has a large effect on the GDP share of SMEs. According to parameter estimation: If $x_1$the independent variable increases by 1% ($x_{2,}$x $_3$) if the independent variable does not change), then the dependent variable y increases by 0.014349 units .. b $_1$ affects variable X more than b $_{2,}$ b $_3$. There is a positive relationship between y and x $_2$.

Table 4. A set of variables that have the greatest influence on the growth of SMEs in Kazakhstan

n	Share of SMEs in GDP, %.	Employers engaged in SMEs, unit
2010	20.6	2631
2011	17.3	2427
2012	17.1	2383
2013	16.7	2577
2014	25.9	2811
2015	24.9	3184
2016	26.8	3167
2017	25.6	3190
2018	28.3	3268
2019	30.8	3399
2020	31.6	3473
2021	33.3	3475

If we study this indicator further, we will create a non-linear model. According to the rank model, we obtained the following data:

As a result, we get the following regression equation:

$$Y = -4.43267 * x^{1.6749} \textbf{(6)}$$

Next, we will evaluate the effectiveness of state projects to support SMEs of the Republic of Kazakhstan. In order to evaluate its effectiveness, we will evaluate the regional programs of support and development of small and medium-sized enterprises using the activity coefficient proposed in the methodology of E. V. Romanenko. Calculating the coefficient of activity of small and medium entrepreneurship allows to compare the development levels of small business organizations in different regions of the country, as well as to assess the effectiveness of its support in each region.[7]

To calculate the coefficient, the following indicators are required:

- the share of small and medium enterprises in the gross domestic product (GDP)
- the share of the number of small enterprises in their total number (S);
- the share of tax revenues in the total amount of tax revenues of small business entities (SC);
- the number of indicators used. (n)

$$K_p = \sqrt[n]{ЖІӨ * ЖС * СК} \textbf{(7)}$$

According to the assessment of 2021, our coefficient corresponded to the level of 714.1 , which means that the level of development of SMEs of the Republic of Kazakhstan is very high. According to E. V. Romanenko's calculation method, the leading regions include regions with a ratio higher than 0.6. Therefore, let's calculate this indicator for each region of the Republic of Kazakhstan.

After receiving the data, we calculated the activity coefficient shown above for each region. For this, the following table was created:

Table 5. A set of indicators obtained in 2021 for the analysis of drivers of SME growth by regions of Kazakhstan.

No	Region name	Number of SMEs entities, units	Share of SMEs in GDP, %	Amount of SMEstax by industry, billion tenge	Activity coefficient
1	Almaty	273.3	37.50%	224.7	12.64607
2	Astana.	173.8	66.90%	401.2	17.99854
3	Turkestan	145.6	26.00%	7.9	1.441118
4	Almaty	143.2	37.50%	28.6	3.265795
5	Karaganda	104.4	15.50%	19.2	1.468877
6	Eastern Kazakhstan	102.9	19.70%	7	0.992678
7	Zhambyl	85.2	21.50%	1.6	0.451147
8	Shymkent city	82.1	42.30%	10.6	1.598871
9	Aktobe	70.1	24.30%	6.5	0.876875
10	Mangystau	60.9	31.60%	93.1	3.527327
11	Kostanai	60	27.20%	15	1.30384
12	Atyrau	58.1	23.50%	266.1	5,023
13	Kyzylorda	54.7	16.30%	12.4	0.876228
14	Akmola	53.2	28.20%	3.5	0.603856
15	Pavlodar	52.4	17.80%	9.5	0.784434
16	West Kazakhstan	50.3	32.70%	191.4	4.67571
17	North Kazakhstan	34.2	31.40%	3,4	0.503542
Source: [6]					

As we can see from the table, the activity coefficient is higher than 0.6 in cities of republican importance, which means that state support is well conducted in these regions. And in the rest of the regions, it is at a relatively low level. The lowest indicator shows a coefficient of 0.5 in the North Kazakhstan region. And the highest rate is in Nur-Sultan, the capital of our country.

Conclusion

In conclusion, studying the development of SMEs in Kazakhstan, we obtained the following indicators.

First, the impact of the contribution of SMEs to GDP and other factors were estimated using a regression model. As a result of the evaluation, we noticed that all indicators of the covariance coefficient (measure of connection) are highly correlated, including the indicator of employees engaged in SMEs and investments in SMEs.

Secondly, we have analyzed the correlation coefficient of the received indicators, and as a result, we have found out that there is a positive, close relationship between GDP and employed people, as well as a positive relationship between GDP and investments. That is, we have noticed that the level of employment affects the GDP indicator more than the amount of investment.

Thirdly, we have determined the development activities of small and medium-sized businesses in the regions of the Republic of Kazakhstan using the activity coefficient proposed in the methodology of E.V. Romanenko. As a result, the activity coefficient is higher than 0.6 in the cities of republican significance, which means that state support is well conducted in these regions. And in the rest of the regions, it is at a relatively low level. The lowest indicator shows a coefficient of 0.5 in the North Kazakhstan region. And the highest rate is in Astana, the capital of our country.

At the end of the study, summarizing the model we created, we noticed that SMEs make a large contribution to GDP. In addition, with the help of state investments in SMEs, small and medium-sized businesses are rapidly developing in the country. The volume of investments is 9.5

billion by the end of 2022amounted to tenge. As a result, the number of people engaged in SMEs of the country has increased, and the number of working entities has increased.

In general, government support for SMEs in Kazakhstan should be comprehensive and cover various aspects of business, including access to financial resources, training and development, export support and the use of digital technologies. This is the only way to ensure the effectiveness of state support for small and medium-sized businesses and contribute to the growth of the economy of Kazakhstan and the creation of new jobs.

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ASSESSMENT OF THE SOCIO-ECONOMIC IMPACT OF THE SELF-EMPLOYMENT OF THE PEOPLE ON THE NATIONAL ECONOMY OF KAZAKHSTAN

G.K. Ilyashova*, S.K. Kondybaeva, R. Kabylkairatkyzy
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail:July.gk1977@gmail.com

Abstract. The issue of employment is a major issue for many countries, as employment is directly related to economic growth. Today, the effective functioning of the market of production factors has a positive effect on the state of the national economy. The labor market, as a mandatory component of any market economy, has a special place among all other factor markets of production. The employment market provides an opportunity to ensure socio-economic development of the economy, distribution and redistribution of important factors in economic sectors, growth of social welfare, reduction of poverty, increase of labor productivity and harmonious development of the market as a whole.

The purpose of the article is to assess the socio-economic impact of self-employment on the national economy of Kazakhstan. In order to fulfill the stated goal, macroeconomic indicators (unemployment, monetary income per capita of the population, the number of SMEs, the share of the population whose income is below the subsistence level, the relationship between PPE (labor productivity) per worker of the Republic of Kazakhstan , GDP per capita of the Republic of Kazakhstan) taken as an indicator. Based on these statistical data, the relationship between the level of self-employment of the population and macroeconomic indicators was proved by means of regression equations.

Key words: self-employment , unemployment, cash income per capita, SMEs, the share of the population whose income is below subsistence level, labor productivity, GDP per capita, regression, correlation, dispersion.

Key words: *self-employment, employment, the labor market of the Republic of Kazakhstan, unemployment, labor productivity, SMEs, regression, linear model, correlation, dispersion.*

Introduction

One of the most important aspects of socio-economic development in the labor market of the Republic of Kazakhstan is the issue of "Self-employed". The Law of the Republic of Kazakhstan "On Employment of the Population" states: "Self-employed - individuals engaged in the production (provision) of goods, works and services for income, including production for their own consumption, members of production cooperatives, members of family enterprises (farms) unpaid workers and employers who use the labor of hired workers" is defined. However, a different concept was adopted for the purposes of state statistics. Self-employment is employment, the amount of remuneration of which is directly related to income from the production (transmission) of goods and services [1]. At the same time, four groups of self-employed workers are employers, i.e. individuals who manage their own enterprise or are engaged in independent entrepreneurial activities in the form of some economic activity and have one or more hired employees, independent workers, unpaid family members and members of production cooperatives. employees are divided [2].

Thus, self-employment creates favorable conditions for aspiring entrepreneurs, enabling them to develop innovative ideas and products. In the post-Soviet society, negative views and opinions about the self-employed prevailed, the presence of the self-employed was considered an indicator of the underdevelopment of the state's socio-economic system and socially vulnerable groups of society [3].

And in developed countries, it is divided into self-employment in the formal sector and is welcomed as an opportunity to reduce unemployment, as well as a way of informal self-employment [3]. Of course, they try to reduce the volume of informal self-employment, that is, they focus on adapting labor legislation to them, promoting its legalization by increasing its flexibility, and segmenting the labor market.

In any country, the ultimate goal of self-employed citizens is personal and family needsis to engage in income-generating activities aimed at satisfaction. Our research revealed that in developed countries, self-employed citizens are protected by law, and there are organizations, unions, and even trade unions that provide them with financial assistance, legal and economic advice . Self-employed people in the Republic of Kazakhstan are socially unprotected and often work in the informal sector, and government organizations and scientists are widely engaged in solving this problem in the modern economy.

Literature review.

Today, in the context of economic and political changes in the labor market, the priority development of flexible types of employment, the blurring of the boundaries of the formal and informal labor markets, great attention is paid to ensuring the mobility of labor resources, the general world labor markets and the country and its regions, and the introduction of civilized forms of labor market management. is dividing, in this regard, different views of the authors have been formed in scientific researches, and it is taking on a two-sided nature... One of the types of flexible employment in the labor market is self-employment of the population.

The concept of self-employment was introduced in the Western economy at the beginning of the last century. Self-employment is employment, the amount of remuneration of which is directly related to income from the production (transmission) of goods and services. At the same time, four groups of self-employed workers are employers, i.e. individuals who manage their own enterprise or are engaged in independent entrepreneurial activities in the form of some economic activity and have one or more hired employees, self-employed workers, unpaid family members and members of production cooperatives. employees are divided.

If we talk about the basic concepts of flexible employment in the labor market, including self-employment, according to foreign scientists, in particular, Schumpeter Y.A. [4] " Like an entrepreneur, it is a special source of re-accumulation of resources, innovative reconstruction of the market ", and Kirchhoff [5] pointed out that "Self-employed people are first of all owners of small businesses". Some of the researchers also emphasize that the self-employed are not fully involved in the formal economy. It should be noted that (Startienė et al) evaluated the effect of a set of self-employment factors on the duration of self-employment in Lithuania using the method of expert assessment and correlation analysis [6].

Russian scientists understand this: (Volgin N.A.)[7] " A form of economic activity that organizes the labor process" (Tsvetkova S.N.)[8]" There will be a situation where wage labor will be replaced by self-employment . "

M.K. Meldekhanova, a scientist who was the first to deal with the issue of self-employment in the Republic of Kazakhstan . [9] , the well-known economist-scientist Z.A. Kulekeev called this phenomenon a prerequisite for the development of entrepreneurship. [10] *clearly states that* "Self-employment *is a type of employment in socially useful work . "*

So, there is no single definition of self-employed in the world. In Kazakhstan and other post-Soviet countries, when talking about the self-employed, first of all, it means people who do not have the status of a legal entity and do not pay taxes, and they are perceived as a problem that needs to be solved in this context.

Basic rules

The importance of determining the criteria of the concept of "self-employed population" is to find optimal ways to distinguish self-employed population from unemployment. This is because the state policy regarding the unemployed population in the Republic of Kazakhstan has been changing over time. Since the collapse of the Soviet Union, the working population in Kazakhstan has been divided into employed and unemployed [11].

Self-employed as a share of the total number of self-employed persons (Determining the number of self-employed persons , their average monthly income level and the number of unemployed persons) methodology"if self-employed are divided into effective and ineffective) if the number of employed people increases, the share of the country's population whose income is below the subsistence level may increase, and this may lead to a decrease in the welfare and quality of life of the citizens of the country as a whole, and an increase in the share of the poor population

in the country . Therefore, it is necessary to consider the relationship between the self-employed and the share of the population whose income is below subsistence level [12].

Materials and methods

Unemployment, being one of the main aspects of the state economy, is a socio-economic phenomenon and a macroeconomic problem that occurs at any time in the labor market. In this period of time, for all states, especially for Kazakhstan, they serve as evaluation factors to determine the effectiveness of the functioning and development of market relations, which is one of the determining factors of successful development and prosperity.

According to the statistical data of our study of this phenomenon, the average duration of unemployment in the country until 2019 was significantly reduced compared to previous years. It should be noted that the implementation of a number of programs such as "Program for the development of effective employment and mass entrepreneurship for 2017-2021", "Business Roadmap 2020" and "unified program for the development of business support" contributed to this. And the increase in this indicator in 2020 is a consequence of the pandemic. is [13].

2005-2020 We can see in the following graph the simultaneous control of the number of self-employed people and the number of unemployed people in Kazakhstan between

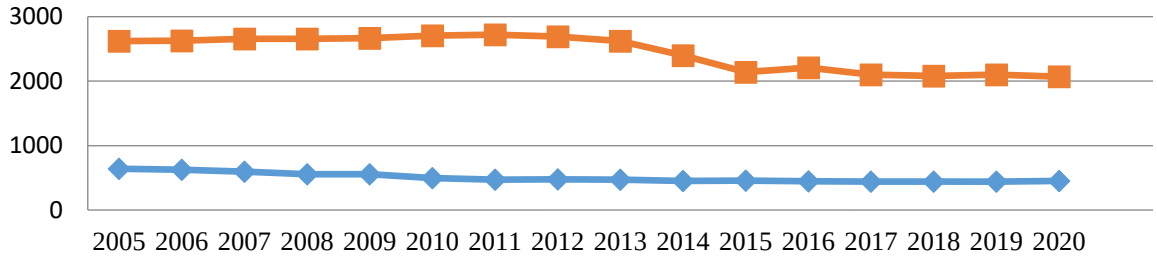

Figure 1. Changes in the number of self-employed and unemployed population of the Republic of Kazakhstan*
*Note - compiled by the authors based on the source [14].

Our research shows that self-employment has a significant positive economic impact not only on wages and employment, but also on increasing per capita income and reducing poverty.

In the period from 2010 to 2020, nominal monetary income per capita of the citizens of the Republic of Kazakhstan had a tendency to grow steadily [15].

2010-2020 The number of self-employed people in Kazakhstan in 2010-2020. is decreasing year by year, and in 2020 the number of self-employed people was at the lowest level in all 10 years - 2,069,000 people.

2010-2020 In order to parallelly monitor the changes in the number of self-employed persons and nominal monetary income per capita of the Republic of Kazakhstan between

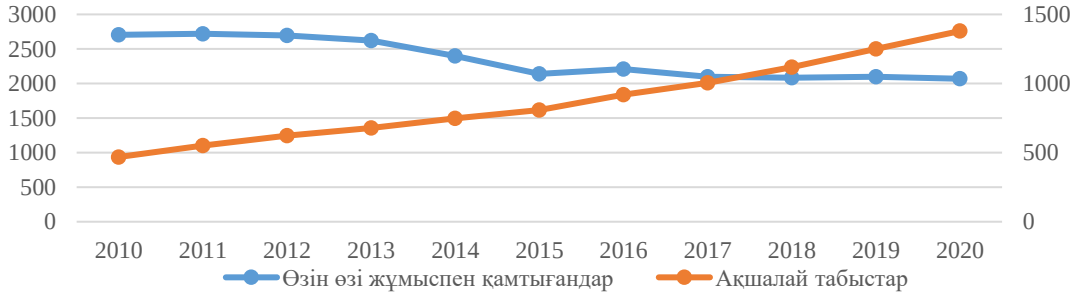

Figure 2. Changes in the number of self-employed persons and nominal monetary income per capita of the population of the Republic of Kazakhstan*
*Note - compiled by the authors based on the source [14].

In order to determine the relationship between these two indicators, that is, to assess how self-employment affects the financial income of the people of the Republic of Kazakhstan, one of the

main indicators showing the level of economic development of the country, we use the method of regression analysis.

Communication between self-employed and registered subjects of small and medium business.The self-employed can be seen as important members of the economy, providing food and services to the population, as well as contributing to economic growth.

Therefore, the issue of considering the relationship between self-employed citizens of Kazakhstan and small and medium-sized business entities of the state is urgent.

The number of registered subjects of small and medium-sized businesses in the Republic of Kazakhstan and the dynamics of self-employed persons in 2010-2020. it is noticeable that it is not uniform.

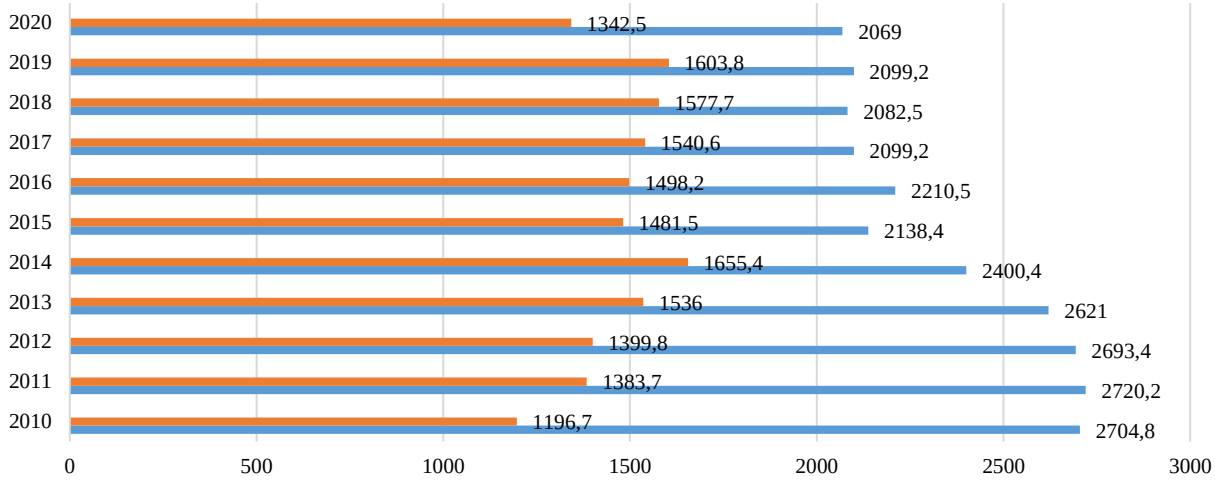

Figure 3. Number of registered entities of SMEs of the Republic of Kazakhstan and dynamics of self-employed persons*

*Note - compiled by the authors based on the source [14].

In the histogram in Figure 3, it can be seen that the total number of SMEs is greater than the share of self-employed. 2015-2019 while the number of self-employed people is gradually decreasing, the number of small and medium-sized business entities is gradually increasing. And in 2020, it is clear that both indicators have decreased. There is no doubt that the Pandemic situation due to the spread of the coronavirus infection in the country in 2020 influenced the changes of the indicators in this way.

Wages in Kazakhstan are very low by world standards, according to this indicator, Kazakhstan ranks last among the OECD countries. Given that wages are derived from labor productivity, it can be noted that labor productivity lags behind economic growth, showing an average growth of 3.2% since 2010, with an average GDP growth of 5%.

The given data show that there are big problems related to labor productivity in the non-oil sector, the retardation of structural changes and the need to make significant investments in the material base, human capital, innovations, and infrastructure that contribute to the growth of labor productivity in order to ensure a comfortable standard of living of the population.

2009-2019 We can clearly see it in the following graph of the parallel monitoring of the number of self-employed persons and the change of PPE (labor productivity) per worker in the period between

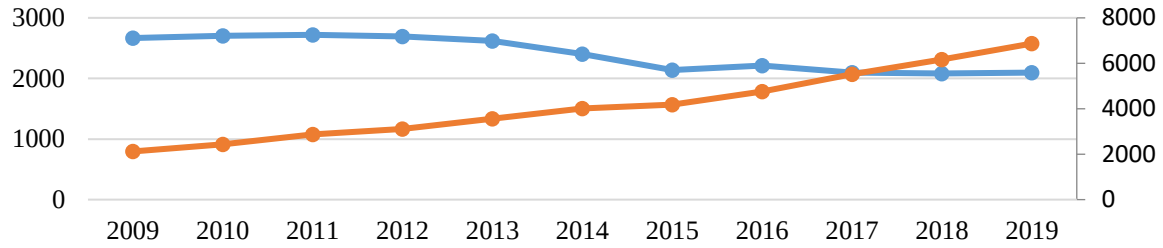

Figure 4. Changes in the number of self-employed persons and labor productivity per employee in the Republic of Kazakhstan*
*Note - compiled by the authors based on the source [14].

That is, when the number of self-employed people increases, the PPE (labor productivity) per workerdecrease is observed or vice versa.

GDP per capita mainly reflects economic activity and standard of living. 2010-2020 The following graph was constructed in parallel control of the changes in the number of self-employed persons and the Gross Domestic Product of the Republic of Kazakhstan between

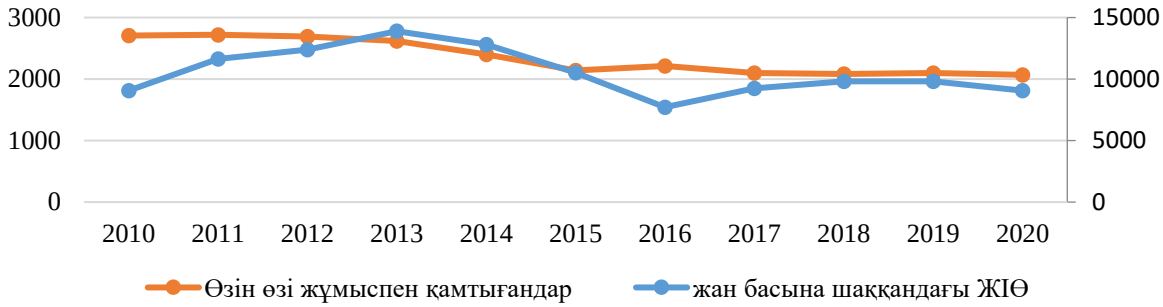

Figure 5. Changes in the number of self-employed persons and GDP per capita in the Republic of Kazakhstan*
*Note - compiled by the authors based on the source [14].

Results and discussion

In order to study the influence of the self-employed population on the structure of the labor force in the country and the economic development of the Republic of Kazakhstan as a whole, a correlation analysis was made comparing the dynamics of macroeconomic indicators in the national economy with the development trend of the labor market.

Macroeconomic indicators obtained in our study to assess the socio-economic impact of self-employment on the national economy of Kazakhstan (unemployment, monetary income per capita, number of SMEs, the share of the population whose income is below subsistence level, labor productivity , GDP per capita of the Republic of Kazakhstan) mainly between 2010 and 2020, but the unemployment index, based on its socio-economic importance, covered the years 2005-2020, and analyzes were made based on the availability of the statistical database. We will consider the relationship between these two indicators below.

With the help of regression analysis, determining the relationship between variables, it is possible to make a conclusion and forecast about their future behavior. Consider simple pairwise linear regression—a statistical method that allows you to predict the values of the dependent variable y using the values of the independent variable x.

Macroeconomic indicators to be analyzed first:

- y dependent variable, result factor - unemployed population.
- x , explanatory factor is the number of self-employed people.

To determine the relationship between these two indicators, we use the method of regression analysis. A pairwise linear regression model was built $\hat{y}$based on the calculations : $= 101.64 + 0.163\ x$

Here, the interpretation of coefficient b: explanatory variable x, that is, when the number of self-employed people increases by 1 thousand people, the resulting indicator y under study, that is, the unemployed population increases by 0.16 thousand.

Mathematical interpretation of parameter a: when the explanatory variable x is equal to zero, that is, the number of self-employed people is equal to 0, it means that the meaning of the dependent variable y, that is, the unemployed population is equal to 101.63 thousand.

To consider the interaction of variables, the coefficient of elasticity E was calculated and the following result was obtained.

The elasticity coefficient shows that if the number of self-employed people increases by 1%, the nominal money income per capita of the population increases by an average of 0.79%.

Correlation analysis was used to examine the relationship between the number of self-employed persons and the unemployed population . During the calculation, the individual correlation coefficient r_{xy}= 0.63 was determined.

Since the value of the correlation coefficient is positive, there is a strong, positive relationship between the two variables.

In order to study the dependence between the nominal monetary income per capita of the population of the Republic of Kazakhstan and the number of self-employed people, we determined the sample characteristics of 10 years (2010-2020). After determining the parameters of the equation, we get the pairwise linear regression model by putting the values in their place.

Pairwise linear regression model: $\hat{y}$= *3038.05 – 0.924 x*

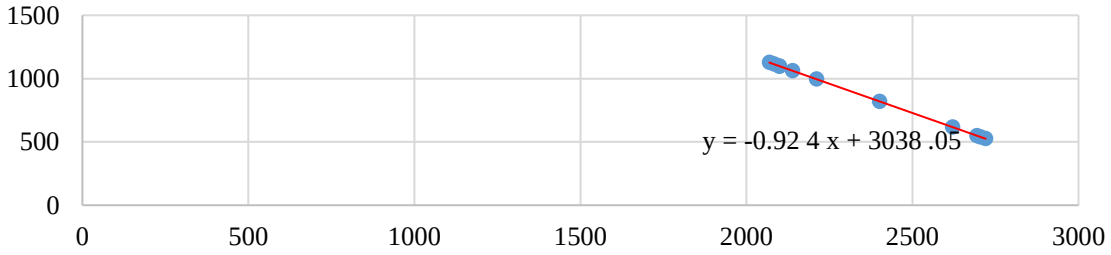

Figure 6. Dependence between the nominal monetary income per capita of the population of the Republic of Kazakhstan and the number of self-employed persons*
*Compiled based on calculations

According to the curve of the graph, it can be seen that there is an inverse relationship between the two indicators. Therefore, based on the graph, if the number of self-employed people increases, it can be assumed that the per capita income of the population may decrease in the coming periods.

The elasticity coefficient shows that if the number of self-employed people increases by 1%, the nominal monetary income per capita of the population will decrease by 2.5% on average.

The density of the relationship between $r_{xy}$the number of self-employed people and the nominal monetary income per capita of the population was equal = -0.886.

Since the value of the correlation coefficient is negative, there is a strong, negative relationship between the two variables.In other words, when there is a minus sign, an increase in one indicator corresponds to a decrease in another variable. This dependence is called feedback. That is, when the number of self-employed people increases, the nominal monetary income per capita of the population decreases or vice versa.

2010-2020 to consider the relationship between the number of registered entities of SMEs of the Republic of Kazakhstan and the number of self-employed persons. We have determined the marks of the selective competition. During the calculation, a pairwise linear regression model was built: $\hat{y}$= *1993.7 – 0.221 x*

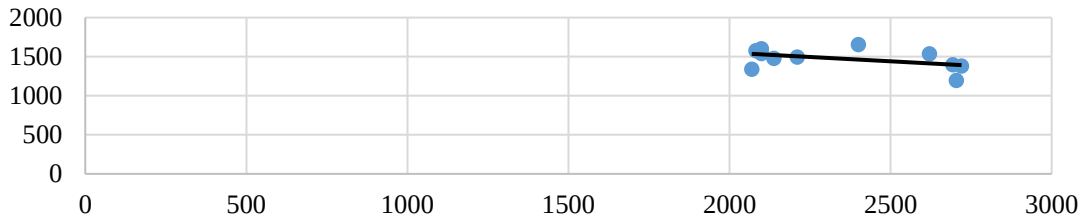

Figure 7. The relationship between the number of registered entities of SMEs of the RK and the number of self-employed persons *
*Compiled based on calculations

According to the curve of the graph, it can be seen that there is an inverse relationship between the two indicators. Therefore, based on the graph, if the number of self-employed people increases, it can be assumed that the number of SMEs may decrease in the coming periods.

The elasticity coefficient shows that if the number of self-employed people increases by 1%, the number of small and medium-sized business entities will decrease by 0.35% on average.

The density of the relationship between the number of self-employed people and the number of registered entities of SMEs was determined by calculating the individual correlation coefficient, i.e. r_{xy}= -0.46907.

Since the value of the correlation coefficient is negative, there is a negative relationship between the two variables, but the level of density is low because $r_{xy} < 0{,}7$. In other words, when there is a minus sign, an increase in one indicator corresponds to a decrease in another variable. This dependence is called feedback. That is, when the number of self-employed people is decreasing, there is an increase in the number of registered entities of small and medium-sized businesses, or vice versa. Statistical data also prove the result of this analysis.

Dispersion analysis was used to investigate whether the change in the number of self-employed persons has a significant effect on the number of registered entities of SMEs. The essence of the analysis of variance is to divide the change of the dependent variable into parts according to the individual and joint influence of the independent variables in order to determine the acceptance of a number of hypotheses about the importance of such an effect using statistical methods.In our case, the result indicator is the number of registered entities of SMEs.

H0: $\mu_1 = \mu_2$, H1: $\mu_1 \neq \mu_2$were considered. During the calculations, the following results were obtained:

Fst > Fkr was; 86.36763 > 4.351244. Since the calculated value of Fisher's ratio is greater than the critical value, the null hypothesis is rejected with a significance level of 0.05. This factor means that it has a significant influence on the change of data, and the resulting sign is related to the independent factor with a probability of 1.07. According to the results of the dispersion analysis, the change in the number of self-employed persons has a significant impact on the registered number of SMEs. This shows that it is necessary to take into account the change of the self-employed, because according to the results of the variance analysis, its effect on the number of SMEs is large.

2010-2020 to consider the relationship between the share of the population whose income is below subsistence level and the number of self-employed. We have determined the marks of the selective competition. After determining the parameters of the equation, a pairwise linear regression model was constructed. It is as follows : $\hat{y}$= *0.384 + 0.0015 x*

That is , if the number of self-employed people increases, it can be assumed that the share of the population whose income is below subsistence level may increase in the coming periods. To consider the mutual influence of variables, we determined the elasticity coefficient. The elasticity coefficient shows that if the number of self-employed people increases by 1%, the share of the population whose income is below subsistence level increases by 0.903%.

the number of self-employed people and the share of the population whose income is below subsistence level was determined by calculating the individual correlation coefficient, r_{xy}= 0.305626.

Since the value of the correlation coefficient is positive, there is a positive relationship between the two variables, but the level of density is low because $r_{xy} < 0{,}7$. In other words, when the correlation value is positive, an increase in one indicator corresponds to an increase in another variable. This dependence is called positive correlation.

Analysis of variance was used to examine the effect of changes in the number of self-employed persons on the proportion of the population whose income is below the subsistence level. According to the study, the outcome measure is the share of the population whose income is below subsistence level. And the factor affecting it is the self-employed.

H0: $\mu_1 = \mu_2$, H1: $\mu_1 \neq \mu_2$were considered. During the calculations, the following results were obtained:

Fst > Fkr was; 758.5780639 > 4.351244. Since the calculated value of Fisher's ratio is greater than the critical value, the null hypothesis that the means are all equal is rejected. This means that the factor has a significant influence on the change of data, and the resulting sign depends on the independent factor with a probability of 2.23. According to the analysis of variance, the share of the population whose income is below subsistence level is significantly affected by the change in the number of self-employed.

Conclusion

The following results were obtained during the research conducted on the basis of the assessment of the socio-economic impact of self-employment on the national economy of Kazakhstan:

- the increase in the number of self-employed people is characterized by a low level of income:

- citizens who "work for themselves" in large cities of the country have high incomes;

- The total number of SMEs is more than the share of self-employed and its number is increasing every year;

- the increase in the share of the population whose income is below subsistence level is affected by the increase in the number of self-employed persons;

- since the relationship between the self-employed and labor productivity per employee of the Republic of Kazakhstan is negative, it can be said that the labor productivity of the self-employed is low;

- GDP per capita is equal to the value of GDP divided by the number of inhabitants.

The level of this indicator shows the economic growth and development of the country, but it was found that the inequality of income and well-being of the population is not taken into account.

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INNOVATIVE DEVELOPMENT STRATEGY TO STRENGTHEN THE COMPETITIVENESS OF THE ECONOMY

Andabayeva G.K., Aitnazarov T*.
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: ait_t1@mail.ru

Abstract. Implementing stimulative economic policies is always relevant, particularly when aimed at fortifying the economy's competitive position within the context of a developmental innovation strategy. The examination of an innovation strategy is motivated by our country's significant emphasis on digitalization and innovation implementation. Despite Kazakhstan's leading position in e-commerce development, it is imperative to increase the share of innovative product and service production. Consequently, enhancing the country's innovation potential through research and development (R&D) activities enables the economy to cultivate intellectual technologies and methods, serving as a driving force in ensuring competitive positioning among companies and enterprises domestically and on the international stage. In line with this, the research aims to conduct an analysis and determine the predominant characteristics of the innovation strategy as a vital direction in enhancing the country's economic potential and ensuring competitiveness. To achieve this, main theoretical principles in the field of innovation strategy were presented, along with tools and models for constructing innovation policies, reflecting general characteristics and stages of innovation development in organizations, as well as the annual growth in innovation utilization in the Republic of Kazakhstan, based on methods such as content analysis, synthesis, induction, and graphical methods. The hypothesis was confirmed as a result. Transitioning to an innovative approach to economic development will enable the adoption of new production forms, thereby increasing efficiency and economic benefits, consequently ensuring economic diversification.

Keywords: innovation strategy, economic development, competitiveness, manufacture, technology.
JEL codes:F01, O10, O32,P21

1 Introduction

The implementation of an innovative development strategy contributes significantly to ensuring economic growth and unlocking its potential opportunities. This strategy aims not only to enhance the overall economic well-being of the country but also to boost the competitiveness of the economy. Kazakhstan views innovation and digitalization as strategically important tasks. In his Address to the Nation on September 1, 2023, the President of Kazakhstan emphasized the increased focus on digitalization and innovation. The country ranks among the global leaders in the e-government development index and fintech. The export volume of the domestic IT industry increased fivefold in 2022 alone, and by the end of 2023, this figure may reach $500 million. Consequently, the Government's goal is to raise IT service exports to $1 billion by 2026. It is worth noting that special attention is required for the use of artificial intelligence. It is forecasted that over the next few years, over $1 trillion will be invested worldwide in this sector. The development of this sector has the potential to significantly increase the GDP of individual countries, including Kazakhstan(TokayevK.-Zh., 2023).

Due to ongoing shifts in technological and socioeconomic paradigms, governmental industrial and innovation policies must enhance their efficacy and adaptability to rapidly changing conditions. This entails a significant amplification of the roles of industrial and innovation development and their impact on ensuring sustainable economic growth (Mamin A., 2019).

Experience from technologically advanced countries confirms that an integrated structure represents the most efficient entity for strategic innovation activities. Within the characteristics of the innovation process, an integrated structure is regarded as a comprehensive system encompassing innovation development and implementation infrastructure. Consequently, the innovation structure

constitutes a cluster of economic entities interconnected through a network system of financial and economic relations aimed at enhancing the efficiency of participants' innovation activities through resource optimization (Seisenbayeva Zh. M., Nurasheva K. K., Isatayeva G. B., 2023).

2 Literature review

Innovation, as an economic concept, encompasses matters relating to novel combinations of production factors, including alterations in enterprise development. These alterations are delineated as follows: adoption of novel equipment, technological processes, or fresh market provisions for production; introduction of products with new attributes; utilization of new raw materials; modifications in production organization and its material-technical support; emergence of new sales markets (Emami L. F., 2021).The economic landscape undergoes rapid transformations, characterized by phenomena such as globalization, evolving customer and investor demands, and continuously escalating market competition. Individuals comprising the organization, termed human resources, are regarded as one of the most crucial assets of contemporary firms (Maier A., et al., 2013).

Startups, being nascent entities, face constraints due to their small size and lack of experience when entering market competition. Research has indicated that establishing relationships with other organizations could serve as a means to mitigate such constraints. While some studies underscore the importance of relationships between startups and large organizations within the innovation ecosystem, few have examined the relevance of cooperative relationships among startups themselves. Cooperative relationships entail a "hybrid activity" involving both collaboration and competition among firms, with primary emphasis on value creation within the innovation ecosystem (Primario S.et al., 2024).As global experience demonstrates, achieving this is only possible through transitioning the economy towards innovative development, as domestic companies currently face intensified competition from international markets. Thus, only innovation-driven companies and corporations are capable of capitalizing on the opportunities provided by integration into the global economy (Khamitov N.N., 2012).Despite its abundant natural resources, Kazakhstan continues to grapple with the challenges of transitioning to a knowledge-based economy. Kazakhstan's strategic course towards industrial-innovative development provides the necessary conditions for the development and implementation of new scientific ideas and technologies (Danabayeva R.I., Shedenov U.K., 2013).

Collectively, organizations using different technologies, firms belonging to different industries, demonstrate different structures in their innovation activities, especially when comparing between countries. This diversity and disparity in the activities of companies may be the most significant characteristic defining the innovation process at the firm level. For example, it has been demonstrated that in technologically advanced sectors, the threat of new market entrants stimulates innovation, whereas in technologically lagging sectors it hinders innovation. In some industries, the entry of new firms into the market has a positive effect on productivity growth in the industry, while in others it suppresses it. In addition, it was found that innovation activity tends to be "persistent," which means that firms with past experience in innovation are more likely to continue to innovate. There is also evidence that the intensity of innovation activity largely depends on factors such as participation in export activities, the level of managerial training and skills, network connections between firms, research and development (R&D) capabilities, as well as the size of the firm (Dobrinsky R., 2008). The formation of public-private partnerships plays a crucial role in the development of an innovative economy. This tool, representing cooperation between the government and business on a long-term basis to address societal issues, allows for achieving concrete results in the shortest possible time through the use of innovation and modernization in both sectors. Pooling efforts ensures maximum efficiency. With the increase in international integration processes, analyzing market structure becomes particularly important, aiming not only to enhance its competitiveness but also to strengthen the country's position globally. Modernizing the real sector of the economy becomes one of the priority tasks, requiring comprehensive methods based on an innovative approach for its resolution. Special attention is given to innovative quality

assurance of products and services, which plays a leading role in utilizing favorable competitiveness factors and transforming a company's potential into tangible resources (Semchenko A.A.).

3Methodology

This study was conducted in order to determine the advantages and benefits of an innovative strategy for economic development and ensuring its competitiveness. The main research methods include content analysis, synthesis, induction method and graphical method.

The content analysis method is aimed at analyzing the content of text, graphic, and tabular material. It provides a toolkit for analyzing large amounts of data to highlight key topics in an innovative development strategy, patterns or characteristics in the content under study. Synthesis is the process of processing, combining and integrating information from different sources. The end result of using this method is to systematically map the directions and areas of research for the development of general concepts and models based on existing theoretical concepts in innovative strategies. The induction method is used to form general statements based on the analysis of individual scientific facts and characteristics. The graphical method is used to visually display data on the number of innovations used and on the level of innovation activity among enterprises in Kazakhstan.

Therefore, the research methodology answers such questions:

What is an innovative strategy for economic development?

What stages of development does the innovation strategy cover to ensure the competitiveness of the economy?

Research hypothesis: an increase in innovation in organizations can ensure diversification in the economy.

4 ResultsandDiscussion

In modern times, the concept of innovative activity encompasses various types of work, including research, development, production organization, and other aspects. Its goal is to obtain and utilize the results of intellectual activity to create and apply new methods, devices, approaches, materials, or to apply existing approaches for new purposes.

Innovative orientation in ensuring the quality of products and services is a key factor that effectively leads to the utilization of favorable external and internal competitiveness conditions, and transforms the company's potential into actionable resources. For example, one can consider the concept of marketing relationships. This concept is based on the following principles (Gugelev A.V., Semchenko A.A., 2015):

— **attracting customers by focusing on solving their problems;**

— **ensuring full interaction with customers for maximum adaptation of offerings to their needs;**

— **creating a product that maximally meets the needs of specific customers;**

— **continuous monitoring of satisfaction among current customers, addressing emerging issues, and maintaining trustful relationships.**

This innovative approach to customer engagement enables companies to reduce marketing research expenses, as well as conduct analysis, segmentation, and positioning of products and services, formulate pricing strategies, promote products and services in the market, and improve the company's strategy.

Information assets and digital control systems often emerge as a result of integration that transcends the boundaries of individual companies. The emergence of phenomena such as the "open business model" and related concepts, such as networks or platforms (Zott C., Amit R., Massa L., 2011), change the perception of where a company ends. Traditional relationships between seller and buyer are being redefined: they are now perceived as part of a larger system, where value is collaboratively created and extracted within partnerships. As a result, new enterprise management tools emerge.

Table 1. Digital models of production and management of enterprises.

Tools
Software applications for planning and regulating production stages (for example, enterprise resource planningsystems, ERP)
Automation and management systems for internal logistics (RFID radio frequency identification technologies, etc.)
Solutions in the field of product and service development
Product lifecycle management tools (product-lifecycle-management, PLM)
Mobile (wireless) devices for programming and operating machines and equipment
Digital means of production (tablets, smartphones, etc.)

Note: used by the authors based on the source (Götz M., Jankowska B., 2020)

The following table provides a general description of the changes caused by Industry 4.0 in the activities of the companies in question.

Table 2. General characteristics of changes in the activities of companies caused by Industry 4.0

Aspect	Description
The level of development of Industry 4.0	The introduction of new technologies (as a rule, it is heterogeneous, gradual, fragmented, but common to all players), which can change the way staff andadministration use resources and thereby affect the competitive advantages of companies.
Expected effects/benefits	The development of new products and processes, leading to increased efficiency, generating new / more significant competitive advantages (optimization of resource allocationand use).
Risks and challenges	Awareness of the need for capital investments and staff training to improve management efficiency in order to strengthen competitiveness based on available resources in the context of Industry 4.0
Changing the industry landscape	Unpredictability of the behavior of industry partners due to Industry 4.0, awareness of both opportunities and barriers, uncertainty about how appropriate it is to copy the strategy of partners in relation to Industry 4.0.
Relations with industry partners	The uncertainty of the prospects for government support, active pressure from partners to move along the value chain and intensify interconnections.
Restructuring of the global value chain and new opportunities for international expansion thanks to Industry 4.0	Pluralism of opinions about the initiators of digital transformation, awareness of the potential of Industry 4.0 to optimize international business

Note: used by the authors based on the source (Götz M., Jankowska B, 2020)

The sustainable advancement within the Industry 4.0 sector relies on knowledge and innovation. Companies are required to update their current models of interaction with suppliers and clients. The full potential of Industry 4.0 technologies is realized when business relationships are considered at every stage of value creation — from research and development to sales, marketing, and post-sales service. The implementation of integrated information systems is necessary while maintaining the role of employees possessing the necessary skills in managing, producing, and servicing Industry 4.0 systems, including expertise in Internet of Things, robotics, blockchain, and manufacturing technologies (Gërvalla, Ternai, 2019). Industry 4.0 is characterized by profound digital transformation in production and business processes, where an innovative strategy plays a pivotal role.

An innovative strategy is a set of plans and methods aimed at developing and implementing new ideas, products, services, or processes with the aim of improving the organization's performance or gaining a competitive advantage in the market. Within this strategy, a model is considered that defines and justifies the choice of the enterprise development path with a focus on enhancing its competitiveness (Shamil M. V., Almaz Kh. Kh., 2015).

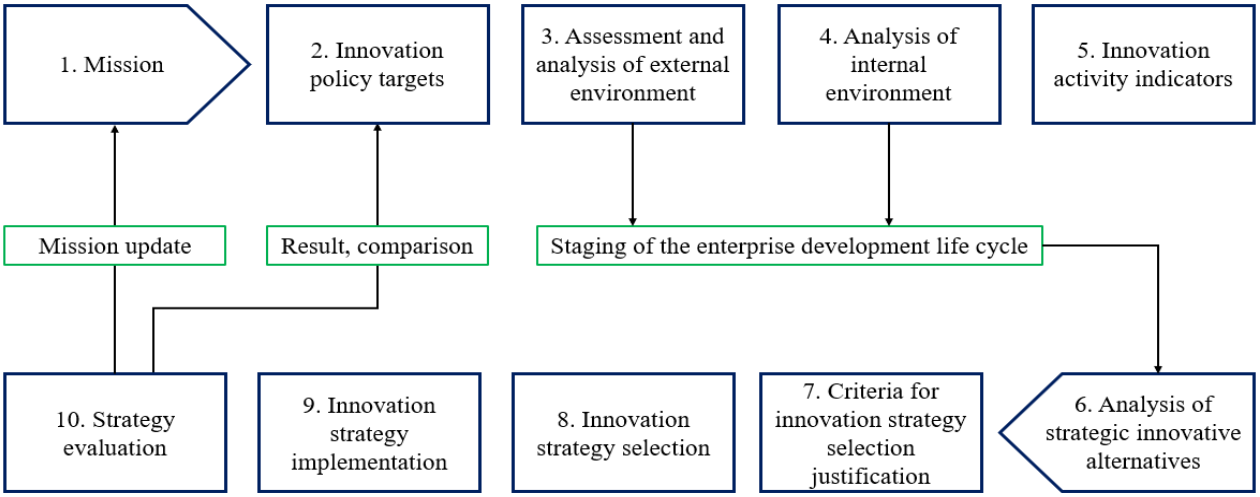

Figure 1. The proposed model for building an innovative strategy of an industrial enterprise. Note: compiled by the author based on the source (Shamil M. V., Almaz Kh. Kh., 2015)

When establishing goals for the enterprise's innovation policy, it's essential to consider factors determined by the stage of the enterprise's life cycle. Typically, four stages are recognized: introduction, growth, maturity, and decline. It is believed that each of these stages comprises specific phases, which are not strictly defined and can be identified based on the dynamics of key economic indicators that characterize the enterprise's efficiency, financial condition, and market stability. Within the growth stage, rapid and slow growth stages can be distinguished. The rapid growth stage, for instance, unlike other stages, is marked by clear, positive, and highly active dynamics of key indicators (revenue, profit, profitability, etc.). In the subsequent stages, their dynamics slows down somewhat, although it remains positive (Shamil M. V., Almaz Kh. Kh., 2015).

Since a successful innovation process requires the creation and market introduction of a competitive innovative product, the innovation strategy involves the use of a product strategy based on a modified or entirely new product. These product strategies can be applied in both offensive and defensive innovation strategies. An overview matrix of product strategies is provided in Table 3.

Table 3. Matrix of innovative product strategies

Product Strategy	**Innovative strategy**	
	Offensive	Defensive
Modernization	The release of improved products, partially new to the market, in order to surpass competitors.	The launch of improved products, partly new to the market, in order to keep up with competitors.
Product development	Launch of completely new products for the market	Not applicable
Geographical modification	Launch of improved products to a new regional market in order to identify competitors.	Not applicable
Geographic product development	Launch of products specially designed for the new regional market	Not applicable
Segment modification	The launch of products specifically improved for a specific segment to occupy the vacant niche.	Not applicable

Diversification	Acquisition of firms with significant intangible assets (technologies and developments for business management, human resources). The result is the creation of a new enterprise and the expansion of the market.	Acquisition of competitors who may pose a serious threat in the future. As a result, the company is enriched with the ideas of competitors and the threat of a prospective loss of market share is reduced.

Note: used by the authors based on the source (Shamil M. V., Almaz Kh. Kh., 2015)

The effective management of innovative potential necessitates substantial investments of time and effort. Given the interconnectedness of innovative potential with human resources upon implementation, it becomes imperative to formalize and oversee this process. Consequently, fostering the notion that continuous change is a natural state of organizational development becomes crucial.

Enterprises and various organizations leverage innovations to construct more flexible, dynamic, and adaptive business and organizational models. Consequently, digital nomadism, as a novel form of lifestyle mobility, presents fresh opportunities for both core and peripheral avenues. The propagation of innovation theory underscores that innovative concepts can disseminate through channels. Nevertheless, the pace at which individuals and entities respond to innovations may vary (RogersE.M., Singhal A., & Quinlan M.M., 2019).

The new way of life associated with the use of digital technologies in travel and work has been termed "digital nomadism." Cities and established tourist destinations have been the first to adapt to the needs of digital nomads, utilizing existing infrastructure (Lingxu Zh., et al., 2024).

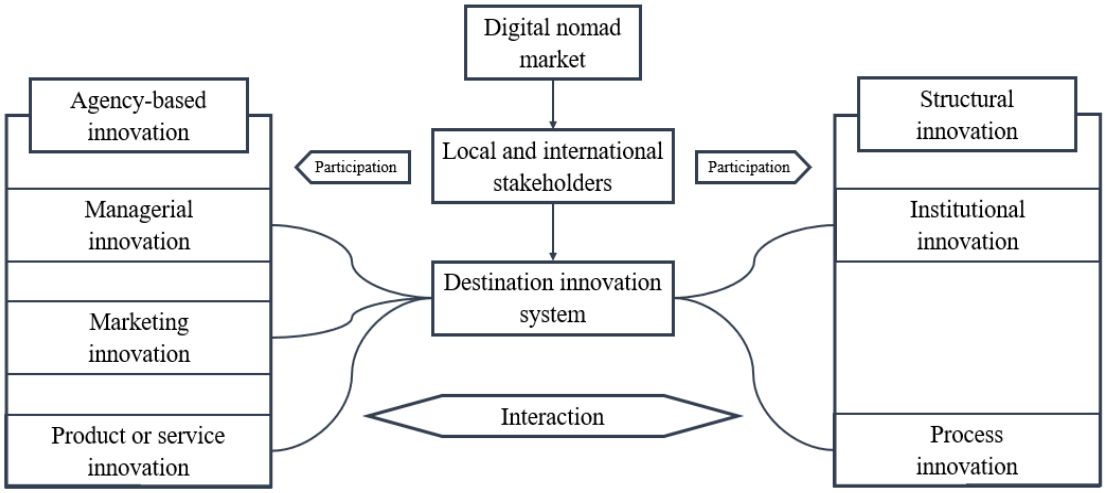

Figure 2. An innovative system for directing digital nomads.
Note: compiled by the author based on the source (LingxuZhouet al., 2024)

The application of innovative parameters in tourist destinations (Hjalager, 2010) within the framework of digital nomadism contributes to the formation of the destination's innovative structure (see Figure 2) and defines innovations in products or services, managerial changes, and marketing novelties. The destination's innovation system encompasses organizational changes and structural modifications. Local and international stakeholders can actively participate in this process of innovation. Arrows in the figure denote physical and informational connections, as well as interactions. At the agency level, innovations are implemented by independent and individual participants striving to enhance their potential. Structural changes in the form of process and institutional innovations contribute to the enhancement of the competitiveness of the tourist destination.

Although widespread adherence to the digital nomadic lifestyle is unfeasible for everyone, there is a surge of young individuals opting for a balance between personal and professional life.

Consequently, the scope and number of digital nomadic communities worldwide continue to expand (MBO Partners, 2023). Remote work opportunities serve as the foundation of digital nomadism. The trend towards remote work is likely to persist alongside the advancement of information technologies and tools for managing remote employees. As remote work becomes increasingly prevalent, cybersecurity and employee monitoring issues become topics of discussion to mitigate risks associated with remote work (Statista Research Department, 2023).

It is important to note that technological, manufacturing, energy, and other sector innovations can contribute to sustainable development. The demand for sustainable development entails a shift in values and priorities, a change in the direction of modern society's development, which is associated with the spiritual elevation of human needs. Sustainable development goals serve as a kind of call to action aimed at efforts to increase economic growth and address a range of issues in education, healthcare, social welfare, and employment, as well as combating climate change and protecting the environment (ZhangirovaR.N., 2020)

Amidst the innovative development of the Kazakhstani economy, various challenges arise, such as fostering economic growth, conducting structural restructuring, addressing unemployment, ensuring global market competitiveness, and others. However, these issues may find resolution through the activation of innovative activities, which, in turn, necessitates investment attraction. The subsequent increase in investments prompts the establishment of an efficient system of government regulation, amalgamating scientific, technical, production, managerial, and financial initiatives (YdyrisC.C., 2010).

The desire to increase the level of innovation activity within the country of Kazakhstan is due to the importance of ensuring the security of information and developing technological support for the market using local innovations.

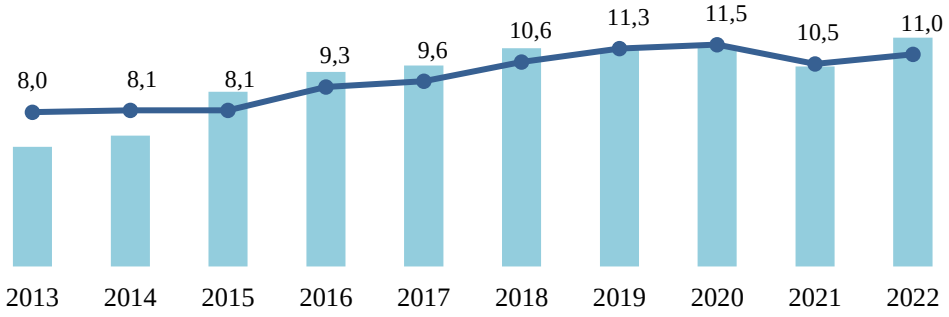

Figure 3. Dynamics of changes in innovative activity of enterprises in the Republic of Kazakhstan. Note: compiled by the author based on the source (The Bureau of National Statistics of the Republic of Kazakhstan., 2022)

Figure 3 illustrates the annual growth in demand for innovative products and equipment among Kazakhstani enterprises for their activities. These statistics also reflect the level of activity of commercial organizations, with active purchases of innovations increasing by an average of 1.1 percent each year. The further increase in the level of innovation activity in the domestic market (including the information technology market) indicates the need to study the key conditions for the development of commercial success among international companies. Based on international experience, the private sector can not only initiate the creation of innovations, but also their production and subsequent implementation on the market. To solve this problem, back in 2017, plans were developed to create an international technopark of IT startups based on EXPO, which subsequently served as a platform for the development of market innovations in this sector. However, as startups develop, it becomes necessary to switch to the production of high-tech products that are in demand on the market. This applies to the field of high-tech enterprises (Kozhamkulova Zh.T., 2018).

5 Conclusions

After analyzing numerous scientific works by foreign and Kazakhstani authors in the field of innovative strategic development, it was concluded that an innovative orientation is indeed crucial for ensuring the quality of products and services. Essentially, it serves as a driving force, leveraging favorable external and internal factors of competitiveness and transforming a company's reserves into tangible resources. It was found that innovation implementation allows enterprises to reduce marketing research costs, conduct market analysis, segmentation, and positioning of goods and services, implement price incentives, promote products and services in the market, and rectify deficiencies in the company's strategy.

Among the primary tools in enterprise management are software applications for planning and regulating production stages (e.g., enterprise resource planning systems, ERP), automation systems, and internal logistics management (radio frequency identification RFID technologies), product lifecycle management tools (PLM), as well as digital manufacturing assets (tablets, smartphones, etc.).

The common characteristics in the implementation process of innovative measures enable companies to alter the use of resources by staff and administration, thus influencing companies' competitive advantages; embrace new products and processes leading to efficiency growth; recognize the need for capital investment and staff training to enhance management efficiency; understand both opportunities and barriers in the innovation field, etc. Therefore, an innovative development strategy can be positioned as both an offensive and defensive strategy, with stages such as modernization, product development, geographical modification and geographical product development, segment modification, and diversification.

Thus, the innovative development strategy encompasses several crucial directions, which may vary depending on the specific conditions and priorities of a country or region. Investing in innovation enables a country's economy to expand and modify production sectors, assortment, and volume of output, types of services provided, and adopt new forms of production while increasing efficiency and economic benefits. Therefore, the hypothesis of diversifying the economy through increased innovation is confirmed.

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DIGITAL SKILLS AN TECHNOLOGICAL INNOVATION IN WORKFORCE DEVELOPMENT

Yerezhepova Aimankul,Torebek Alisher*
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail:ali10999875@gmail.com

Abstract. In the contemporary landscape of workforce development, this article delves into the paramount significance of digital proficiency and technological advancement. It outlines the escalating demands for professional skills in light of the swiftly evolving digital sphere and the advent of novel technologies. Through an analysis of the ramifications of digital prowess on the labor market, the article navigates through the challenges and opportunities confronting both employees and enterprises. Additionally, it scrutinizes the requisite adaptations in educational schemes and policies to ensure efficacious workforce cultivation and sustainability amidst the digital era. Consequently, the article furnishes pragmatic recommendations aimed at fostering collaboration among governments, businesses, and educational institutions to nurture the essential skills indispensable for thriving in modern work environments. This study encompasses a broad contextualization of the research subject, employing diverse methodologies to elucidate its intricacies. The findings underscore the critical role of digital competencies in shaping contemporary employment dynamics. In conclusion, the article advocates for concerted efforts towards holistic skill development initiatives, emphasizing the imperative of aligning educational endeavors with the evolving demands of the digital age.

Key words: digital skills, technological innovation, workforce development, digital transformation, education and training.

1 Introduction

In modern dynamic society, rapid development of technology plays a crucial role in changing the reality of labor, setting new requirements for the skills and competencies of workers, digital skills and technological innovations will become an integral part of the development of the workforce, creating the success of individuals and enterprises in the face of rapid change.

The introduction of digital technologies such as artificial intelligence, automation, data analysis and other innovative solutions fundamentally changes workflows and gives new opportunities to improve productivity. In this regard, having the appropriate digital skills will become a strategic factor for successful adaptation to the modern working environment.

2 Literature review

In the contemporary landscape of workforce development, the integration of digital skills and technological innovation stands as a pivotal area of focus, drawing attention from researchers worldwide. A myriad of studies and scholarly endeavors delve into the multifaceted dimensions of this domain, examining its implications for the evolving workforce paradigms and socio-economic landscapes.

For instance, researchers at prestigious institutions such as the Massachusetts Institute of Technology (MIT) have undertaken comprehensive reviews of the transformative role played by digital skills and technological innovation in workforce development. Their investigations encompass the analysis of emerging trends in digital literacy, the impact of automation on job markets, and the dynamics of upskilling and reskilling initiatives facilitated by technological advancements. Initial data collection efforts have been instrumental in laying the groundwork for subsequent modeling and analysis. [1]

Moreover, studies conducted by experts at leading academic institutions, like Stanford University, have explored the intersection of digital skills and workforce development within the context of emerging global economic initiatives. Notably, research endeavors have focused on elucidating the implications of digital skill proficiency for competitiveness in the international job market. Models developed from empirical data have been utilized to assess the potential impact of

policies and initiatives aimed at fostering digital literacy and technological innovation in various regions. [2]

Furthermore, scholarly articles authored by thought leaders in the field, such as those affiliated with the World Economic Forum (WEF), have delved into the geopolitical and socio-economic ramifications of digital skills and technological innovation on workforce development strategies. Through in-depth analyses, these studies have underscored the imperative for nations and organizations to adapt to the evolving digital landscape, emphasizing the need for agile response mechanisms and proactive skill development initiatives. [3]

Additionally, research efforts led by esteemed scholars and practitioners, including those from Harvard University, have sought to forecast the trajectory of digital skills acquisition and technological innovation in workforce development. Utilizing advanced forecasting models and trend analysis techniques, these studies have provided insights into the dynamics and growth patterns of digital skill adoption across different sectors and demographics. [4]

In sum, the literature surrounding the integration of digital skills and technological innovation in workforce development constitutes a rich tapestry of scholarly inquiry and empirical investigation. By synthesizing diverse perspectives and empirical findings, researchers continue to illuminate the pathways towards a future-ready workforce equipped with the requisite digital competencies to thrive in an increasingly digitized global economy.

3 Methodology

The study is aimed at carefully considering the impact of digital skills and technological innovation on the formation and development of the workforce, the authors focus on the challenges facing workers and enterprises, as well as provide practical recommendations for the effective development of digital competencies in the educational and corporate environment. tries to outline strategies to help create a flexible and adaptive workforce [5].

The topic of digital skills and technological innovations in the development of the workforce is very relevant in the modern world. Rapid technological development, digitization of processes and the introduction of new technological solutions in various sectors of the economy create several challenges and opportunities for society and business.

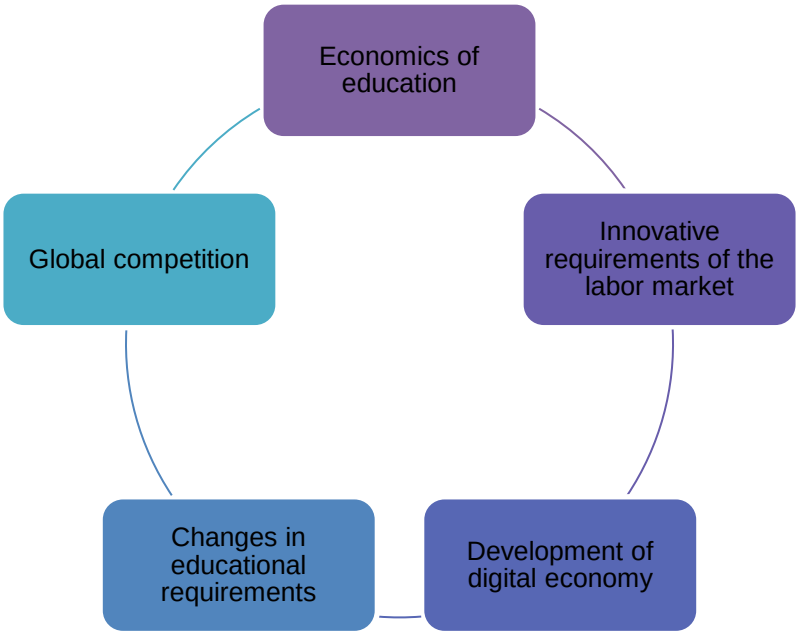

Figure 1. Digital skills and technological innovations in workforce development

Knowledge Economy: In the face of constant changes in the technological environment, the economy is transitioning to a model in which knowledge and digital skills become the main factors of competitiveness. Knowledge of modern digital skills is important for effective work in various fields.

Innovative requirements of the labor market: The labor market is dynamically developing and needs workers who can adapt to new technologies and implement it in their workflows.

Development of the digital economy: countries and companies actively developing digital technologies are moving to the global level, which emphasizes the importance of training personnel with digital skills to participate in global economic processes.

Changing requirements for education: The modern education system must meet the needs of the digital society, giving students not only theoretical knowledge, but also the skills to work with digital technologies.

Global competition: At the global level, countries compete for the best talent and investment, and digital skills become the determining factor in their competitiveness.

Due to the above-mentioned factors, the relevance of this topic is not only preserved, but also growing, considering the need to constantly update and develop digital skills in modern society.

4 Results and Discussion

In Kazakhstan, the topic of digital skills and technological innovations in the development of the workforce is particularly relevant, reflecting the country's desire to modernize and integrate into the global economy [6].

For Kazakhstan, the importance of this topic is based on several key aspects.

Table 1. Key aspects that justify the importance of digital skills and technological innovation in workforce development

Strategy "Digital Kazakhstan":	Kazakhstan is actively implementing the program "Digital Kazakhstan", aimed at the development of the digital economy and society. This strategy includes the introduction of modern technologies, stimulating digital innovation and teaching the population digital skills.
Infrastructure projects:	Projects on the creation of modern digital infrastructure, such as the development of high-speed Internet connection, support the introduction of digital technologies in various areas of activity.
Educational programs:	Public and private educational institutions are striving to adapt their programs to train specialists with digital skills. This includes both higher education and professional retraining programs.
Startup ecosystem:	The startup environment, favorable for the emergence and expansion of digital first companies, is developing. This will create new jobs and stimulate the demand for highly skilled workers.
State support for innovations:	The state actively supports innovative projects and start-ups, which will contribute to the growth of digital technologies and the growing demand for workers with appropriate skills.
Global competitiveness:	The development of digital skills is becoming an important factor in the competitiveness of both individual professionals and the country as a whole in the global labor market and innovation.

Thus, the topic of digital skills and technological innovations in Kazakhstan will not only reflect global trends, but also become an important tool for achieving national strategic goals for modernization of the economy and ensuring sustainable development.

There are several challenges in the development of the workforce in the Republic of Kazakhstan, including digital skills and technological innovations. Some of them include:

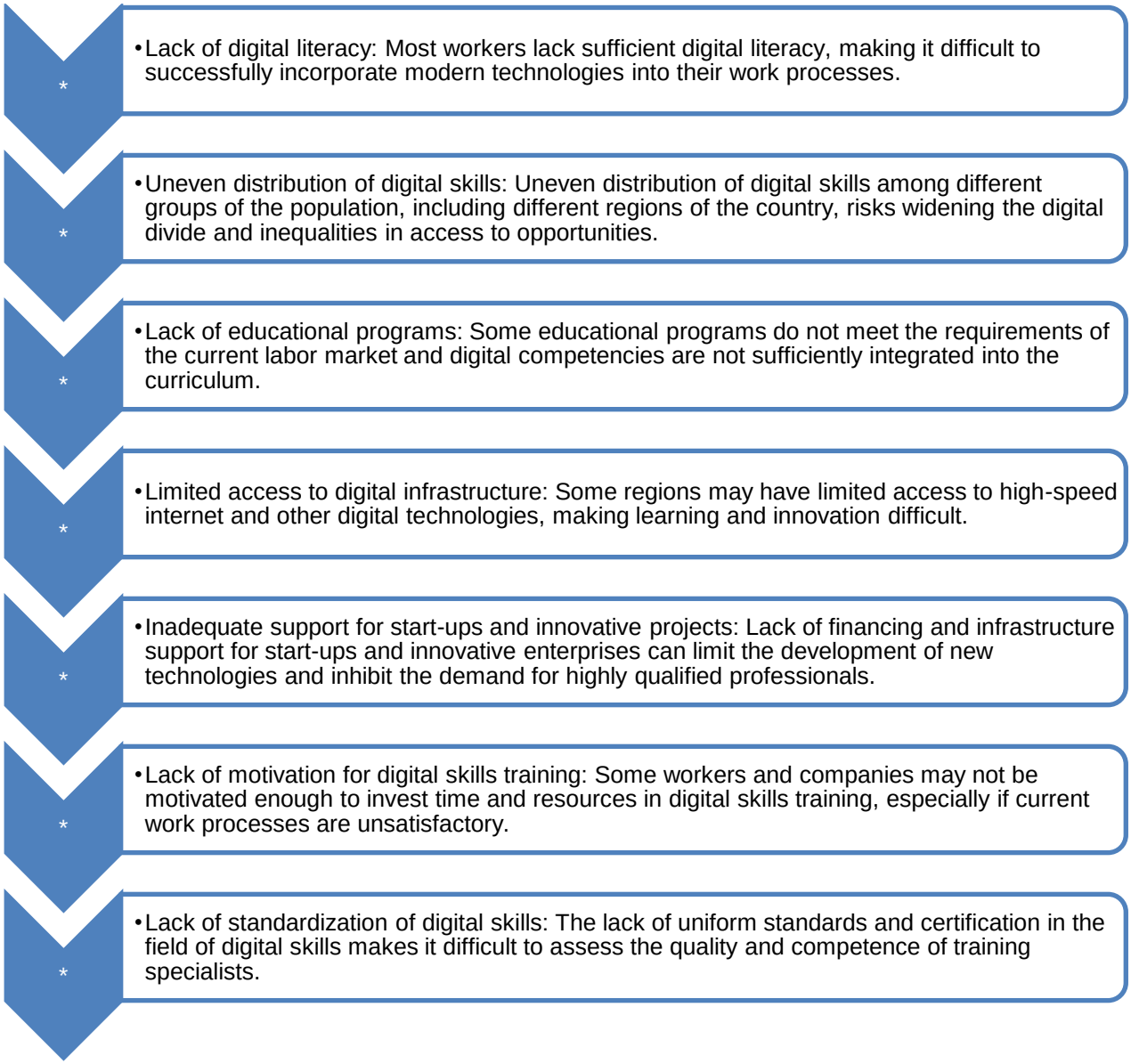

Figure 2. Problems of digital skills and technological innovation in workforce development

Addressing these challenges requires a comprehensive approach, including modernization of educational programs, expansion of digital infrastructure, support for innovation and start-ups and the creation of incentive mechanisms for learning digital skills at the individual and enterprise level [7].

Table 2. SWOT analysis of digital skills and technological innovations in the development of the workforce in the Republic of Kazakhstan

Strengths (Strengths):	Weaknesses (Weaknesses):
State support: Active state support in the implementation of programs for the development of digital skills and technological innovations. Educational initiatives: Launch educational programs and initiatives aimed at improving digital literacy and training in modern technologies. Strategy "Digital Kazakhstan": A national strategy covering various aspects of digitalization from infrastructure to knowledge.	Digital inequality: Uneven distribution of access to digital skills and technologies between different segments of the population and regions of the country. Shortage of qualified teachers: Limited number of qualified teachers capable of teaching modern technologies. Low integration into business processes: insufficient integration of digital skills into the business processes of companies and organizations.
Features	Threat:

International cooperation: opportunities for increasing international cooperation and exchange of experience in the field of digital skills and technological innovation. Development of startup environment: Increase support for start-ups and innovative projects, which will contribute to the development of new technologies and creation of new jobs. Training for specific labor market needs: Adaptation of educational programs to the specific needs of the labor market and business sectors.	Technology imbalance: The gap between technology upgrades and workers' ability to adopt it can develop. Global competition for talent: the risk of losing highly qualified personnel due to the attractiveness of foreign employers. Adoption of unbalanced technology: the ability to adopt uneven technology in areas that could lead to imbalances in the business environment.

SWOT analysis will identify key aspects of digital skills and technological innovation in Kazakhstan, identify strategic priorities and develop effective measures for the development of this sector.

The PEST analysis of digital skills and technological innovations in the development of the workforce in the Republic of Kazakhstan (analysis of political, economic, socio-cultural and technological factors) is as follows:

Table 3. PEST analysis of digital skills and technological innovations in the development of the workforce in the Republic of Kazakhstan

Political factors:	Economic forces:
State support: Active participation of the state in the development and implementation of programs for the development of digital skills and technological innovations. Legislation: regulation in the field of digital technologies and innovations, including issues of data privacy and electronic security.	Investment in innovation: the level of investment in research and development, which contributes to the development of new technologies. Startup financing: Availability of funding for start-ups and innovative projects in the field of digital technologies. Economic stability: The impact of economic stability on the ability of companies and governments to invest in digital initiatives.
Social cultural factors:	Technological factors:
Education system: The possibility of educational institutions to adapt programs to the new requirements of the digital economy. Digital literacy of the population: The level of digital literacy of the population and its readiness to master new technologies. Social and cultural aspirations: The impact of socio-cultural trends on the choice of profession and innovative approach to work.	Infrastructure: Readiness of the technological infrastructure (for example, high-speed Internet) for the introduction of modern technologies. Innovative technologies: Availability and readiness to implement new technologies, such as artificial intelligence, blockchain, etc. Innovative activity: The level of innovation activity in various sectors of the economy and the readiness of companies to implement technological innovations.

Analysis of these factors will help to understand the macroeconomic and political environment in the country, as well as identify factors affecting the development of digital skills and technological innovations in the workforce in Kazakhstan [8].

Proposals for the development of digital skills and technological innovations in the development of the workforce in the Republic of Kazakhstan:

1. Expansion of educational programs:

– development of modern educational programs, including online courses and trainings, to ensure access to training in any region;

– introduction of digital skills in educational standards at all levels of education.

2. Support for innovations and startups:

– creation of favorable conditions for technology and innovative start-ups through financial support, tax incentives and infrastructure programs;

– strengthen cooperation between the business sector, government and educational institutions to stimulate innovation.

3. Active involvement of professionals:

– to attract practitioners from global innovation centers for training and advice;

– creation of exchange and partnership programs with foreign companies to exchange experience.

4. Strengthen ingress of digital infrastructure:

– invest in the development of high-speed internet and modern digital infrastructure in all regions of the country;

– ensuring the availability of modern technologies in rural and remote areas.

5. Stimulation of social responsibility of companies:

– encourage companies to implement training and digital skills development programs for their employees;

– to encourage companies to participate in educational projects and to cooperate with educational institutions.

6. Adaptation of labor legislation:

– to consider the possibility of adapting labor legislation to support new forms of labor and technological changes in a flexible way.

7. Development of the system of assessment of qualifications:

– creation of standards and systems for assessing digital competencies, ensuring transparency and recognition of acquired skills;

– development of a system of certification and accreditation in the field of digital technologies.

8. Encourage personal reading:

– support for personal learning and self-education by providing resources and support for internet learning and exchange of experiences.

Implementation of these recommendations can contribute to the effective development of digital skills and technological innovations in the workforce of the Republic of Kazakhstan [9].

In the development of the workforce in the Republic of Kazakhstan it is possible to improve digital skills and introduce technological innovations through a number of measures and programs. Here are some ways to improve digital skills and technological innovation:

Figure 3. Ways to Improve Digital Skills and Technological Innovation

Education and training:

– Development of modern educational programs aimed at digital technologies and innovations.

– Improving the skills of teachers and coaches on the introduction of new technologies in the teaching process.

– Creation of specialized courses and programs to improve digital literacy of the population.

Infrastructure and technology accessibility:

– Development of digital infrastructure, including high-speed Internet access and the distribution of modern computers.

– Support for programs that provide access to digital technologies for all segments of the population, including remote and rural areas.

Stimulation of entrepreneurial innovations:

– Support for innovative start-ups and high-tech entrepreneurship.

– Creation of innovation centers and technoparks for the development of cooperation between business, the academic community and the government.

Digitalization of public services:

– Introduction of electronic public services to facilitate interaction of citizens and companies with the authorities.

– Development of digital platforms to improve the efficiency of public services.

Promotion of research and development:

– Financing of research projects in the field of digital technologies and innovations.

– Cooperation between state, business and educational institutions for joint research and innovation projects.

Training in the workplace:

– Implementation of workplace training programs to improve the digital skills of employees.

– Development of the system of internships and exchange of experience between companies to spread the best digital experience.

Adaptation of the legislation:

– Active work on the creation and adaptation of legislation supporting digital innovation and technology.

– Development of mechanisms for the protection of intellectual property to stimulate innovation.

The implementation of these measures will contribute to the development of digital skills and technological innovations in the Republic of Kazakhstan, increase the country's competitiveness in the global economy.

The development of digital skills and technological innovations in the Republic of Kazakhstan is a component of the strategy of sustainable economic development. Improving the skills of the population, creating modern infrastructure and supporting business innovation shall become the main factors contributing to the country's competitiveness in the world market. The adaptation of the legislation and active state support for the introduction of digital technologies in different spheres of life will ensure not only the effectiveness of the labor market, but also the improvement of the quality of life of citizens.

5 Conclusion

In conclusion, digital skills and technological innovations play an important role in the development of the modern workforce in the Republic of Kazakhstan. These factors not only increase productivity, but also create new business opportunities, improve education and allow effective interaction with public services. Flexibility in adapting to modern technologies has become a crucial role for countries seeking sustainable development, and in this regard, The Republic of Kazakhstan is making significant efforts to provide its economy and society with the necessary digital resources and knowledge.

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ANALYSIS OF FOREIGN EXPERIENCE OF THE STATE AND TRENDS IN THE DEVELOPMENT OF WASTE MANAGEMENT AND THE POSSIBILITY OF APPLYING IT IN KAZAKHSTAN

Yerezhepova A.A., Yu Hao*, Xinjiang
Al-Farabi Kazakh National University, Almaty, Kazakhstan
*E-mail: Yh570461@mail.ru

Abstract. This article presents a comprehensive analysis of the feasibility, economic viability, and environmental benefits of implementing Waste-to-Energy (WtE) projects in Kazakhstan, with a focus on the lessons learned from the Ningbo WtE project in China. Through a detailed methodology that includes a literature review, case study analysis, and comparative assessment, the study explores the technological, economic, and regulatory frameworks essential for the successful adoption of WtE solutions. The findings indicate that WtE projects, exemplified by the Ningbo case, offer a sustainable pathway for waste management and energy production, contingent upon appropriate technology adaptation, financial structuring, and governmental support. The study highlights the significance of public education and community engagement in fostering social acceptance and underscores the need for a conducive policy and regulatory environment to facilitate the implementation of WtE projects in Kazakhstan.

KeyWords: Waste-to-Energy (WtE); Sustainable Waste Management; Public-Private Partnership (PPP); Environmental Policy; Energy Production

JEL Codes

Q53 - Air Pollution; Water Pollution; Noise; Hazardous Waste; Solid Waste; Recycling

Q55 - Environmental Economics: Technological Innovation

Q58 - Environmental Economics: Government Policy

R11 - Regional Economic Activity: Growth, Development, Environmental Issues, and Changes

L94 - Electric Utilities

1 Introduction

The global paradigm of waste management is rapidly shifting away from traditional disposal methods towards more sustainable practices. Amidst this transformation, Waste-to-Energy (WtE) solutions are emerging as a pivotal technology for the future of waste management. In Kazakhstan, a country grappling with significant waste management challenges, the exploration and adaptation of WtE technologies hold the promise of a sustainable, energy-efficient future.

2.1 Global Trends in Waste Management

Globally, the narrative of waste management is being rewritten. Countries are moving away from landfilling, which poses grave environmental and health risks, towards innovative solutions that prioritize waste reduction, recycling, and energy recovery. Notably, Sweden, Germany, and Japan have set benchmarks in WtE implementation, showcasing how integrated policies, advanced technologies, and societal participation can coalesce to address waste management and energy production simultaneously.

The transition towards sustainable waste management is a response to the dual challenges of increasing waste volumes and the urgent need for sustainable energy sources. Countries leading in Waste-to-Energy (WtE) technology demonstrate the feasibility of converting waste challenges into energy opportunities[1]. These nations have successfully integrated WtE within their waste management strategies, achieving high levels of waste recycling and energy recovery[2].

2.2 Kazakhstan's Current Waste Management Landscape

Kazakhstan's reliance on landfills mirrors a global challenge that many countries are working to overcome. The environmental degradation attributed to landfills is prompting a shift towards more sustainable practices[3]. In Kazakhstan, significant amounts of waste present both a challenge and an opportunity for the adoption of WtE technologies[4]. Kazakhstan faces a pressing need to revamp its waste management framework. Predominantly reliant on landfills, the country's approach to waste

has led to environmental degradation and missed opportunities for energy recovery. Cities like Almaty, Astana, and Shymkent produce vast quantities of waste, much of which could be converted into energy. The legislative environment in Kazakhstan is gradually evolving to support sustainable waste management practices, yet the implementation of WtE projects remains nascent.

2.2.1 Potential and Challenges for WtE in Kazakhstan

The potential for WtE in Kazakhstan is significant, given the country's energy needs and environmental targets. Waste composition analysis indicates a substantial fraction of waste could be utilized for energy production. However, several challenges impede the progress of WtE projects, including but not limited to technological adaptation, investment requirements, and regulatory hurdles. The document analysis highlights SHLAM (a type of waste material) as an example, pointing to specific local challenges such as the adaptation of technology and securing financial investment for project development. The potential for bioenergy production through WtE processes in Kazakhstan, given the country's waste composition, is significant[5]. However, challenges include the adaptation of WtE technologies, securing investment, and navigating regulatory landscapes[6].

Table 1. Challenges

Housing construction invested by the Almaty Government:		
Time	Amount (million Tenge)	Increase ratio
2021	25578	/
2022	30516	19.30%
2023	38949	27.60%

It can be seen that due to the increase in housing prices and house rents, the Almaty Municipal Government's investment in real estate has increased exponentially, which further reflects the current surge in Almaty's population.

Waste treatment accounts for industrial production:

Industrial production volume in January-March 2023 by January-March 2022 reached 493.4 billion tenge at current prices. Reached 124.1%. In manufacturing, production increased by 24.5%, electricity supply, gas supply and air conditioning by 25.3%, and water supply, sewerage systems, waste collection and distribution control decreased by 1.5%.

To sum up, the population of Almaty is growing due to centripetal immigration brought about by external immigrants and its own regional advantages. At the same time, the industrial scale of Almaty is also gradually increasing, but the matching garbage treatment and sewage treatment Other infrastructure has not been improved in time according to development, and waste-to-energy projects are highly consistent with urban development.

This calorific value analysis report aims to estimate the High Heating Value (HHV) and Low Heating Value (LHV) of a specific waste mixture, based on its composition and the proportion of its constituents. The components include food waste, paper/cardboard, polymers (plastics), textiles, vegetable waste, bones, leather, rubber, and others, with their calorific values sourced from relevant literature. The HHV calculation considers the energy contribution of each component by multiplying its calorific value by its percentage in the mixture, while the LHV is estimated as 92.5% of the HHV to account for the energy not recoverable due to the latent heat of water vapor. According to our calculations, the overall HHV of the waste mixture is approximately 9.50 MJ/kg, and the LHV is approximately 8.78 MJ/kg. These estimates provide a preliminary understanding of the energy potential of the waste mixture. It's important to note that these values are based on a simplified estimation using available literature and may vary depending on the specific composition and moisture content of the waste. For precise energy recovery and utilization projects, a more detailed and accurate analysis is recommended.

First, the high calorific value of garbage indicates that more energy can be released during the combustion process. This is an important indicator for waste-to-energy plants because energy output is directly related to power generation efficiency and the economic return of the project. In

Kazakhstan, since the composition of garbage includes food waste, paper/cardboard, polymers (plastics), textiles, etc., these components have a high calorific value, making the garbage as a whole a fuel with high energy density.

Secondly, from the perspective of low heating value (LHV), after taking into account the energy loss of latent heat of water vapor, the energy gained is still quite high, which further confirms the effectiveness of waste as an energy source. LHV is a more critical indicator when considering practical applications because it is closer to the energy value that can be utilized under actual operating conditions.

Furthermore, while this simplified estimate based on Kazakhstan's waste composition and proportions provides an initial understanding of the potential of waste-to-energy projects, it also points to the need for a more detailed and accurate analysis. This analysis will help to more precisely determine the economic feasibility of the project, including return on investment and operating costs.

In summary, the high calorific value of Kazakhstan's waste not only demonstrates its strong potential as an energy recovery and conversion project, but also provides strong proof of the economics of waste-to-energy projects. This provides a solid foundation for further projects of this type, helping to advance the country's sustainable energy and waste management strategies while reducing reliance on traditional fossil fuels and promoting environmental protection.

2.3 Case Studies: Foreign Experience and Lessons for Kazakhstan

Examining global precedents, there are invaluable lessons for Kazakhstan. For instance, the Nordic model illustrates the importance of integrating WtE within a broader waste management and energy policy framework. Investment models from Germany demonstrate how public-private partnerships can facilitate the financing of WtE projects. Japan's technological innovations in WtE offer insights into how Kazakhstan can overcome technical barriers. These case studies underline the necessity of a supportive policy environment, stakeholder engagement, and tailored technological solutions. The successful implementation of WtE in some countries has been facilitated by comprehensive policy frameworks[7]. The experience of other nations highlights the role of public-private partnerships in financing WtE projects, offering valuable lessons for Kazakhstan[8].

2.3.1 Technology Insights: Kazakhstan's WtE Options

WtE technology offers a variety of methods for converting waste into energy, including incineration, pyrolysis and gasification. Each technology has unique advantages and challenges based on waste composition, energy recovery potential and environmental considerations.

Grate incineration: The most widely used WtE technology, suitable for treating mixed municipal solid waste that does not require extensive pretreatment. It provides high waste processing throughput and the flexibility to handle changes in waste. However, it requires a powerful flue gas cleaning system to reduce emissions and environmental impact.

Pyrolysis and gasification: Advanced thermal treatment technology that converts organic waste into syngas with the potential for higher energy recovery efficiency compared to traditional incineration. These technologies require specific waste pretreatment and face challenges in achieving commercial scale and operational reliability.

Comparative Analysis of WtE Technologies

The comparative analysis highlights the importance of selecting appropriate WtE technologies based on local waste characteristics, economic feasibility and environmental objectives. For example, while operationally proven, grate furnaces may not achieve the highest energy recovery efficiency, they offer reliability and flexibility. In contrast, pyrolysis and gasification promise higher efficiencies but require significant technical and economic investments in waste pretreatment and syngas utilization.

Environmental Impact and Regulatory Framework

The environmental performance of WtE technology is critical, including emissions control, ash management and reducing overall ecological impact. Kazakhstan must develop and enforce strict environmental regulations that comply with international standards and focus on emission

limits, waste pretreatment requirements and sustainable ash disposal practices. Implementing best available techniques (BAT) and complying with the Industrial Emissions Directive (IED) can guide the environmental regulatory framework for WtE plants.

Economic feasibility and financing mechanisms

The economic feasibility of a WtE project depends on a comprehensive analysis of capital investment, operating costs, energy market prices and potential revenue streams from energy production. Innovative financing mechanisms, including public-private partnerships, green bonds and international funding, can ease initial financial barriers and ensure the long-term sustainability of projects. In addition, government incentives and policy support are crucial to create an enabling environment for WtE investment.

Public engagement and capacity building

Public acceptance and community involvement are critical to the successful implementation of WtE projects. Kazakhstan must invest in extensive public awareness campaigns, education programs and stakeholder consultations to gain community support and address potential issues related to health and environmental impacts. In addition, capacity-building initiatives aimed at developing local expertise in WtE technology, project management and environmental monitoring are critical to developing a skilled workforce and ensuring operational excellence.

2.3.2 Foreign Experience and Lessons for Kazakhstan, taking Ningbo case as an example:

Sus Environment

Established in 2008, SUS Environment has grown from incineration technology provider to the integrated developer, investor, operator and technology provider for waste-to-energy projects. Achieving a Licensing Agreement with Hitachi Zosen in 2009, SUS has supplied more than 360 incineration lines to 180 WTE plants in China and in some Southeast Asian countries, and also invested over 46 BOT/PPP WTE projects with waste processing capacity of 76,000 TPD since then.

Ningbo WTE PPP Agreement was signed between SUS and Ningbo municipality government on January 19, 2015, followed by starting the construction on January 1, 2016 and trial operation on June 21, 2017. During the implementation of the project, especially in the preliminary phase, the preparation works such as site selection, household resettlement, environmental assessment, and the construction of peripheral supporting facilities are extremely difficult. However, with the strong supports from local government and efficient public education and publicity, the project was implemented quite smoothly, and the construction was completed within 18 months only.

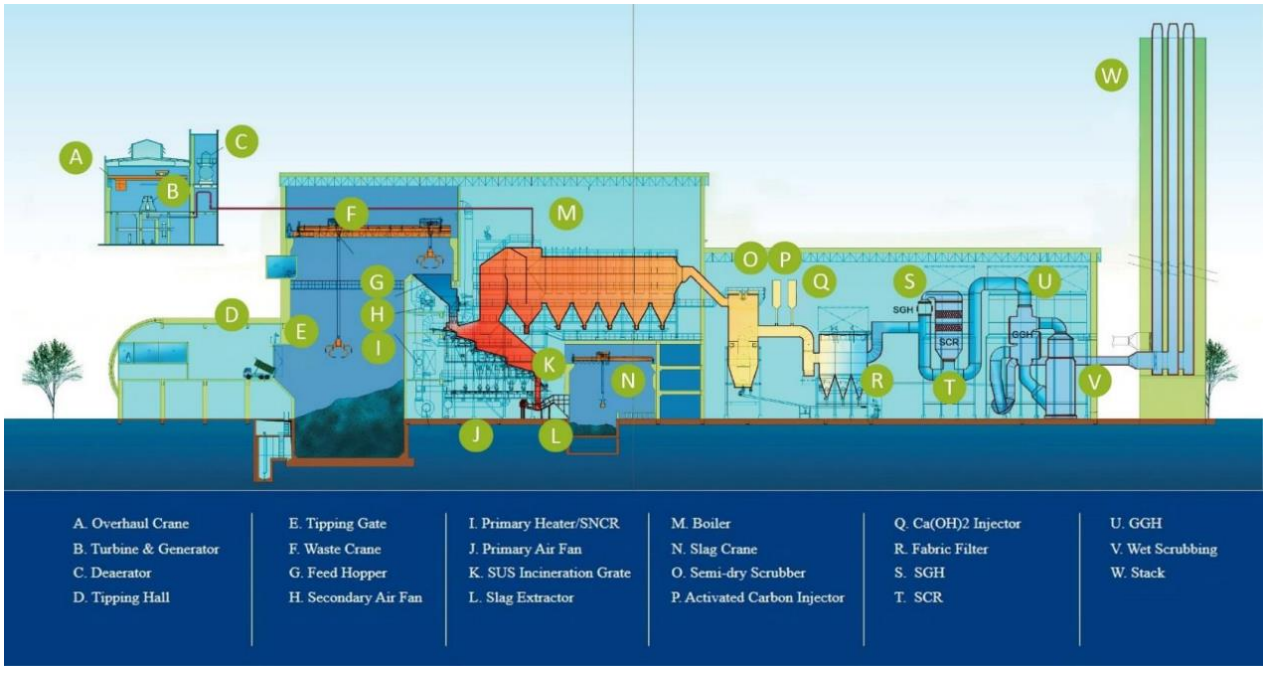

Figure 1. Technical process introduction

-Waste truck are recorded by the weighbridges installed at the gate before going to the tipping hall.

-Following the instructions from control room, the truck dumps waste into the bunker through the designated dumping

gate. Under minus pressure, the odor from the bunker is prevented to emit into the air.

-Waste cranes installed above the bunker feed waste into the incinerators through the hoppers.

-Heat containing in high-temperature flue gas is recovered by the boiler to generate steam. Electricity is produced

after steam passing through the turbine and generator. Except a small portion of electricity used on site, the remaining

is delivered to the Eastern China Power Grid.

-The technologies of "SNCR + Semi-dry scrubbing + Dry scrubbing + Activated Carbon Injection + Fabric Filter + Steam

Gas Heater + SCR + Wet Scrubbing + Gas-Gas-Heater" are adopted for effective removal of NOx, acid substances,

dust, dioxin and heavy metals from the flue gas. The emission values are much lower than the limits stipulated in

European Industrial Emission Directive 2010/75/EU.

-The plant enjoys a high level of automatic operation with the Distributed Control System on its integral process. Bottom

ash is recycled as brick aggregates. Fly ash is stabilized with chelating agent before being landfilled. Leachate is treated in on-site treatment plant and then reused without discharge to the surrounding water body

Table 2. Operation performance

Operations

Parameters	Unit	2019	2018	2017
Waste received	t	946,770	952,656	401,446
Electricity generation	MWh	372,582	350,096	147,160
Feed-in electricity	MWh	305,070	289,096	122,777
Bottom ash	t	161,833	176,119	69,096
Fly ash	t	24,920	23,158	8,162

Emissions

Parameters	Unit	IED	2017			2018			2019		
			#1	#2	#3	#1	#2	#3	#1	#2	#3
Dust	mg/Nm^3	10	3.19	6.50	3.12	1.99	2.28	1.46	0.69	0.73	0.80
NO_x	mg/Nm^3	200	55.33	60.22	49.93	48.50	47.79	39.38	44.96	44.21	44.57
SO_2	mg/Nm^3	50	4.16	9.87	8.66	1.54	2.47	5.36	1.8	2.31	3.72
HCl	mg/Nm^3	10	0.52	10.33	2.91	0.42	0.10	0.76	0.55	0.39	0.57
CO	mg/Nm^3	50	1.98	2.42	2.42	2.34	2.27	2.73	3.30	3.26	3.92
Dioxin and furan	$ngTEQ/Nm^3$	0.1	0.0200	0.0055	0.0032	0.0070	0.0045	0.0120	0.0140	0.0160	0.0160

Key success factors for Ningbo WtE project

1. Technologyand Innovation: The Ningbo WtE project adopts SUS incineration grate technology and a number of advanced flue gas treatment technologies, such as "selective non-catalytic reduction (SNCR) + semi-dry washing + dry washing + activated carbon injection + bag filter + steam gas heater + selective catalytic reduction (SCR) + wet scrubbing + flue gas - flue gas heater"

combination effectively removes NOx, acidic substances, dust, dioxins and heavy metals, and the emission value is much lower than that of European industries Limit values stipulated in the emission directive 2010/75/EU.

2. Environmental and social benefits: The project's design compares the waste treatment process to the process of bees making honey, and its innovative concept attracted many visitors. In addition to generating electricity, the bottom ash is recycled as brick aggregate, the fly ash is stabilized by chelating agents before being landfilled, and the leachate is reused after on-site treatment without being discharged to surrounding water bodies, embodying the concepts of environmental protection and resource recovery.

3. Public participation and education: The project encountered great difficulties during the implementation process, especially in preliminary preparations such as site selection, resident relocation, environmental assessment, and construction of peripheral support facilities. However, thanks to the strong support of the local government and effective public education and publicity, the project was successfully implemented and construction took only 18 months.

Lessons for Kazakhstan

Kazakhstan can draw the following lessons from Ningbo's experience when considering implementing WtE projects:

1. Technology selection and adaptability: Selection of incineration and flue gas treatment technologies suitable for local waste characteristics is key to the successful implementation of WtE projects. In addition, technological innovation and continuous optimization are equally important to improve energy recovery efficiency and reduce environmental impact.

2. Government role and public participation: The government plays a vital role in providing policy support, promoting public-private cooperation, and public education and participation. Public education and transparent information disclosure can help increase social acceptance and public support for projects.

3. Environmental protection and resource recovery: WtE projects should not only focus on energy recovery, but also pay attention to environmental protection and comprehensive utilization of waste, and achieve waste reduction, resource utilization and harmlessness through scientific management and technical means.

2.4 Opportunities for Kazakhstan

Embracing WtE can significantly contribute to Kazakhstan's energy security and environmental sustainability, aligning with global sustainability trends[9]. Adopting WtE solutions presents Kazakhstan with a unique opportunity to enhance its energy security, mitigate environmental impacts, and align with global sustainability goals. The strategic implementation of WtE can catalyze the transition to a circular economy, reducing reliance on landfills while generating renewable energy. Furthermore, WtE projects can stimulate local economies, create jobs, and position Kazakhstan as a leader in sustainable waste management in Central Asia.

Recommendations

To capitalize on the opportunities WtE presents, Kazakhstan must address the challenges head-on. Recommendations include:

- Enhancing regulatory frameworks to support WtE development, including incentives for investment and clear guidelines for project implementation.

- Encouraging private sector participation through favorable policies and financial models that mitigate investment risks.

- Investing in technology adaptation and transfer, ensuring that WtE solutions are compatible with Kazakhstan's waste composition and energy infrastructure.

- Launching public awareness campaigns to build societal support for WtE projects, emphasizing the environmental and economic benefits.

To advance WtE development, Kazakhstan needs to refine its policy environment, encourage private investment through risk mitigation strategies, and engage the public through awareness campaigns[10].

3 Methodology

To assess the feasibility and potential economic benefits of Waste-to-Energy (WtE) projects in Kazakhstan, drawing from the foreign experience of the Ningbo WtE project, a comprehensive methodology was adopted. This approach involved a multi-step process, including literature review, case study analysis, and comparative assessment.

Literature Review:

A systematic review of existing research, reports, and case studies related to WtE projects worldwide, with a particular focus on the Ningbo WtE project in China. This review aimed to identify best practices, technological innovations, and key success factors for WtE implementation.

Case Study Analysis:

The Ningbo WtE project was selected as a primary case study. Detailed information regarding the project's design, technology, investment, operation, and environmental performance was collected. This data served as a basis for understanding the project's contribution to waste management and energy production, as well as its social and environmental impacts.

Comparative Assessment:

The insights from the Ningbo WtE project were then compared to the current waste management practices and energy needs in Kazakhstan. This step involved analyzing the composition of waste in Kazakhstan, evaluating the country's regulatory and policy framework for WtE projects, and identifying potential barriers and opportunities for implementing such projects.

4 Result and Discussion

The analysis of the Ningbo WtE project and the assessment of Kazakhstan's context revealed several key findings:

Technological Feasibility:

The technology used in the Ningbo WtE project, including advanced incineration and flue gas treatment systems, is suitable for application in Kazakhstan, considering the country's waste composition and energy requirements. However, adaptations may be necessary to address specific local waste characteristics and environmental standards.

Economic Viability:

The Ningbo WtE project's investment and operation model, particularly its public-private partnership (PPP) approach, offers valuable lessons for Kazakhstan. The project demonstrates that with appropriate financial structuring and government support, WtE projects can achieve economic viability and provide a sustainable solution for waste management and energy production.

Environmental and Social Impacts:

The environmental performance of the Ningbo WtE project, with emissions much lower than the limits stipulated in the European Industrial Emission Directive 2010/75/EU, indicates that WtE projects can be designed to have minimal environmental impact. Public education and community engagement were key to the project's social acceptance, highlighting the importance of these aspects in implementing WtE projects in Kazakhstan.

Policy and Regulatory Framework:

The success of the Ningbo WtE project was facilitated by a supportive policy and regulatory environment. For Kazakhstan, establishing a clear and favorable regulatory framework for WtE projects, including incentives for renewable energy production and waste reduction, will be crucial for attracting investment and ensuring project success.

5 Conclusion

WtE technologies offer a viable pathway for Kazakhstan to address its waste management challenges while contributing to its energy and environmental goals. Learning from global experiences and adapting best practices to the Kazakhstani context is crucial for the successful implementation of WtE projects. With strategic focus and commitment, Kazakhstan can transform its waste into a valuable resource for the benefit of the environment and its people.

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«Қазақ университеті» баспаханасы