«ЖАҺАНДЫҚ ӨЗГЕРІСТЕР ЖАҒДАЙЫНДАҒЫ ТҰРАҚТЫ ЭКОНОМИКАЛЫҚ ДАМУ ПАРАДИГМАСЫ: СЫН-ҚАТЕРЛЕР, САЛДАР, МҮМКІНДІКТЕР»

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“THE PARADIGM OF SUSTAINABLE ECONOMIC DEVELOPMENT IN THE CONTEXT OF GLOBAL CHANGE: CHALLENGES, CONSEQUENCES, OPPORTUNITIES”

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ӘЛ-ФАРАБИ АТЫНДАҒЫ ҚАЗАҚ ҰЛТТЫҚ УНИВЕРСИТЕТІ

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КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ УНИВЕРСИТЕТ
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MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE
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Absorptive capacity of Kazakhstani enterprises

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Abstract

Today there are no high-tech corporations in Kazakhstan, and small innovative business is not developed. The Kazakhstani economy has low susceptibility to innovation. One of the reasons for the low susceptibility of the Kazakhstani economy to innovation can be the low absorptive capacity of national enterprises. The aim of this research was to analyze the Kazakhstani enterprises' absorptive capacity. The conceptual framework of this research is measuring firm's absorptive capacity by their economic activity in technological innovations, especially by analysis of transfer of technologies. Statistical analysis was the main research method used. The information base was the statistical data of the Bureau of national statistics of the Agency for strategic planning and reforms of the Republic of Kazakhstan from 2015 and 2020. The research identified a low level of absorptive capacity in Kazakhstani enterprises and the need to form and develop a national system of absorptive capacity in Kazakhstan. To improve the absorptive capacity of Kazakhstani enterprises it is necessary to develop their ability to acquire, assimilate, transform and exploit knowledge, including foreign technologies. Research findings may serve as the theoretical and methodological basis for the implementation of effective policy to create a diversified, technological economy and national system of absorptive capacity management strategy.

Keywords: Technological entrepreneurship, National absorptive capacity system, Technological innovations, Technology transfer, Research and development.

JEL codes: M10, O32, O38.

1 Introduction

Kazakhstan's strategic course towards joining the top 30 most developed countries of the world is impossible without a knowledge-based economic base, non-resource production and export, and new high-tech sectors of the economy. In the Message of the First President of the Republic of Kazakhstan N.A. Nazarbayev noted that work in this direction should be based on the support of research and innovation, the commercialization of scientific developments, and foreign investments for the transfer of

knowledge and new technologies to the republic (Nazarbayev, 2014). This topic is still relevant today. Head of State K.-Zh. Tokayev noted in his Message that «the creation of a diversified, technological economy is not just a necessity, this path has no alternative» (Tokayev, 2020).

For the transition to new technologies, the country has two ways: independent development and borrowing of available in other countries. However, today there are no high-tech corporations in Kazakhstan, and small innovative business is not developed. The Kazakhstani economy has low susceptibility to innovation (Kireyeva et al., 2021).

One of the reasons for the low susceptibility of the Kazakhstani economy to innovation can be the low absorptive capacity of national enterprises. So, an objective study of the national firm's absorptive capacity will reveal the existing strengths and bottlenecks, develop effective mechanisms for increasing the absorptive capacity, which will contribute to the increase in the complexity and manufacturability of the Kazakhstani economy, and, as a result, the creation of a diversified and technological economy. So that is why the goal of this research is an analysis of Kazakhstani enterprises' absorptive capacity.

2 Literature review

According to the theory of resources and possibilities, absorptive capacity is a distinctive resource and an opportunity for firms, a source of competitive advantage. It is also part of dynamic opportunity theory, which studies the learning process that leads to the creation of new organizational capabilities (Berger, 1982; Hurtado-Ayala & Gonzalez-Campo, 2015).

In 1990, the concept of absorptive capacity was developed, where it served as a characteristic of the company - the ability «to identify the value of new external information, its assimilation and commercial use» (Cohen & Levinthal, 1980). In the 2000s, there was a reconceptualization of its provisions, according to which the absorptive capacity is «a set of organizational procedures and processes by which a company acquires, assimilates, transforms and uses knowledge to create dynamic organizational capabilities» (Zahra & George, 2002; Samovoleva, 2018a; Samovoleva, 2018b; Suleimenov & Alibekova, 2018; Paliokaitė, 2019).

In recent years, began to highlight the country's absorptive capacity or national absorptive capacity (Narula, 2004; Chandra & Clarke, 2010), which is often considered according to the concept of national technological capabilities. Initially, it meant «the ability to study and implement technologies and related practices of already developed countries» (Perkins & Koo, 1995; Crespo-Cuaresma et al., 2004). Now the absorptive capacity is being studied using the example of developing countries (Khordagui & Saleh, 2013; Omoregie, 2015), as well as its relationship with technological and

innovative development (Polterovich, 2009; Dnishev & Satpayeva, 2017; Samovoleva, 2019; Alzhanova et al., 2020). In this vein, the increase of absorptive capacity level leads to the development of technological innovations (Del Carpio Gallegos & Miralles Torner, 2018). Investments in the formation and development of absorptive capacity contribute to the increase of innovation and productivity (Mowery & Oxley, 1995; Sousa et al., 2021).

It should be noted that today there is no generally accepted definition of an absorptive capacity as an economic indicator. This is due to the difficulties in measuring it, as well as the complexity of the concept of knowledge and the assessment of tacit knowledge. It can be determined by the level of technological separation of foreign firms from national ones: the larger is the gap, the lower is the absorptive capacity (Kadochnikov et al., 2011). It also can be measured by economic activity of the subjects starting from small firms to large businesses in technological innovations, i.e. the share of enterprises providing development and implementation of technological innovation (percentage ratio of the total number) (Isaenko, 2012).

According to the literature review, it should be concluded that the above studies indicate the presence of scientific interest in the study of absorptive capacity, which contributed to the creation of a certain theoretical and practical basis. Hence, the concept of absorptive capacity is the part of the theory of dynamic opportunities. The concept is developing dynamically and currently its theoretical framework is not completely formed. To this date, there is no clear definition of the absorptive capacity and acknowledged methodology for its analysis. Upon that, the issues of assessing the absorptive capacity are insufficiently studied in Kazakhstan. Therefore, there are practically no studies with statistical measurement of Kazakhstani enterprises' absorptive capacity, algorithms and methods for its analysis.

3 Methodology

There are two research questions:

1. What is the state (the level of development) of Kazakhstani enterprises' absorptive capacity?
2. What mechanisms are required for Kazakhstan's enterprises to increase their absorptive capacity and the technological development of the country as a whole?

The hypothesis of the research is as follows: the level of Kazakhstani enterprises' absorptive capacity is low, which requires the development of new and improvement of existing mechanisms for its development.

The research was conducted in a cabinet way. It used descriptive research methods. The concept principal provisions of absorptive capacity

were the theoretical and methodological basis of the research. The conceptual framework of this research is measuring firm's absorptive capacity by their economic activity in technological innovations, especially by analysis of transfer of technologies on the example of Kazakhstani enterprises. There is the structured approach was the main using the following methods: systematization, generalization, comparison, analysis, synthesis, economic and statistical analysis. The following research forms were used for data visualization: bibliographic, graphic, and groupings.

Within the framework of the research, secondary data on technological entrepreneurship development were used, the source of which was the statistics of the Bureau of national statistics of the Agency for strategic planning and reforms of the Republic of Kazakhstan for 2015 and 2020. The data were processed using Microsoft Excel.

4 Results and Discussion

At present, the innovation business in Kazakhstan is not developing, there is a lack of high-tech corporations. The innovative activity of Kazakhstan's enterprises is at a low level. In 2020, innovative activity in the field of technology amounted to 8.6%, which increased by 2 percentage points compared to 2015, including in terms of the size of enterprises (Fig. 1).

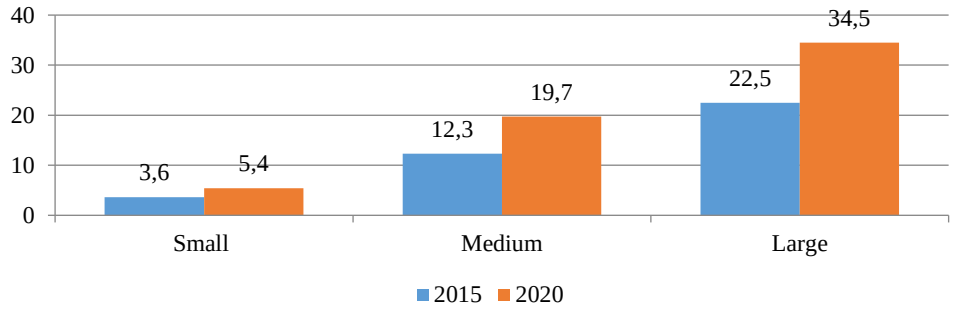

Fig. 1. Technological activity of Kazakhstani enterprises, %, 2015-2020

So, the innovative activity of large enterprises (34.5%) is higher than that of medium-sized (19.7%) and small (5.4%) enterprises. It should be emphasized that the number of enterprises, which have created new technologies is fewer than enterprises, which have used them. During the period, 2015-2020 there is observed a reduction in the number of both categories of enterprises. However, it must be considered, that for the studied period the number of used new solutions and equipment has increased two times, while the number of created ones decreased by 16,5% (Fig. 2).

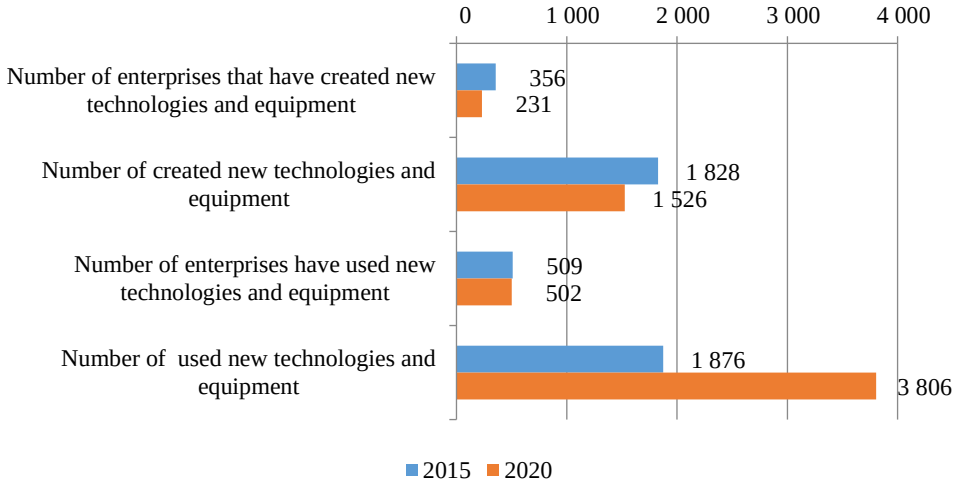

Fig. 2. Information about the created and used new technologies and objects of equipment, units, 2015-2020

This suggests that the low level of absorptive capacity of Kazakhstani enterprises and its growth over the studied period, however, is at a slow pace. Kazakhstani enterprises mostly introduce new or improved goods and services, however, the number of the latter enterprises decreased from 2015 to 2020. During this period, there was an increase in the number of enterprises using improved goods and services (Fig. 3).

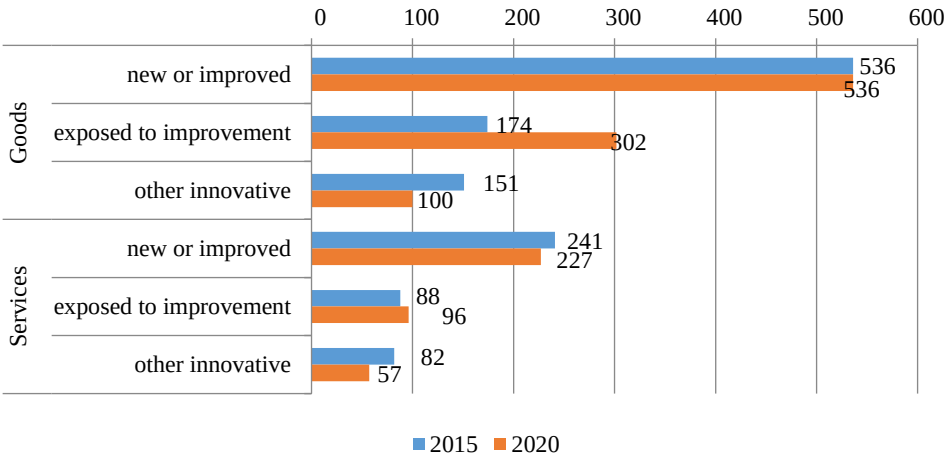

Fig.3. Number of Kazakhstani enterprises that introduced innovative goods and services, units, 2015-2020

The introduction of innovative goods and services was mainly carried out by the enterprise itself against the background of a decrease in the number

of enterprises that improved goods created by other enterprises. The situation with services is the opposite (Fig. 4).

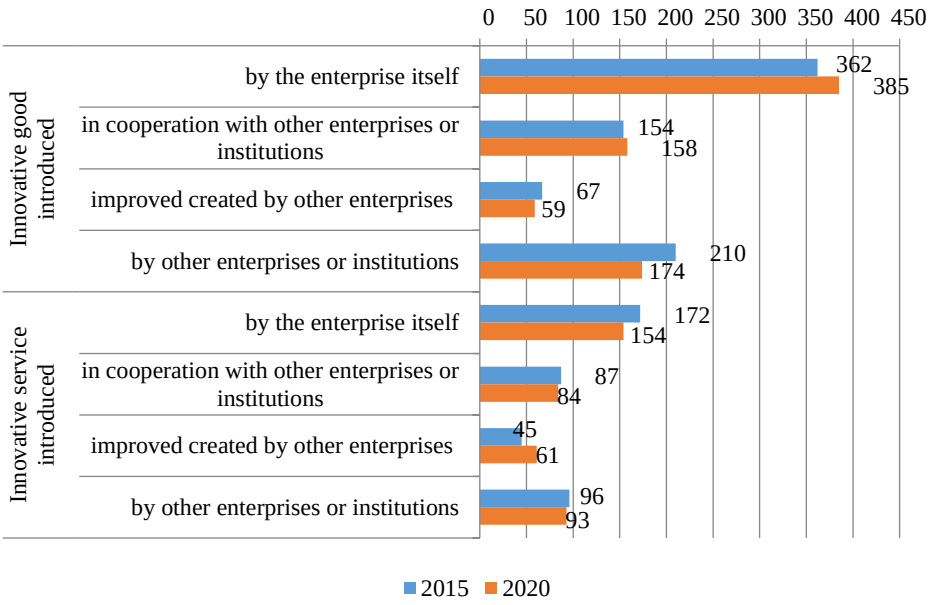

Fig. 4. Sources of introduced innovative goods and services at Kazakhstani enterprises, units, 2015-2020

The presence of knowledge transmission channels is among essential components of absorptive capacity since when the necessary knowledge and technologies are found, there is a possibility of failure to obtain them from the external environment. The absence of established knowledge transmission channels and technologies can become a barrier to the technological and innovative development of an enterprise.

So, in Kazakhstani technological enterprises the primary sources of information for new projects are internal sources and suppliers, clients and consumers, conferences, fairs, exhibitions as well. Universities, public or private research institutes, and professional and industry associations are little used as sources of information. It must be noted that during the studied period, the appeal to all sources of information increased (Fig. 5).

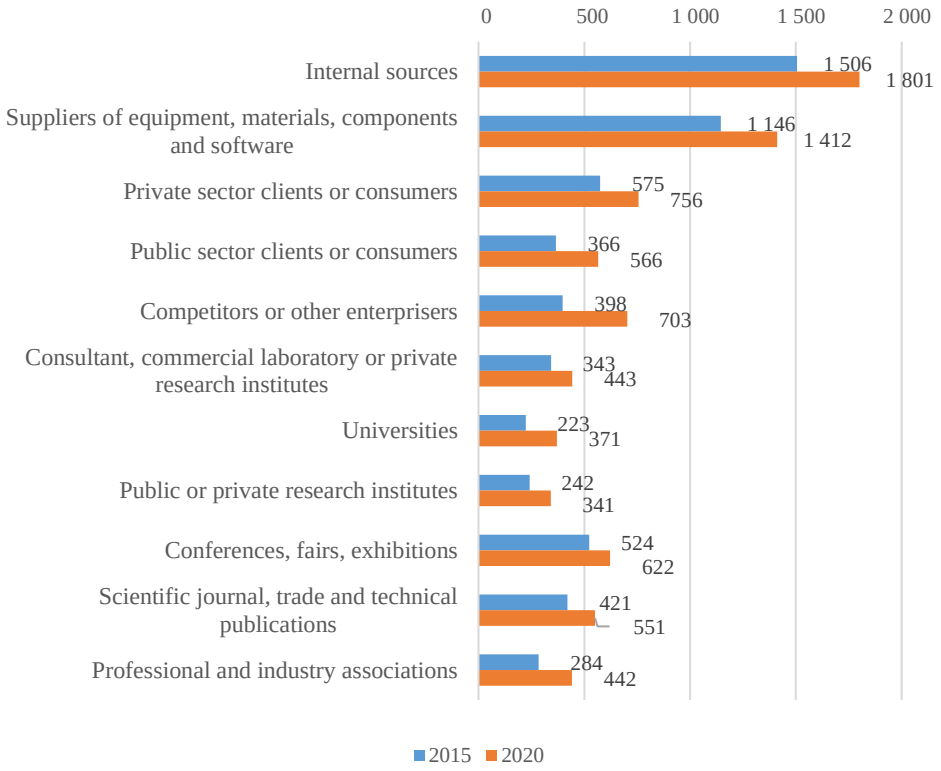

Fig. 5. Distribution of the importance of sources that provided information for new projects, %, 2020

The transfer of foreign technologies by Kazakhstani enterprises is conducted in its simplest forms and in fact comes down to the supply of machinery and equipment. It is obtaining modern machines, equipment, software, and other capital items that most of the innovation-active firms of the republic are engaged in (Fig. 6).

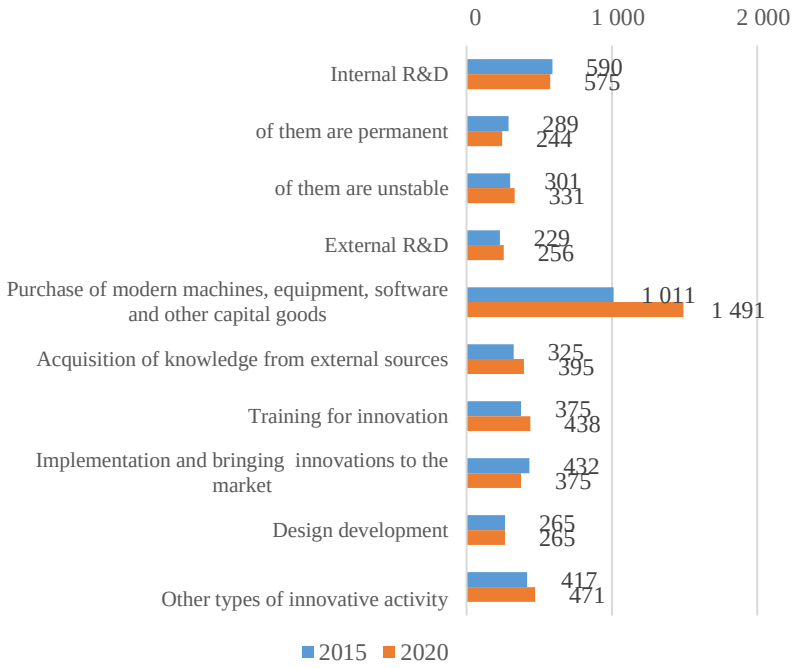

Fig. 6. Number of Kazakhstani enterprises that carried out activities to create technological innovations, units, 2015-2020

The number of Kazakhstani enterprises that created technological innovations based on internal R&D decreased by 2.5%. It should be noted that over this period their number engaged in R&D permanently decreased by 15.6%, on a non-permanent basis - vice versa, increased by 10%. The number of enterprises which activities are aimed at obtaining knowledge has increased.

Acquisition of modern machines, equipment, software, and other capital items is the main cost of technological innovation. In 2020, they comprised 495,057 million tenges (an increase of 48.5%). Their share in the cost structure was 50.9% in 2015 and 63.7% in 2020. External costs for R&D doubled and made up 20,679.5 million tenges in 2020. While internal costs for R&D increased only by 9.7% and amounted to 44,534 million tenges. The cost of acquiring knowledge from external sources increased 2.5 times and amounted to 2,780 million tenges, while the cost of design, marketing research, training, and other related activities decreased fourfold and amounted to 10,035.1 million tenges. It is important to stress that the disadvantage of financial means and high expenditures for technological innovation are the primary reasons for enterprises' low technological activity, along with the lack of demand for innovations and their need due to earlier innovations.

Thuswise, the analysis of Kazakhstani enterprises' technological activity, in particular in technological innovation showed low absorptive capacity and its slow growth. One of the main reasons for absorptive capacity low level can be the focus of Kazakhstani enterprises on the purchase of equipment, rather than on the results of R&D and the acquisition of knowledge, as well as the low level of collaboration between firms and with universities and research organizations of the country.

To increase the absorptive capacity of enterprises following mechanisms and measures can be used (Polterovich, 2016): training and internships, including abroad; mastering of new methods of organizing production; purchasing of licenses and patents, including abroad; encouragement and stimulation of research to identify promising areas and effective borrowing mechanisms; prevention of "brain drain"; invitation of foreign teachers and researchers as consultants in production; conducting joint research with domestic and foreign scientists; development of the practice of joint ventures organizing with foreign capital; stimulating outsourcing; stimulating the development of research departments and design bureaus at enterprises, etc. Considering that technological enterprises constitute a part of innovative ventures, a national innovation system and a national absorptive capacity system should be developed, especially the gap between matching elements must be cut to a minimum by means of development of specialized infrastructure that contributes to the development of the ability of Kazakhstani companies to adapt, develop, use and imitate new knowledge and technologies.

5 Conclusion

The aim of this research was achieved: the level of development of Kazakhstani enterprises' absorptive capacity was analyzed. The results show that enterprises of Kazakhstan have a low level of absorptive capacity and it is growing slowly. So, it requires the development of new and improvement of existing mechanisms.

Kazakhstani enterprises adhere to the strategy of technological inertia. Transitioning to the strategies of creation on new technological niches and technological breakthrough requires increasing their absorptive capacity. To improve the absorptive capacity of Kazakhstani enterprises it is necessary to develop their ability to acquire, assimilate, transform and exploit knowledge, including foreign technologies. Technological absorptive can become an effective tactic instead of the creation of new technologies which is associated with huge financial and time costs. The priority direction in this area is the formation and development of an interactive growth management system with a focus on the development of technology transfer mechanisms in combination with other borrowing policy measures. The obtained results are

useful in formulating effective policy to create a diversified, technological economy and national system of absorptive capacity management strategy.

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A workload measurement framework for determining staffing needs

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Abstract

Determining workforce demand is an integral part of the workforce planning process - determining workforce size, composition, organization, and deployment. It analyzes the current and forecasts the future levels of workload required to fulfill the organization's mission and the factors that influence the workload. But the lack of reliable sources of actual task durations is the most significant difficulty in determining the workload. This paper proposes a workload measurement framework. Its purpose is to measure the workloads of tasks managerial, professional, and technical employees perform at the workplace.

Our approach suggests a detailed description of work processes and an elementwise time study using a specially designed web application.

The proposed workload measurement framework was successfully implemented in the study to determine staffing needs for local government employees. More than 1800 state employees responded to the time study. The proposed workload measurement framework provided quality data for workload analytics.

The proposed workload measurement framework has two benefits. Firstly, it provides the workload model developers with the actual task duration data, thus making the workload models more accurate and less dependent on subjective inputs. Secondly, it decreases the labor-intensity of the data collection and analysis processes, thus reducing the workload model development lead times.

Keywords: Determining staffing needs, Tasks, Workload, Time study
JEL Codes: J01, J23, J22

1 Introduction

Determining workforce demand is an integral part of the workforce planning process - determining workforce size, composition, organization, and deployment. It analyzes the current and forecasts the future levels of workload required to fulfill the organization's mission and the factors that influence the workload (Vernez et al., 2007). A workload model is defined as a result of this analysis. Organizations can use workload models to predict potential gaps between the available human resources and the human resources required to fulfill their mission. Accurate and reliable workload

models are essential for successful workforce planning (Emmerichs et al., 2004).

Approaches used for workforce supply and demand planning are subdivided into qualitative and quantitative according to the methods of obtaining and analyzing data. According to the technical rationale, these approaches are subdivided into those that involve a detailed study of work processes (Bottom-up approach) and those based on mathematical modeling. In practice, approaches to determining staffing needs are frequently combined. Their choice depends on the available historical and statistical data and the time that subject-matter experts (SME) can devote to researchers (Nataraj et al., 2014; Schulker et al., 2020).

Compared to approaches based solely on mathematical modeling, the Bottom-up approach is more objective in determining staffing needs and has rationalization potential. The Bottom-up approach is more intuitive than those based on mathematical modeling as it increases the transparency of work processes for decision-makers. A detailed study of work processes can reveal their imperfections and initiate a search for more efficient work methods. This approach can help detect unproductive use of work time and the underperformance in crucial areas of work caused by understaffing or misallocation of duties, negatively affecting overall productivity (Birkinshaw and Cohen, 2013; Schulker et al., 2020).

However, the bottom-up approach also has significant drawbacks. The bottom-up approach is much more labor-intensive and complex than those based on analyzing historical and statistical data. Another disadvantage is that determining staffing needs for managerial, professional, and technical employees relies heavily on subjective inputs that are difficult to verify. As a result, this may adversely affect the quality of the staffing model.

This paper proposes a workload measurement framework. Its purpose is to measure the workloads of tasks managerial, professional, and technical employees perform at the workplace. It suggests a detailed description of work processes and an elementwise time study using a specially designed web application.

The proposed workload measurement framework has two benefits. Firstly, it provides the workload model developers with the actual task duration data, thus making the workload models more accurate and less dependent on subjective inputs. Secondly, it decreases the labor-intensity of the data collection and analysis processes, thus reducing the workload model development lead times.

2 Literature review

In the scientific literature, various techniques are used for workforce planning. Researchers in the field used different approaches to classify these

techniques. For example, Bryant, Maggard, and Taylor (1973) subdivided workforce planning techniques into four categories: Judgemental techniques, Matrix models, Quantitative techniques, and Computer simulation. Safarishahrbijari (2018) subdivided workforce planning techniques into seven categories: Qualitative, Time series analysis, Optimization models, Generic mathematical models, Statistics and regression, Analytical stock and flow models, and Simulation modeling. Borba et al. (2019) subdivided quantitative workforce planning techniques into Mathematical programming and Computational intelligence.

2.1 Quantitative techniques

Under quantitative techniques, the literature mainly describes the application of operations research methods which can be divided into three broad categories: Optimization, Simulation, and Statistics and Probability.

Optimization approaches involve finding solutions by minimizing inputs or maximizing outputs under existing limiting factors. Optimization also suggests comparing potential options and choosing the most acceptable. Traditionally, Linear programming, Objective 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 modeling, 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 choose mathematical methods for business problems that would have an explicit analytical solution. In such cases, Simulation modeling can be used. Simulation modeling utilizes computers to replicate the behavior of real business systems in a simplified form. Simulation modeling imitates essential elements of business systems and the logic of interaction between these elements. System dynamics is the most frequently used technique in workforce supply planning (Safarishahrbijari, 2018). In System dynamics, business processes are modeled using three types of elements (stocks, flows, and information) that can interact with each other using feedback loops and allow time delays between inputs and outputs (Wang, 2007).

The third major category of Operations research techniques used in workforce planning is Statistics and probability. This category of techniques involves the application of mathematical methods to data to identify patterns, forecast, and test hypotheses. Time series analysis falls into this category. The main idea of time series analysis is to extrapolate past trends into the future, considering the main trends, cyclicality, seasonality, and other recurring and continuous patterns. A subgroup of Time series analysis includes Box-Jenkins, exponential smoothing, vector error correction, and Markov

modeling (Wong, Albert, and Chiang, 2005; Hsu, Chen, and Hsien, 2012; Wong, Albert, and Chiang, 2007; Belhaj and Tkiouat, 2013).

Regression is another technique used in workforce planning. Regression approximates an analytical relationship between the dependent variable and the independent variables. In workforce demand planning, the dependent variable is the number of workers demanded, and the independent variables can be various workload drivers. Performance indicators of a particular enterprise, industry, or microeconomic indicators can be used as workload drivers (Meehan and Ahmed, 1990; U.S. Department of health and Human Services, 2008).

2.2 Other quantitative techniques

In workforce planning, less sophisticated quantitative methods can also be used. For example, Nataraj et al. 2014, in addition to the aforementioned quantitative approaches, describe the use of Benchmark analysis, Input-output modeling, and Ratio analysis techniques.

2.3 Qualitative techniques

Qualitative techniques for workforce planning suggest the use of expert judgment. Individual judgments of managers and experts are collected and analyzed in this approach. Qualitative techniques include the Direct managerial survey (Ward, 1996), the Delphi method (Dakley and Helmer-Hirschberg, 1962), the Nominal group technique (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 a consensus. Unlike the Delphi Method, in which experts give their assessments independently, the Nominal group technique involves live communication and exchange of opinions between experts. Scenario analysis is a strategic management technique in which the decision-makers generate several discrete future states of the business, each contingent on assumptions about the future organization’s internal and external environment.

2.4 Combining qualitative and quantitative techniques

In practice, the approaches used for workforce planning often combine quantitative and qualitative techniques. This is because there is frequently a lack of reliable and systematic data to get by with only quantitative techniques. Utilizing qualitative techniques alone may adversely affect the validity of the workforce model since expert judgments may have bias. On the other hand, collecting and analyzing reliable expert assessments can be very costly. We will briefly describe two approaches combining quantitative and qualitative techniques: the Top-down and Bottom-up approaches.

The Top-down approach uses regression analysis to approximate the analytical relationship between the number of workers required on the workload drivers. But the workload drivers may not accurately determine the number of workers, as they may contain elements with different workloads.

To improve the model's accuracy, workload drivers can be subdivided into different workload categories using expert assessments.

The Bottom-up approach involves a detailed description of work processes, identifying the workload of each element, and determining the required number of workers based on the overall workload.

2.5 Essential elements of the Bottom-up approach

The latest published study on determining staffing needs using a bottom-up approach is Schulker et al. (2020). In the study to determine staffing needs for administrative, professional, and technical workers in the U.S. Secret Service, the authors have described the most important aspects of applying the bottom-up approach. And we would like to describe the main methodological techniques of the bottom-up approach using this example.

Description of work processes. A detailed description of work processes is the basis of the bottom-up approach in developing a staffing model. Schulker et al. (2020) refer to the well-documented processes as process maps. Process maps are formed by studying work processes and interacting with the process owners. It is crucial to document all processes and their most essential elements.

The level of granularity in the description of work processes. Work processes should be documented with a sufficient level of detail in such a way as to reflect the main features that are important for building an adequate model. Researchers should avoid overly detailed descriptions of work processes due to the following considerations. A high level of detail requires more time for subject-matter experts to assess the task durations and frequencies. Work processes without excessive detail are better perceived and more convenient to apply and update. Elements of some generalized work processes can be used in the construction of other work processes. On the other hand, overly generalized work processes are difficult to assess regarding their workload. Depending on the situation or complexity, the frequency and duration of executing these elements may vary.

An assessment of the frequency and duration of execution of work process elements. The average workload of a job element can be determined as the product of the mean frequency and the mean duration of its execution. The total workload of the work process is determined by identifying the workload of each element. This is perhaps the most crucial and complex process of the bottom-up approach since the quality of a staffing model depends on how accurately the assessment of the workload is done.

Highly variable task durations. When analyzing a work process, the duration of some of its tasks can be challenging to predict because of the large spread in the values. Schulker et al. (2020) suggest the following solutions in such situations: (i) despite the large spread in the values, use the mean value based on the expert opinions; (ii) introduce complexity categories into the

staffing model; (iii) refine the staffing model with objective, measurable, realistic, and articulated performance standards (quality, timeliness, or cost-effectiveness).

3 Methodology

Our workload measurement framework involves a detailed description of work processes and time study using a web application that resembles a timesheet. Employees keep track of work time by selecting tasks and fixing the start and end times of their execution in chronological order. Employees pick out the tasks they perform at work from a predetermined list. This approach enables the subsequent analysis and generalization of data from the time study. Before conducting the time study, we prepared comprehensive lists of tasks based on job descriptions and interviews with the work process owners.

3.1 Developing exhaustive lists of job tasks for the time study

We prepared a separate comprehensive list of tasks for each functional unit - a group of interchangeable employees performing homogeneous tasks. In other words, a functional unit is a structural unit of an organization. We developed exhaustive lists using job descriptions. And we used relevant instructive documents for the groups of professionals whose work processes were regulated by law.

We structured and ordered exhaustive lists in such a way that the respondents could easily comprehend them. To achieve this goal, we adhered to the following presentation principles: (i) eliminating task duplicates; (ii) breaking down large tasks into more specific ones; (iii) presenting tasks in semantic sequence (e.g., by technology, by chronology, from most important to least important); and (iv) grouping tasks according to their meanings. Thus, an exhaustive list of tasks should resemble a process map.

Since job descriptions do not always cover the entire range of responsibilities, we refined the lists of tasks together with managers and subject-matter experts in interviews.

3.2 Time-study web-application

A time study web application helps get objective data on actual task durations. It significantly improves the quality of data and the coverage of respondents.

Our web application can be used on mobile devices. The application has an intuitive interface. In addition to filling out timesheets, we provided respondents with additional functionality that allowed them to analyze their data, control subordinates, set assignments, etc. These features minimize distractions for employees during the data collection process.

The web application allows the researchers responsible for conducting the time study to administer the data collection process. This includes: (i)

creating accounts, (ii) uploading and updating the comprehensive lists of tasks, and (iii) assisting respondents with any questions that arise. The application provides the researchers with the feature to monitor the data collection progress and access various data slices.

The application was designed to account for non-productive time (rest breaks, meetings, workplace preparation, etc.).

3.3 Initiating the time studies

Before conducting the time study, we determined a name list of respondents. Next, we created accounts (login and password) for each respondent. The manager had access to the data of his subordinates for monitoring and setting assignments. Respondents were grouped into functional units. Each unit consisted of a manager and subordinated employees with a single comprehensive list of tasks. All employees of the unit who were present at the time of the study participated in the study. We strictly observed this condition for the study data to be unbiased.

We began the time studies with a briefing for respondents to inform them about the goals, objectives, and timing. During these briefings, we trained them on how to use the application. We reserved some time at the end of the briefings to answer questions from respondents. In total, the briefings lasted no more than 45 minutes.

Immediately after the study launched, we had to answer numerous requests from respondents on various issues of using the application and other technical nuances. Usually, on the second day, the number of requests decreased noticeably, and on the third day, respondents used the application confidently. At the start of the study, we were at the client's office to assist respondents. As a rule, the most frequent difficulties faced by respondents were account access problems and updating the lists of tasks.

3.4 Time study duration

We conducted time studies for two weeks (10 subsequent workdays).

3.5 Description of the sample

We conducted time studies among the employees of Kazakhstani local governments. The studies involved 1,804 local government employees. We selected three regions for the study: Almaty City (247 respondents), the Karaganda region (835 respondents), and the North Kazakhstan region (722 respondents). The time study among the employees of local governments was carried out from late 2018 to early 2019.

4 Results

This section describes the generic uses of time study data.

4.1 Workload structure analysis

Workload structure analysis is the primary way to study the task contents of managerial, professional, and technical employees. It shows the

distribution of the overall workload by tasks as a percentage. This analysis is suitable for the team and for the individual employees. Based on this analysis, management decides to revise (optimize) business processes in such a way as to maximize labor productivity or to reallocate the duties according to the qualifications, abilities, and individual qualities of employees (Birkinshaw and Cohen, 2013). By classifying tasks, we can generalize the workload structures of employees performing heterogeneous functions. An example of such an analysis is the study of routine task contents (Table 1).

Table 1: Workload structures of managerial, professional, and technical employees by ISCO-08 occupation group

Task category	**Task subcategory**	**Managers**	**Professionals**	**Technicians and Associate Professionals**	**Clerical Support Workers**	**Total**
Non-routine	Organizing	12.4%	9.4%	6.6%	4.1%	9.2%
interactive	Coordinating	2.6%	2.7%	1.3%	0.4%	2.3%
	Communicating	9.1%	8.0%	14.9%	9.3%	9.0%
	Controlling and evaluating	10.4%	10.8%	7.2%	9.6%	10.2%
Non-routine	Creating	11.2%	8.9%	5.3%	3.9%	8.5%
analytic	Analyzing	36.9%	37.2%	24.9%	19.6%	34.0%
Routine cognitive	Routine cognitive	17.4%	23.0%	39.8%	53.1%	26.8%
Total		**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

4.2 Uneven distribution of the overall workload across tasks

We summed up the workload per task and arranged them in descending order of their aggregated workload. A fifth of all tasks (20%) generates the lion's share of the total workload (78%). Figure 1 shows the workload distribution across all tasks. Each column represents one-tenth of the total number of tasks arranged in the descending workload order.

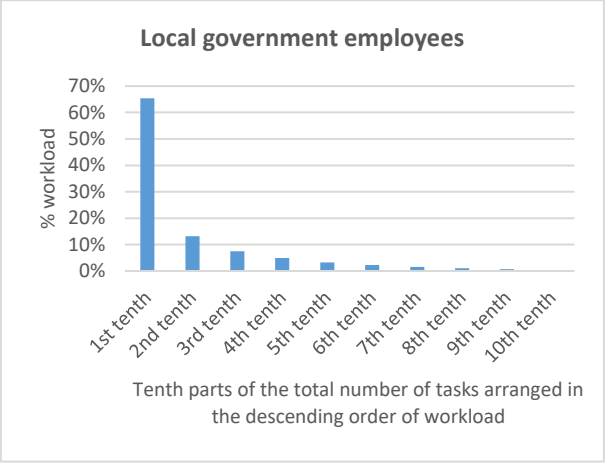

Figure 1. Workload distribution across all tasks. Each column represents one-tenth of the total number of tasks arranged in the descending workload order

4.3 Task execution frequency

There is a direct relationship between task execution frequency and workload. The higher the execution frequency, the higher the workload. So, measuring task execution frequency is essential for evaluating workload. We measure it in the number of days the task was performed. Since the study period is two weeks (10 working days), the maximum frequency is ten days, and the minimum is one day. The general trend is that about 60% of all tasks performed during the 2-week study were executed only 1–2 times (Figure 2). Figure 3 shows a direct relationship between the task workload and execution frequency.

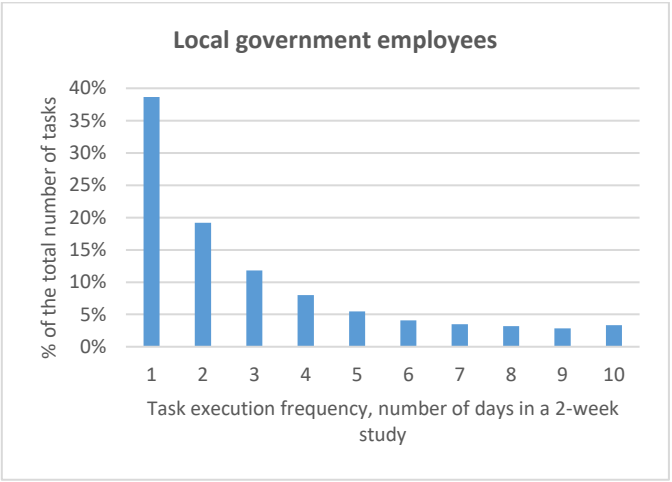

Figure 2. Distribution of the number of tasks executed during the 2-week study by execution frequency

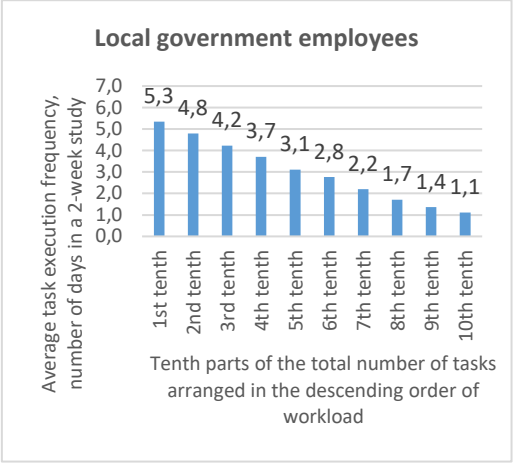

Figure 3. Relationship between the task workload and execution frequency

4.4 Number of employees executing a task

The number of task performers is another indicator that characterizes workload. Since we create an exhaustive list of tasks for a group of employees, the same task can have several performers. The more employees perform it, the higher the workload. The time study web application provides developers with the data to calculate the number of task performers for each task.

5 Discussion

5.1 Theoretical contribution

Prior research on developing staffing models stated that the lack of reliable sources of actual task durations is the most significant difficulty in determining the workload (National Research Council, 2006, 2013, 2020; Nataraj et al., 2014). Therefore, when determining staffing needs for managerial, professional, and technical employees, researchers rely on subjective estimates that are difficult to verify (Schulker et al., 2020).

Because mental labor is hidden from external observation studying the duration of tasks by managerial, professional, and technical employees is a challenge. Considering this feature of mental work, direct observations to estimate the task durations by employees can be severely limited. At the same time, using expert estimates may lead to a significant deviation from the actual task duration (Teter, 2014; Roy et al., 2013; Roy and Christenfeld, 2008, 2007; Goswami and Urminsky, 2014).

We proposed an approach to studying the duration of the task execution based on a detailed study of work processes and conducting time studies using a web application. Our workload measurement framework provides the workload model developers with the actual task duration data, thus making the workload models more accurate and less dependent on subjective inputs.

5.2 Managerial contribution

Developing staffing models is a labor-intensive and painstaking process requiring effort, finances, and time from the researchers and the studied enterprises. Our workload measurement framework decreases the labor-intensity of the data collection and analysis processes, thus reducing the workload model development lead times.

Our approach contributes to increasing the transparency of work processes. The proposed workload measurement framework can help managers to revise (optimize) business processes in such a way as to maximize labor productivity or to reallocate the duties according to the qualifications, abilities, and individual qualities of employees.

5.3 Limitations

In our opinion, the limited duration of time studies is the main limitation of our methodological approach. Because some of the tasks performed by managerial, professional, and technical employees are seasonal or cyclical, two weeks for conducting research is certainly not enough to get an adequate workload structure. So, some judgmental input still would be necessary to assess annual task workloads.

Another limitation of our methodological approach is that in obtaining data, we have to rely on the discipline and conscientiousness of respondents. However, for our part, we tried to provide all possible measures to increase the transparency of the data collection process. For example, in our web application, we have provided options allowing managers to validate the timesheets of their subordinates. We also provided the researchers with the feature to monitor the timeliness of filling out the timesheets.

5.4 Future research agenda/directions

We plan to integrate the NASA Task Load Index (NASA TLX) into our methodology. The NASA TLX Load Index is a widely used subjective multivariate scoring tool that evaluates anticipated workload to assess the efficiency of work task execution, human-machine systems, work groups, or other aspects of performance. We will study the relationship between the subjective workload and the gap between the actual staffing level and the staffing needs determined using the Bottom-up approach. In other words, we plan to test the possibility of using NASA TLX to verify the adequacy of the staffing needs determined using the Bottom-up approach.

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The modern model of category management in the fast-moving consumer goods market

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Abstract

This article discusses the modern model of category management in the FMCG market. Category management is a strategic approach to product category management that involves analyzing data and consumer behavior to improve product range, pricing, promotion, and placement. The article discusses the importance of the FMCG market and the critical elements of a modern category management model, including data analytics, the interaction between retailers and suppliers, and customer focus. The article also explores the challenges and opportunities for adopting a modern category management model, such as the need to invest in technology and the potential to increase sales and profitability. Overall, the article highlights the importance of a modern approach to category management in the FMCG market and provides information for companies seeking to improve their category management strategies. As a result of the study, a step-by-step model for implementing a category management system was formed based on the experience of international companies. Companies in the manufacturing and trading sectors of the market can use the resulting methodology.

Keywords: category management; fast-moving consumer goods market; assortment optimization; key performance indicators scorecard.

JEL codes: D40, M11, M31, L11

1 Introduction

Category management has become an increasingly important strategy for companies operating in the fast-moving consumer goods (FMCG) market. Companies can optimize their product offerings and pricing strategies by analyzing consumer behavior and market trends to increase profitability and market share. However, the traditional approach to category management has evolved over the years, and a new modern model has emerged that takes advantage of technological advances and data analytics.

Category management is a process of joint management of product categories between a retailer and a manufacturer, and it's an innovative economic solution driven by changes in the traditional relationship between a supplier and a retailer to satisfy end users' needs.

The basic principle underlying the modern category management model is to create additional value for the consumer concerning the product's price, choice, availability, and other characteristics. Within the framework of the modern concept, category management projects create additional value not only for the consumer but also for project partners.

Category management combines the knowledge of the manufacturer and the seller about the consumer. We are talking about managing an entire product category, not individual brands of the manufacturer, which was based on a deep understanding of the category development trends.

This scientific article explores the key features of the contemporary category management model and examines its impact on the FMCG market. Through a combination of theoretical analysis and empirical research, this article provides valuable insights for companies looking to stay competitive in today's fast-paced business environment.

2 Literature review

Category management has become a crucial approach for companies operating in the fast-moving consumer goods (FMCG) market. It is a data-driven process that involves analyzing consumer behavior and market trends to optimize product offerings and pricing strategies. Over the past five years, there has been significant research in the area of category management in the FMCG market.

The fast-moving consumer goods (FMCG) industry is highly competitive, and companies are always seeking ways to improve their market position. One of the strategies employed in the industry is category management, which involves the management of product categories to optimize sales and profitability.

In this Scopus literature review, we examine the most recent research on category management, including its impact on the FMCG market, the challenges faced by companies implementing category management, and the role of technology in category management. Examples of some articles are presented below.

A comprehensive literature review on category management in the FMCG industry is provided by H. Zhang, Y. Li, and L. Li, who examine various aspects of category management, including its definition, benefits, and challenges, as well as the role of technology in category management. The authors also suggest future research directions [1].

Reviewing the challenges faced in implementing category management in the retail industry, K. Fatima and M. S. Siddiqui identify factors that hinder successful implementation, such as lack of top management support, poor data management, and resistance to change. They propose solutions to

overcome these challenges and improve the effectiveness of category management [2].

Yeung and Nair discuss the research trends and future directions of category management in the grocery retailing industry, identifying emerging issues such as the use of data analytics, shopper marketing, and collaboration between retailers and suppliers. They suggest directions for future research in the field [3].

A multi-objective decision-making approach for category management in the FMCG industry is proposed by Jagadeesh, Kumar, and Panda. They consider various objectives, including maximizing sales, minimizing costs, and improving customer satisfaction, and apply their approach to a case study in the industry, demonstrating its effectiveness. [4]

Investigating the impact of feedback loops on the value of category management in retailing, Wouters, Koster, and Kooistra develop a model that incorporates feedback loops and test it using simulation. They find that feedback loops can significantly enhance the value of category management [5].

González-Benito, González-Benito, and Muñoz-Gallego provide a comprehensive review of the literature on category management in the retail industry, examining various aspects of category management, including its history, benefits, and challenges, as well as the role of technology in category management. The authors suggest future research directions [6].

Through an exploratory study, Siarheyeva, Siarheyeva, and Bublyk explore the challenges of implementing category management in retail chains, identifying several challenges such as lack of standardized processes, poor data quality, and insufficient communication. They propose solutions to overcome these challenges and improve the implementation of category management [7].

Boukherroub and Djellal conduct an empirical analysis of category management in the retail industry, focusing on France, and examine the effectiveness of category management in improving sales and profitability. They find that category management has a positive impact on retail performance [8].

Gwak and Kim conduct a qualitative study to explore the implementation of category management in small and medium-sized enterprises, identifying several factors that influence its effectiveness, such as top management support, employee skills, and information technology infrastructure [9].

Conducting a bibliometric analysis of category management in retailing, J. Kim and C. Y. Kim examine the trends and patterns of research in the field, including the most cited authors, journals, and keywords, and provide insights into the research directions and gaps in the field [10].

In summary, the literature on category management in the FMCG industry is vast and diverse. The studies reviewed here provide valuable insights into the benefits, challenges, and future directions of category management in the industry. They also suggest solutions to overcome the challenges and improve the effectiveness of category management.

3 Methodology

This methodology involved conducting expert interviews with representatives of international FMCG campaigns to identify the main prerequisites for developing and systematizing current data on category management. The interviews were conducted with 30 experts, including category managers, marketing coordinators, and supervisors, for the development of retail channels. The interviews aimed to obtain relevant data on the features of the implementation of category management in enterprises. The data collected through the expert interviews would then be used to analyze and develop current data on category management in the FMCG market.

4 Results and Discussion

Based on an expert interview, data relating to category management trends were systematized and described. The current market conditions in the Republic of Kazakhstan justify the current role of category management.

As the main reasons for increasing the importance of category management, the experts identified:

−The need to optimize business processes, as well as the definition of core and non-core types of business processes;

−Increasing demand for joint profit acceleration between retail companies and manufacturers;

−Diversification of purchasing behavior in the conditions of economic volatility;

−Focus on identifying and meeting the needs of customers;

−A wide range of products in modern networks;

−Accelerated development of modern trade formats and increased competition;

−High rates of the absence of high-turnover goods.

Based on the above prerequisites, the potential for to improve business processes in the FMCG industry. In addition to the main prerequisites that affect the acceleration of the development of category management in the Republic of Kazakhstan, specific barriers delay the spread of the foundations of category management. Among the limiting factors, the experts highlighted:

−Lack of resources to build a category management system;

–Deficiency of full data exchange, both internal and external information;

–Shortage of experienced professionals in the field of category management;

–Insufficiency of an adapted structure in retailers and manufacturers;

–Inflexible information systems in the FMCG market;

–Need for reliable market data.

The identified prospects and barriers determine the importance of introducing category management in organizations of different levels.

The modern concept of category management implies the construction of category models based on cooperation with retail organizations.

Based on the benchmarking of the experience of international companies and the results of an expert survey, the basics of category management can be presented as a process model (Figure 1).

1. Preparatory phase	Assessment of available resources
2. Analytical stage	1. Formation of the category definition
	2. The role of the category
	3. Category evaluation
	4. Indicators and goals of the category
	5. Category Strategy
3. Implementation Phase	6. Category Tactics
	7. Evaluation of results

Figure 1. Modern category management model

Note: compiled by the authors based on data from the primary study

Category management must also be considered as the implementation of individual projects in the context of the period of operation of the organization, categorical distribution, and so on.

The following economic and other indicators can be the priority goals in CM projects:

–Category growth beyond organic market growth in value terms

–Increase in category sales in physical terms

–Reduction of inventory in the store

–Increasing category profitability

–Segmentation and navigation within a category

–Category visualization.

Understanding and researching the buyer's needs in a particular category of goods is essential for achieving high category performance. Category management in modern practice is a collaborative effort between the retailer and its key suppliers. The Product Category Management process involves the work in multifunctional groups of each partner - the retailer and the supplier: marketing and marketing research departments, IT and analytics services, and logistics departments.

The preparatory stage is singled out separately based on the peculiarities of doing business in Kazakhstan.

This stage aims to determine the vectors of cooperation between the product manufacturer and its distributor. The conditions are assessed as part of this stage, and the cooperation priority is determined.

Defining the boundaries and structure of the category is the main stage of category management. At this stage, the parameters of a particular class in the retailer's business are determined, which is why the decision is crucial for the chain's competitive position in the market and choosing the development strategy for the category itself.

The decision is made jointly by the retailer and the manufacturer "category captain," considering the network's differentiating strategy and all available quantitative and qualitative market research, consumer needs, and buyer behavior (AC Nielsen, MEMRB, Gfk panels, etc.)

The category structure is fixed with at least four levels of segmentation. Maintaining a database with a specific structure is essential for category analysis and further tracking of results after the category development plan is implemented:

–Price segment;

–Taste;

–Packing size;

–Type of packaging.

The next stage - the definition of the role - makes it possible to indicate the importance of the category for the network and, thus, helps to optimize the distribution of resources among all product groups. Such resources are the whole complex of strategic and tactical decisions for the category.

The role definition process includes next steps:

1. Determining the set of roles that will be used be called in the company;

2. Assigning each of the categories to its role;

3. Distribution of resources between categories according to their roles.

Based on the data from expert interviews with international practice, the following models are used:

Main - a category that defines a network as one from the preferred suppliers of these products by offering consistently competitive customer value to the target customer.

Competence is a category that defines the chain as a priority supplier of these products by offering excellent customer value to a particular group of buyers who purchase high-value products, thus creating the chain's image.

Seasonal - a category that defines the chain as the leading supplier that offers a competitive assortment during the season or special event.

These are the classic definitions that are accepted in international practice. If, again, we come closer to convention and retail reality, then the roles indicated above can be combined into four groups of importance for the buyer and the network itself. The structure can be represented as follows:

The main category - aimed at increasing the overall consumer basket, can take up to 55-60% of the turnover.

Seasonal class - aimed at improving the flow of customers in a particular season, it can take up to 55-60% of the turnover during the peak season.

Image category - aimed at maintaining the image of the manufacturer and retailer, takes up to 5-7% of the total turnover of types.

The competency category is complementary for the network and takes 15-20% of the turnover.

Role definition principles:

–The role of the category should describe the desired outcome.

–The status of a particular category will determine its future role.

–The category role should be consumer-centric. A fundamental principle that says that everything done with categories should be aimed at the best way to meet the buyer's needs.

–Category roles should be coordinated. In an ordinary supermarket, there are from 150 to 200 different categories. Creating the right balance of all categories gives the chain a competitive edge.

–The main goal is to prioritize

–when a customer visits a store; he finds the product exactly where it is most

–comfortable and appropriate for him.

–Category roles should be clear. All managers in the network must understand what this or that means.

–The role, what tactical measures can be applied depending on the decision for each product group.

Once the roles of categories have been defined, a foundation for further strategic and tactical management of product groups within them is created. According to the designated functions, tactical measures can be distributed accordingly. The text provides an example of how the primary resources of a

store - assortment, pricing, shelf placement, and promotional activities - can be distributed according to the role assigned by the network to the product group.

The text also highlights a few additional points: firstly, the role of a category can be determined for each format of a network of stores or the entire network as a whole. Secondly, the part of a category can and should change over time as both the market and the consumer evolve. Lastly, each segment and subcategory can have its role within a variety.

Overall, the process emphasizes the importance of defining the role of a category, as it is a crucial process that affects multiple levels of management. By prioritizing category management according to their preference for the target consumer, retailers and suppliers can create additional value and maximize return on investment.

Assessment of a category is a necessary step in category management, aimed at understanding the current state of the category in the retail network and identifying the essential areas of category development to achieve higher turnover, profitability, and customer loyalty. Partners need to assess the current state of the category and its components (subcategories, segments, brands, etc.) according to the category's role in the retailer's network. The discrepancies between current and desired performance indicators determine the most critical areas of category development. The result of the Category Assessment stage is crucial for further steps - defining the Category Strategy and Tactics. Category assessment consists of a comprehensive review in several directions: Consumer/Buyer, Market, and Retail Operator.

The assessment of the Consumer and Market enables the evaluation of the category in the country or sales channel based on various quantitative and qualitative indicators without considering the specific situation of the retail operator. The retail operator assessment allows comparing the category's current state in the analyzed retail network with the market situation and competing retail operators based on benchmark analysis.

The usual process lists various questions that the Assessment of the Consumer/Buyer aims to answer, such as the level of penetration of the category, the factors influencing its purchase, the purchase frequency, the purchasing mission, the level of loyalty, and the channels where the class is purchased. The Assessment of the Market, based on Retail Audit data, provides the following:

−Information on the category's weight in FMCG sales;

−The contribution of sales channels to category sales;

−The dynamics of demand;

−Seasonal dependencies in sales.

The information for analysis can be obtained from Retail Audit data, Household Panel data, and field research data. However, the data from panel

studies and retail audits only sometimes provide specific answers to recent questions due to the high level of fragmentation in the Russian retail business and its low concentration level. Therefore, special consumer and market research studies have become necessary for identifying problematic areas and opportunities for development. The category evaluation is carried out sequentially at several levels, from general to specific, to determine such areas and opportunities for growth. Retailers need to know both consumers and buyers, as well as the market and its trends, to assess the category fully. To achieve this, the supplier and retailer must exchange information and jointly analyze the results.

The interview data from experts outline the main goals for category indicators, which include reflecting changes in consumer behavior, changes in the market, and changes in the retail operator's indicators. The retailer and supplier determine the category's goals jointly based on the category assessment and should align with the overall category strategy. The goals should be measurable and realistic, reflect changes within the retail operator and the market, and be suitable for tracking results over a long period. The plans should be easy to understand and analyze. Specific, measurable goals include penetration level, frequency of purchases, turnover, market share, and inventory turnover. Gross profit, net profit, and the number of days of inventory are also important indicators.

The importance of developing a category management strategy connects the overall retail operator's strategy with the specific category strategy. The article describes three main strategies: retaining market share, strengthening the store's image, and attracting attention. It also emphasizes the need to consider the additional costs associated with implementing strategies that increase customer loyalty. The text concludes by listing key considerations when choosing category management strategies, including the role of the category, the importance of being pragmatic, and the possibility of implementing different strategies for different category segments.

Developing tactics is an exciting and responsible stage in Category Management projects. By following the steps of the classic model, we have already determined the role, category strategies, and critical indicators.

The tactical work of the category manager is built around four points of attraction: the category assortment, store space, and shelves, pricing, and promotional activity to stimulate sales. Sometimes, a specific Category Management project may only allow the use of some tactical techniques. For example, the retailer may limit the supplier's category management activities to working with the assortment and shelf space only, leaving the promotional planning and pricing policy decisions to themselves. Thus, the arsenal of available tactical actions for each project is unique.

In general, all tactical activities of the Category Manager should be based on research data. Based on facts or fine examples from the practice of colleagues or competitors.

Some specialized program products combine different data for category management purposes, draw planograms, calculate price elasticity, and implement other tactical procedures. Among the suppliers of this software, it is worth mentioning the companies IRI, MEMRB, Nielsen, and SAP - the packages developed by them programs make working on Category Management projects much more efficient.

The implementation stage is usually the essential phase of any category management project. This is where our hypotheses and theories formulated in the plan are put into practice in a specific store. However, despite its importance, the implementation stage often needs the necessary planning and preparation from the category management team, which can lead to negative consequences and even project failure.

Several key factors need to be considered in preparation for the project's implementation in stores. These include forming a comprehensive team, understanding the partner hierarchy, involving all necessary employees, planning for evaluation, and paying particular attention to assortment. It is also essential to take photographs of the shelves before the project begins.

Assessment of results is essential in understanding the success of a developed category plan and its implementation in stores. When evaluating, the following points should be taken into account:

–A long enough test period should be considered to evaluate sales performance (at least three months).

–The comparison should be made with stores that did not participate in the test and similar indicators from the previous year.

–Adjacent categories should also be considered for evaluation.

–Previously defined project implementation effectiveness criteria (KPI) should be evaluated.

After the test period, conclusions can be drawn, and any shortcomings identified in the pilot stores can be corrected. Special attention should be paid to applying the developed recommendations in all retail network stores.

5 Conclusion

In conclusion, this article highlights the importance of a modern category management approach in the FMCG market, which involves analyzing data and consumer behavior to improve product range, pricing, promotion, and placement. The article also emphasizes the critical elements of a modern category management model, such as data analytics, the interaction between retailers and suppliers, and customer focus. The challenges and opportunities for adopting a modern category management

model are also discussed, with the need to invest in technology and the potential to increase sales and profitability being the key factors.

The article provides a step-by-step model for implementing a category management system based on the experience of international companies, which can be used by companies in the manufacturing and trading sectors of the market. The methodology involves expert interviews with representatives of international FMCG campaigns to identify the main prerequisites for developing and systematizing current data on category management.

In summary, companies seeking to improve their category management strategies in the FMCG market can benefit from the information provided in this article. By adopting a modern category management approach and utilizing data analytics, retailers and suppliers can improve their product range, pricing, promotion, and placement, resulting in increased sales and profitability.

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Assessment of Poverty and Inequality in Kazakhstan: Current Situation and Prospects for Development

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Abstract

The development of strategies to reduce poverty and inequality is the main priority of sustainable development policy worldwide. Currently, the problem of economic inequality and poverty is one of the most acute problems in Kazakhstan. This is because the mass protest of the people in January 2022 made us realize that the poverty line in Kazakhstan is one of the lowest indicators in the world. The article analyzes the current state of socio–economic inequality and poverty, assesses the state of low-income large families in the Republic of Kazakhstan. During the analysis of the current state and assessment of poverty and inequality in the country, it was revealed that the scale of poverty in Kazakhstan varies regionally, which indicates mainly Despite the existing differences and income inequality between the regions, there is no centralized support program for large families in Kazakhstan. Since the current methods of social policy are ineffective in combating poverty, it is recommended that the government consider the mechanisms and tools of a strategy to overcome income inequality and poverty in the country by creating high-quality jobs in underdeveloped regions.

Keywords: poverty, inequality, income of the population, social policy, Gini coefficient.

JEL codes: I30, I38

1 Introduction

Reducing the level of poverty and inequality is one of the important tasks of the Kazakh society. The January (2022) events in Kazakhstan once again clearly demonstrated the problems of poverty and income inequality of people, which deepened during the Covid-19 period [1]. According to official data of the National Bureau of Statistics of the Republic of Kazakhstan, the middle class in Kazakhstan does not exceed 3%, which means that most of the population lives below the poverty line, or is somewhere nearby. The poverty rate in the country is 5.3%, 1 million 619 thousand. a person with a simultaneous increase in the depth and severity of poverty of 0.8 and 0.2%, respectively (Bureau of National Statistics of the Republic of Kazakhstan, 2022), according to the World Bank, the poverty level is much higher - 15.5%.

(World Bank, Kazakhstan overview, 2022). Also, the calculation of the incomes of Kazakhstanis by the median method showed that half of the population of Kazakhstan in 2022 has a monthly income of about 49.6 thousand tenge per month. There remains a significant differentiation of income in urban and rural areas. Thus, in urban areas, the share of the population with incomes below the subsistence minimum is 3.7%, in rural areas -7.6% [2;3].

According to the KPMG report, 55% of the national income, that is, more than half of the country's wealth, belongs to only 162 people. The annual income of 96.6% of the adult population (11,711,334 people) does not exceed $10,000 2.7% (326,322 people) earn from $10,000 to $100,000 0.35% (42,301 people) have an annual income from $100,000 to $1 million 0.05% (5,838 people) annually replenish their wealth in the amount of $ 1 to $ 50 million. And, most importantly, there is almost a statistical error, namely 0.001% (162 people) own about 55% of the total wealth. Of these, 112 people have from $50 million a year. up to $80 million 45 people — from $80 million to $800 million. Five people — from $2 to $3 billion [4]. Thus, there is a high level of income inequality of the population, an increased level of depth and severity of poverty.

The problem of poverty is not only sociological, but also psychological in nature, so-called habitual poverty arises in society, which leads to social poverty: depression, social isolation, discrimination and suicide, etc. It affects the development of the country as a whole, political, social and economic stability, the relevance of this problem is increasing dramatically every day.

In his Message to the people, the President of the Republic of Kazakhstan KJ. Tokayev stressed the need to adapt the priorities of social policy in the "new situation", taking into account the challenges and accumulated problems. The new model of the country's development considers public trust in the state as the main issue of social policy and is based on fair distribution and creation of opportunities for the population. For the first time, on behalf of the President, a completely new document is being developed for Kazakhstan - the Social Code [1].

2 Literature Review

Back in 1873, the great English economist Alfred Marshall, in his report "The Future of the Working Classes", read at the Cambridge Reform Club, posed the following question: can everyone equally be rich, healthy and educated? In other words, can socio-economic equality be achieved in society? He said literally the following: "The question is not whether all people will eventually be equal–for they certainly will not be – but whether progress cannot continue steadily, even slowly, until everyone, at least by

occupation, becomes a gentleman. I think it is possible and that it will be so" [5].

For the first time, the relationship between inequality and economic development was investigated by the American Economist S. Kuznets, who showed that economic growth first leads to an increase in inequality, and then to its decrease [5].

P. Tridico in his work considers an interesting idea of classifying types of economic inequality into intra- and inter-country, and also gives the author's view on the cyclical development of these processes. For intra-country inequality, the key driver of change is changes in the labor market, the creation of new professions and types of employment, technological changes that allow some people to earn more than others, which leads to the polarization of income and wealth within one country [6]. This idea is well described with. Rosen in the theory of superstars, and also fits perfectly into the concept of economic globalization and technological progress, as a result of which, for example, bloggers can earn fabulous incomes by selling intellectual products to a global audience [7].

Poverty reduction is increasingly becoming a major topic for researchers in various social sciences, from economics and finance to management and entrepreneurship [9, 10). This is due to the seriousness of the problem of extreme poverty and the clearly ambiguous results of measures to combat poverty. These measures include foreign aid programs, microfinance and property rights promotion, as well as initiatives at the bottom of the pyramid, these initiatives have not had much impact on extreme poverty and may have actually created some additional problems.

However, in recent years, researchers have begun to study economic growth and its relationship to poverty reduction through entrepreneurship and the development of new technologies and new methods (Ahlstrom 2014, 2015; Bloom et al. 2013; Bloom, Draca, and Van Reenen 2016; McCloskey 2017). This, in turn, has given rise to new approaches (and ways of considering) poverty reduction that challenge the existing theory of poverty research, traditionally focused more on financial aid and other basic poverty reduction measures (Easterly 2002; Sachs 2003; Whitacre, Meadowcroft, and Gallardo 2019). Studies ranging from trade policy and globalization (Pearce 2005; Bergh, Mirkina, and Nilsson 2016; Bhagwati and Srinivasan 2002; Dollar and Kraay 2004) to legal and institutional reform (Rodrik, Subramanian, and Trebbi 2004) to leadership are making significant progress in understanding many key factors in combating extreme poverty and stimulating economic growth.

Kazakh researchers managed to substantiate the general patterns of the formation of economic stratification and income inequality [11]. When assessing the relationship between inequality and economic growth, it turned

out that economic growth and openness to trade contribute to reducing inequality in the distribution of income and the level of absolute poverty, while the growth of foreign direct investment, on the contrary, leads to their growth [12].

3 Methodology

Various types and methods of systematic, comparative, functional, economic–statistical and structural analysis, synthesis were used as the methodological basis of the study.

Currently, one of the main problems in the country is the problem of poverty, which is increasingly developing into a problem of poverty. The number of people who find themselves below the poverty line is steadily growing, and there is a consistent increase in the stratification of the population by income and material security, which is spontaneous, since until recently the impact on it from the state was hardly noticeable.

4 Results and Discussion

According to the calculated data of the Bureau of National Economy, the share of the population of Kazakhstan with incomes below the subsistence minimum in 2021 amounted to 5.3% or 1 million 619 thousand people. The World Bank has set the international poverty line at $1.90 per day. In Russia, the share of the population with such low incomes is practically absent, amounting to less than 0.1%. Turkey ranked 21st out of 156 countries in the World Poverty Index (World Misery Index) for 2021. According to the index compiled by economist Steve H. Hanke from Johns Hopkins University, Turkey also ranks first among European countries in terms of poverty. According to the statistics of the countries that published data for 2021, the poverty level is below 5% only in Kazakhstan and Belarus. Moreover, in Kazakhstan this indicator was 5.3%, in Belarus – 5.2%. However, in a European country, about 451 thousand people are below the subsistence level, and in Kazakhstan – 858.5 thousand [2].

Table 1. Key indicators of uneven income distribution in the Republic of Kazakhstan for 2018-2022

	The proportion of the population with incomes below: in %		The depth of poverty %	The severity of poverty %	Gini coefficient for 20 % of population groups
	subsistence minimum values	the cost of the food basket			

2018	3,7	0,1	0,5	0,1	0,280
2019	3,8	0,1	0,6	0,1	0,277
2020	4,6	0,1	0,7	0,2	0,275
2021	5,2	0,1	0,8	0,2	0,285
2022	5,3	0,1	0,8	0,2	0,290
Note: compiled on the basis of [2]					

Analyzing Table 1, we can say that regions in Kazakhstan have been developing disproportionately for many years due to the uneven distribution of income: the share of the population with incomes below the subsistence minimum in 2022 increased to 5.3% with a simultaneous increase in the depth and severity of poverty (0.8 and 0.2%, respectively). The share of the population with incomes below the cost of the food basket is stable (0.1%), so this group of people has income only for survival. The depth of poverty shows the average deviation of the level of income (consumption) of people who are below the subsistence minimum from the subsistence minimum. The severity of poverty shows inequality among the poor – the degree of dispersion of the incomes of the poor from their average value.

From the theory of distribution of the total amount of monetary income among the population, it is expressed in terms of the share of total monetary income, which falls on each of the 20 and 10% groups of the population as the average per capita monetary income increases. For example, the Gini coefficient for 20% of population groups, which is an indicator of the degree of stratification of society in the ratio of the richest 20% to the poorest 20%, in Kazakhstan tended to decrease from 0.275 in 2020 to 0.290 in 2022 (Table 2).

Table 2. The share of income of the population by 10 percent (decile) groups and the Gini coefficient

10-% of the population group	2016	2017	2018	2019	2020
1 decile	4,15	4,07	4,06	4,09	4,15
2 decile	5,35	5,23	5,26	5,27	5,27
3 decile	6,21	6,10	6,13	6,07	6,05
4 decile	7,05	6,92	6,89	6,86	6,81
5 decile	7,97	7,82	7,74	7,73	7,67
6 decile	9,02	8,89	8,79	8,78	8,71
7 decile	10,29	10,21	10,09	10,09	10,05
8 decile	11,99	11,98	11,89	11,86	11,90
9 decile	14,65	14,79	14,83	14,83	14,78

10 decile	23,32	23,99	24,32	24,42	24,61
Gini Coefficient	0,278	0,287	0,289	0,290	0,291
Note: compiled on the basis of [2]					

To measure income inequality, the statistical method of dividing the population into equal shares — deciles and quintels (1/10 and 1/5 of the studied population) is widely used. The measurement includes a comparison of incomes in the upper, middle and lower groups. The distribution of income by deciles, quintels reflects the degree of income differentiation and levels of concentration of purchasing power of the population. Consequently, according to calculations, in Kazakhstan, low-income groups (poor) are located on 1 decile, and the highest-income groups (rich) are located on 10 deciles.

Analyzing Table 2, we can see that the share of income of the population in 1 decile is 5 times lower than in 10 decile, this once again proves a large imbalance in the distribution of income in the country. Also, the Gini coefficient for 10 percent (decile) groups in 2022 increased to 0.291, which indicates a slight increase in income differentiation of the population. In 2020, compared to 2016, the share of income from the 1st decile group did not change, 4,5,6,8 decreased, and the share of income from the 9th and 10th decile groups increased by 0.1 and 0.94 percentage points, respectively (Table 2).

In 2021, the Gini coefficient in Kazakhstan was 28.8%, which is the average value for developing countries. For comparison, highly developed countries with strong economies have significantly higher indicators, so the US Gini coefficient for 2021 is 41.5%, in Germany — 31.9, in China — 38.5, in Russia it has increased to 37.5%. While developing economies have an average Gini coefficient of about 27% (Finland — 27.4, Norway — 27.0, Denmark — 28.7), the highest stratification rate in the world is observed in the least developed countries of the African continent: in Namibia — 59.1, in Suriname — 57.9, in Zambia — 57.1, and in South Africa, it reached 63% in 2021 [3].

As of 2022, wages in Kazakhstan, with the existing regional income discrepancy, are on average 269,149 tenge per month. The highest rates are observed in Almaty (159.4 thousand tenge), Atyrau region (171.2) and Nur-Sultan (241.6), and the lowest is in the densely populated Turkestan region (102.8 thousand tenge) (Figure 1).

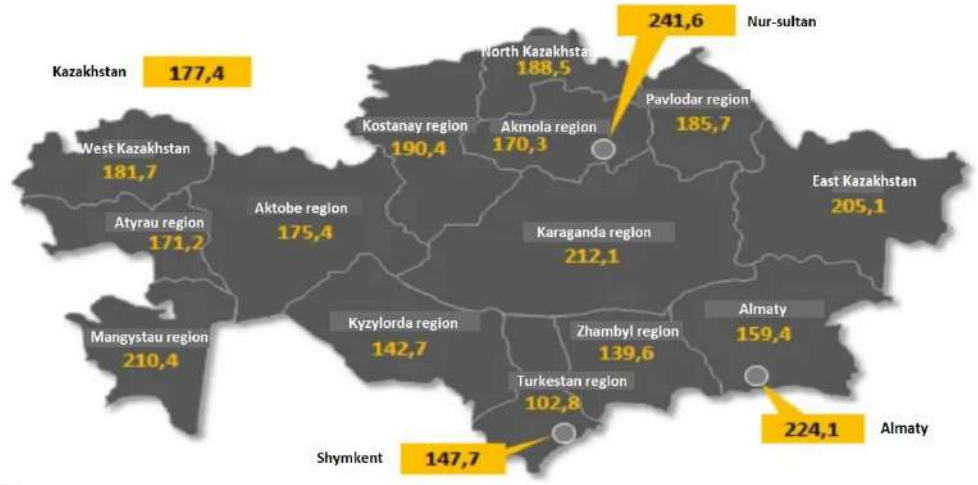

Figure 1. Monetary incomes of the population of the Republic of Kazakhstan by region, 1st quarter 2020 (thousand tenge)
Note: compiled on the basis of [2]

Analyzing Figure 2, we can say that Astana and Almaty, as well as the industrially developed Karaganda region and the oil-producing Mangystau region, stand out with the highest per capita incomes. The minimum income is received by residents of mainly southern agricultural regions. Incomes of the population increased in almost all regions compared to the 1st quarter of 2019, with the exception of Almaty and Turkestan region, which may be due to a faster rate of population growth in these regions with a relatively low rate of income growth. According to the analysis, the largest share of income from hired work is received in the western regions, namely in the Mangistau and Atyrau regions, in the Turkestan region – from self-employment or entrepreneurship, and in the North Kazakhstan region – from social transfers. At the same time, it should be noted that in the Turkestan region, income from self-employment and entrepreneurship account for 30.4% of all income in the region. This may be a consequence of the fact that in the Turkestan region the largest number of self–employed is 361.5 thousand. a person according to the 1st quarter of 2020. There are arguments that there is a large share of the shadow economy of the self-employed in this area.

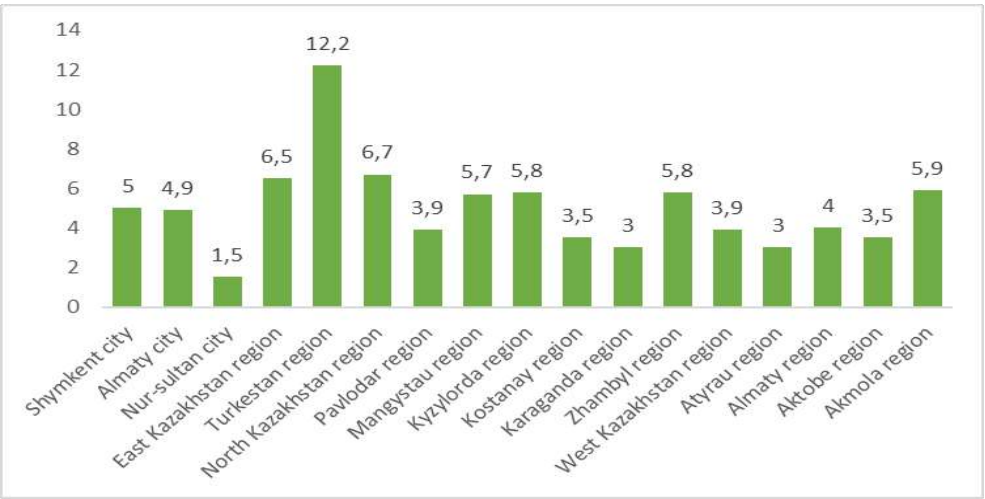

Figure 2. Poverty level in Kazakhstan by region, 2020

Note: compiled on the basis of [2]

Figure 3 shows that the scale of poverty in Kazakhstan varies regionally, which indicates mainly the existing income inequality between regions.

Table 3. Household food consumption by regions of the Republic of Kazakhstan, %, on average per capita per quarter, tenge

	Consumer spending — total			including food products		
	2018	2019	2020	2018	2019	2020
The Republic Of Kazakhstan	152 378	165 084	178 565	76 867	88 228	100 864
Akmola	147 909	155 355	183 687	74 526	84 344	101 873
Aktobe	120 036	142 143	159 837	61 338	74 753	95 457
Almaty	155 212	171 815	188 277	83 679	98 855	113 120
Atyrau	128 402	137 941	147 168	75 973	81 753	96 095
West Kazakhstan	120 340	136 946	148 692	63 913	79 382	90 261
Zhambyl	114 586	130 624	148 443	65 911	72 674	90 134
Karaganda	170 951	184 020	209 010	82 200	95 154	113 710
Kostanay	121 721	141 780	169 370	56 137	68 349	84 456
Kyzylorda	114 310	121 647	136 259	61 744	69 178	81 571
Mangystau	148 201	154 412	163 215	80 272	87 281	94 486
Pavlodar	153 450	169 911	194 147	81 289	94 636	115 332
North Kazakhstan	149 997	163 251	187 885	71 351	81 353	97 965
Turkestan	95 512	108 923	125 543	56 298	67 641	78 973

East Kazakhstan	163 009	179 225	194 454	88 081	98 133	112 540
Nur-Sultan City	173 159	189 615	200 180	76 128	88 534	102 070
Almaty city	270 912	278 438	262 434	114 589	138 034	137 289
Shymkent city	145 771	135 686	137 550	75 291	63 668	66 564
Note: compiled on the basis of [2]						

Table 3 shows that the lowest consumption of food by households are Turkestan, Kyzylorda, Zhambyl regions. The highest rate is observed in Almaty, Astana, Akmola, Karaganda regions.

According to the UN classification by the share of expenditures on food and income of the population, Kazakhstan falls into the group with a lower-than-average standard of living (40-50%): more than half of the population cannot afford to buy even a basic grocery basket painlessly.

Such an imbalance is associated with overpopulation in 32% (in Turkestan, Zhambyl, Kyzylorda regions), this of course shows high labor resources, but despite these advantages, these regions occupy leading positions in terms of unemployment in the country. This means that the majority of the population does not work, this also proves low monetary incomes (102.8 thousand tenge) than other regions, compared to the Mangystau region, it is two times lower (210.4 thousand tenge).

Table 4 – Comparative table of the number of recipients of social assistance from the state and the average monthly amount of assigned assistance in 2020 and 2021

Name of regions	Number of recipients of social assistance from the state		Growth rate for the period from 2020 to 2021	Average monthly amount of assigned social assistance, tenge		Growth rate for the period from 2020 to 2021
	2020 year	2021 year		2020 year	2021 year	
Republic of Kazakhstan	571584	2177176	3,8%	4834	12188	2.5%
Akmola	12 371	43 607	3,5%	2 702,9	11 525,0	4,3%
Aktobe	20 082	92 214	4,6 %	2 981,7	11 999,0	4%
Almaty	58 768	274 378	4,7%	3 622,8	12 152,0	3,35%
Atyrau	10 949	39 856	3,6%	3 933,6	11 067,0	2,8%
West Kazakhstan	16 815	58 605	3,5%	3 585,1	11 582,0	3,2%

Zhambyl	74 517	193 968	2,6%	2 847,2	12 613,0	4,4%
Karaganda	10 967	61 644	5,6%	3 606,8	12 349,0	3,42%
Kostanay	14 256	49 491	3,5%	3 291,2	10 873,0	3,3%
Kyzylorda	39 409	154 103	3,9%	3 833,3	13 756,0	3,6%
Mangystau	9 761	54 045	5,5%	4 076,7	12 583,0	3,1%
Turkestan	195 620	624 305	31,8%	7 419,9	11 714,0	1,6%
Pavlodar	6 977	44 017	6,3%	3 316,0	11 483,0	3,5%
North Kazakhstan	8 723	24 698	2,8%	3 013,6	10 916,0	3,6%
East Kazakhstan	31 601	98 290	3,1%	3 974,4	11 929,0	3%
Nursultan	4 601	41 988	9,12%	3 310,3	12 830,0	3,9%
Almaty	2 781	63 163	22,71%	4 333,2	12 535,0	2,9%
Shymkent	53 386	258 804	4,9%	3 941,5	12 968,0	3,3%
Note: compiled on the basis of [2]						

An analysis of the data in Table 3 shows a tendency to increase the average monthly amount of assistance from the state to the poor. The country's growth rate was 3.8%. Turkestan became the leader in the growth rate of this indicator among the regions – the number of recipients increased to 624,305 people in 2021 (see Table 3). In this region, the share of the population with incomes below the subsistence minimum is higher compared to other regions. This is due to the large accumulation of the population in this region.

According to the Ministry of Labor and Social Protection of the Population, as of May 1, 2021, there are 454.4 thousand large families in the country, including more than 2 million children.

According to statistics of the Bureau of National Statistics, Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, the share of the poor population living in families of five or more people is 89.6%. For comparison, the share of the population with incomes below the subsistence minimum in families consisting of three people is only 3.6%.

According to UNICEF research, 90% of poor families in the country have many children. In other words, statistics show that the probability of being in the poverty zone is higher among large families. Accordingly, the risk of child poverty is higher among such families.

According to the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan, in

comparison with 2011, the distribution of per capita income of households with four or more children became more uniform by the end of 2020, but still the level of per capita income remains low.

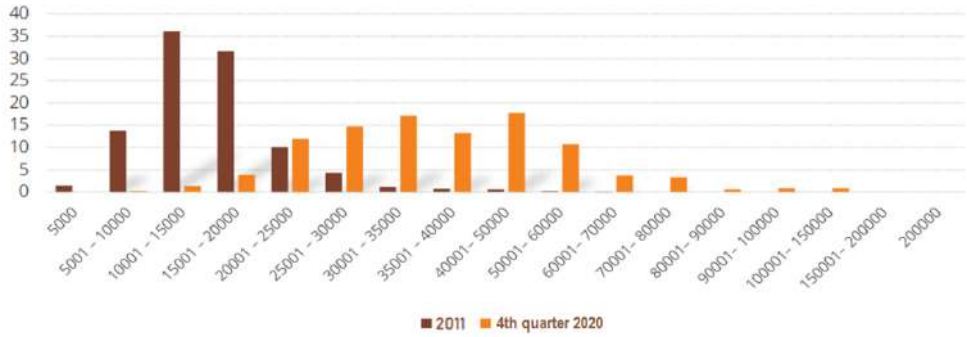

Figure 3. Distribution of households with 4 or more children by the size of the per capita monetary income, %

Note: compiled on the basis of [2]

If we consider the number of large families receiving financial support from the state, then according to the data provided by JSC "Center for Human Resources Development", their number has increased markedly over the past three years. If in 2018 there were 228,014 families of recipients of state benefits and targeted social assistance (TSA) with four or more children under the age of twenty-three, then their number doubled across the country in 2020. The largest increase in recipients over the past three years was observed in Atyrau region (+145.45%), the cities of Almaty (+131.34%) and Nur-Sultan (+131.21%). At the same time, the majority of recipients in the republic (about 60%) live in rural areas.

The largest number of recipients over the past year lives in the Turkestan region – 109,593 families, the smallest number – in the North Kazakhstan region (4,017 families), which is explained by the general distribution of large families across the country.

The main reasons for the surge in the number of recipients of state benefits and TSA among large families with children under twenty-three years old were the simplification of obtaining TSA from 2020 and an increase in the birth rate (206,046 last year against 194,272 in 2019). Simplification of the procedures for obtaining TSA, on the one hand, allowed in a more convenient form and in a short time to issue an application, but, on the other hand, led to the fact that people who do not need help from the state received it.

Let's analyze the distribution of households within the population with incomes below the subsistence minimum. In this category, the most negative results are shown by households consisting of 5 or more persons. If in the 4th

quarter of 2018 86.1% of the population with incomes below the subsistence minimum were families of 5 or more persons, by the end of 2020 their share increased to 89.6%. For comparison, during the same period, families consisting of 3 persons accounted for 3.3% and 3.6% of the total population living with incomes below the subsistence minimum, respectively.

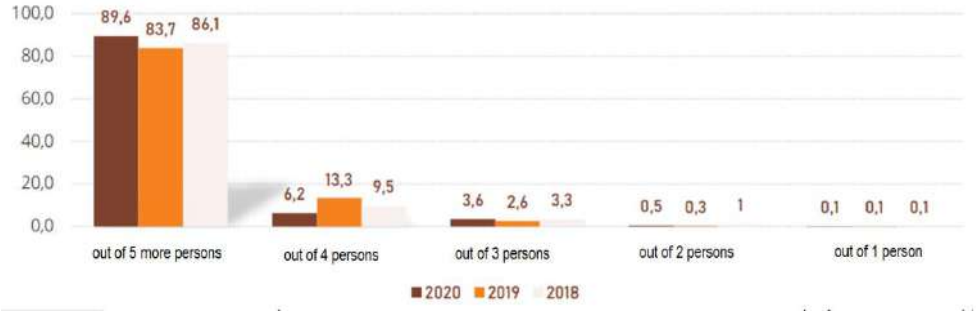

Figure 4. The share of the population with incomes below the subsistence minimum, depending on the size of the household for the 4th quarter of 2018-2020, %

Note: compiled on the basis of [2]

Despite the positive changes in state policy towards large families in terms of the adoption of legislative acts (this includes an increase in the amount of benefits, and simplification of receiving targeted social assistance), especially in the last 2 years against the background of negative information reasons, there are still maneuvers for further improvements. Lack of work and limited opportunities for the development of children in rural areas force some families to move to large cities in search of a better life. At the same time, they often cannot afford normal living conditions, posing a threat to the lives of children. Large families have the right to queue for housing at the local executive body, but the speed of construction in the regions and, accordingly, the progress of the queue leaves much to be desired. And some move in the hope of receiving greater material benefits in the form of assistance from the state, popularizing dependent sentiments. The low income level of large families can give rise to another problem – child poverty. Therefore, there is a need for well-developed mechanisms to support large families, taking into account the rational burden on the budget.

The Government of the Republic of Kazakhstan implements many state programs aimed at improving social well-being. However, despite the existence of a wide class of social assistance programs, information asymmetry leads to the fact that largest families simply do not have detailed information about existing programs, benefits, and support. The reason for this is, among other things, the large number of support programs that often duplicate each other. In order to raise awareness about the rights and

opportunities of large families, explanatory work and the creation of a "roadmap for large families" are required.

Thus, there is no centralized support program for large families in Kazakhstan, which should regulate measures suitable for this targeted social group.

5 Conclusion

The conducted research allowed us to draw the following theoretical conclusions and recommendations.

In 2021, the share of the population of Kazakhstan with incomes below the subsistence minimum, according to the Bureau of National Economy, amounted to 5.3% or 1 million 619 thousand people, while according to the World Bank, this figure is much more, 15.5%.

The scale of poverty in Kazakhstan varies regionally, which indicates mainly the existing differences between regions and income inequality. At the same time, there is a gap in the level of wages for similar types of work. It is noteworthy that high economic indicators do not always have a positive impact on the situation of the poor. In addition, there is a noticeable difference in the monetary income of the population of different regions.

Based on the above, we can conclude that the current economic growth of 3-4% does not increase the welfare of the majority of the population and is distributed extremely unevenly. A solution to this problem may be, in addition to the implementation of state programs ("State Program for the Development of Regions for 2020 2025"), the creation of new institutional structures whose powers will include control over the distribution of benefits. In international practice, such a method of resolving inequality issues has been successful in Switzerland. Institutional transformation can be the key to solving the problem of uneven intra-country socio-economic development of the regions of the Republic of Kazakhstan.

The state plays a major role in raising the incomes of the population by supporting businesses and providing social guarantees, including social assistance, to the poorest citizens of the country. But since these methods are ineffective in combating poverty, it is recommended that the government consider the mechanisms and tools of a strategy to overcome income inequality and poverty in the country by creating high-quality jobs in underdeveloped regions.

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The Revival of Monotowns in The Republic of Kazakhstan Based on the Application of Territorial Marketing Tools

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Abstract

The development of monotowns remains one of the most pressing issues in today's environment. Monotowns contribute to the development of industries in many sectors of the economy. This article describes approaches to the revival of monotowns. The aim of the study is to develop a modern approach and strategy for the development of monotowns based on territorial marketing tools. The study was conducted using a triangulation approach, which combines several sequential methods. The method of comparison, analysis and observation was applied in the research. Results of the study: conceptual approaches to the revival of monotowns were summarized, a new approach to the revival of monotowns was developed and the strategy for the development of monotowns with the use of territorial marketing tools was disclosed. The application of territorial marketing tools for the revival of monotowns was substantiated. Development proposals for each city are recommended. The results of the study have practical significance and can be applied by local government, the government to improve the quality of people's lives and solve the problem of monotowns development.

Keywords. monotowns, small cities, territorial marketing, regional development.

JEL codes: R11

1 Introduction

The development of monotowns is necessary for the efficient functioning of the economy. The development of monotowns contributes to economic growth, job creation and improvement of urban infrastructure. One of the urgent issues in modern conditions is the development of monotowns, as there are 27 monotowns in the Republic of Kazakhstan with a population of 1757,418 people and 32 city-forming enterprises. Supporting the economy of monotowns is one of the tasks of the state of the Republic of Kazakhstan. For these purposes, a programmer for the development of monotowns in the Republic of Kazakhstan was adopted (Programmer for the Development of Single-industry Towns in the Republic of Kazakhstan, 2012). However,

despite the measures taken, there are still many unresolved problems. Most cities are in a difficult socio-economic situation. Many monotowns remain in a depressed state: the population is falling, the outflow of people to more developed cities is increasing, and unemployment is growing. Therefore, internal and external needs should be studied, and territorial marketing tools should be applied for this purpose. Using the system of territorial marketing positioning allows to implement long-term programmers of territorial development aimed at improving the development of the economy and the quality of life of people.

2 Literature review

Many researchers have devoted their work to the study of monotowns revitalization approaches. Inis H.A. (Inis, 1940) and Landis P.H. (Landis P.H, 1940) conducted the first study devoted to monotowns A.G. Granberg offers his approach to revitalization of monotowns, in particular, as a city that concentrates a single industry or activity (A.G., Granberg). G. Green emphasizes a deep connection between the society and the city-forming enterprise (G. Green, 1992).

T. Rohner (Rohner, 2021) develops monotowns as foreign cities, however, he does not suggest the methods which might achieve the mentioned goal. A. Taylor (Taylor, 2020) suggests that the demographic indicators for the development of monotowns should be improved, and he has conducted a similar review in Australia in the context of gradual demographic changes in such regions. The approach to revitalizing monotowns through technological development is suggested by Taneo, S. Y. M., Noya, S., Melany, M., Setiyati, E. A. (Taneo, S. Y. M., Noya, S., Melany, M., Setiyati, E. A. 2022.). Scholars have argued that the future of monotowns depends on innovation, which is also the case in the Republic of Kazakhstan. Bolter, K., Robey, J. Suggest that monotowns may develop on the basis of improved socio-economic indicators. (Bolter, K., Robey, J. 2020). Other scientists, in particular, A. Nurgalieva, M. Karimbergenova, L. Moldashbayeva and others (Nurgalieva, Karimbergenova, Moldashbayeva and others, 2019) suggest developing cities based on their specialization. Scientists A. A. Kireyeva, N. K. Nurlanova and A. Kredina (Kireyeva, Nurlanova, Kredina, 2022) propose their approach to the revival of monotowns based on the study of the social and economic condition of depressed areas of Kazakhstan, taking into account the path of development of similar regions in foreign countries. Scientists A.A. Satubaldin, N. K. Nurlanova argue that a differentiated approach to solving the problem is necessary (N. K. Nurlanova, 2017).

Minister of National Economy Republic of Kazakhstan Alibek Kuantyrov said that so far 18,000 jobs have been created in monotowns for the mining, metallurgical, chemical, agricultural, construction and machine-

building industries and a pool of 86,000 anchor projects worth 2,100,000,000 tenge has been formed. For further development, it is proposed to increase the delta limit for capital construction of housing stock and engineering infrastructure, to develop master classes for solving socially significant problems of settlements, and to intensify work on creating new investment projects (Kuantyrov A, 2023). The main approaches to the development of monotowns are provided for in the state programmer for regional development. This programmer provides for state support measures aimed at creating new jobs, developing the economy, and supporting small and medium-sized businesses. We believe that a triangulation approach, which combines several methods at each stage, can be applied to solve the major problem of monotowns development. The aim of this study was to develop a modern approach and strategy for the development of monotowns on the basis of territorial marketing tools.

3 Methodology

A considerable number of different kinds of research methods were used during the work. For example, some data from official websites of enterprises, which are fundamental to monotowns in Kazakhstan, was used. During the study, a triangulation approach was applied, which made it possible to identify the main factors that had a significant impact on all components of the socio-economic development of monotowns in Kazakhstan and depict them as separate interrelated processes that form a single system of influence. The method of comparison is used to consider the main indicators of monotowns ' development (Table 1).

Table 1 - Key indicators of the development of monotowns in the Republic of Kazakhstan.

№	City	Population in 2017	Population in 2022	Number of employed in city-forming enterprises in 2017	Number of people employed in city-forming enterprises in 2022	Average salary in monotowns in 2017.	Average salary in monotowns in 2022.
1	Stepnogorsk	77678	67851	38675	37850	120000	120000
2	Chrome plating	34636	26737	26780	20700	130 000	130000
3	Tekeli	40943	33000	18564	16000	125000	125000

4	Kulsary	61900	60472	32563	30675	130000	130000
5	Altai	46890	36116	18563	16451	110000	110000
6	Kurchatov	8220	7310	5310	4310	113000	113000
7	Ridder	67098	57097	35678	25013	120000	120000
8	Serebryansk	9234	8429	5238	4234	140000	140000
9	Zhanatas	32876	22383	12344	11343	130000	130000
10	Karatau	33564	30214	16781	15212	120000	120000
11	Aksay	41385	40400	21450	20134	130000	130000
12	Balkhash	80786	79167	36180	35160	150000	150000
13	Zhezkazgan	10675	91633	45786	45322	130000	130000
14	Carajal	19383	18426	91342	90756	130000	130000
15	Saran	62456	52020	3500	2500	140000	140000
16	Satpaev	70786	69776	34786	33756	150000	150000
17	Temirtau	191342	186229	97675	96745	160000	160000
18	Shakhtinsk	59564	57152	26875	25678	150000	150000
19	Be careful	29456	28365	20654	19343	130000	130000
20	Arkalyk	29564	28249	15568	14567	140000	140000
21	Jithikara	35765	34736	17786	15736	150000	150000
22	Lisakovsk	41150	40150	35678	34678	140000	140000
23	Rudny	130414	129517	11657	11382	150000	150000
24	Janaozen	160810	150 700	77123	75123	150000	150000
25	Aksu	45435	44714	3300	2200	130000	130000
26	Ekibastuz	144412	143411	71876	70452	140000	140000
27	Kentauyu	215678	213163	180976	160450	150000	150000
28	In total	1782 101	1757 418	1002702	1938472	3536 000	3536000
Note - compiled by the authors on the based https://forbes.kz/finances/finance/kak_menyalis_tsenyi_i_zarplatyi_v_kazahstane_za_10_let/ https://bizmedia.kz/2023/02/08/zarplaty-poloviny-naemnyh-rabotnikov-v-kazahstane-ne-izmenilis-za-god/							

If we consider the dynamics of demographic and economic indicators for 5 years, the population decreased by 24 683 people, the number of those employed in township-forming enterprises decreased by 935 770 people. A high differentiation of wages in monotowns remains. Wages have not changed

at all. There is a need for modernization of monotowns. Thus it is expedient to define what factors have influenced the outflow of the population and deterioration of socio - economic indicators. In our study we relied on the method of comparison as using this method it is possible to obtain new knowledge about the conceptual approaches and strategies for the development of monotowns. Using this method it is possible to determine the barriers and opportunities for urban development. The method of observation allowed us to determine the factors affecting the development of monotowns (figure 1).

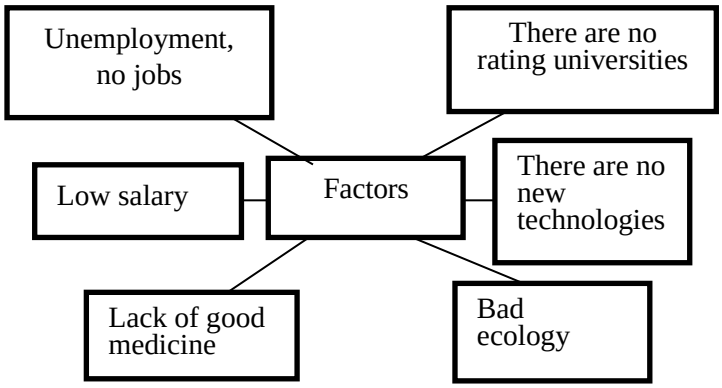

Figure 1 – Factors influencing the depressive state of monotowns.
Note - developed by the authors.

Thus, having studied the main factors influencing the development of cities, we conclude that marketing positioning is necessary, as territories are becoming an active participant in the market of goods, works and services, offering buyers advantages.

4 Results and discussion

In order to build a development strategy for monotowns in the Republic of Kazakhstan, let us consider the specific features of these monotowns (Table 2).

Table 2 - Specific features of monotowns

№	City	Year of foundation	Description
1	Stepnogorsk	1959	Gold and polymetals are produced. Metallurgical, mining, engineering and chemical industries are developed
2	Chrome plating	1940	There are 7 schools and a mining college. Leader in chrome ore mining.

3	Tekeli	1937	Production, extraction and processing of ores, lead and pig iron. Tekeli's role was invaluable during the Great Patriotic War, every eighth bullet was produced from Tekeli lead.
4	Kulsary	1937	Major oil and gas reserves discovered. A major oil field center.
5	Altai	1791	There is a well-developed mining and manufacturing industry. It is one of the producers of agricultural products.
6	Kurchatov	1947	There is a dairy plant, a bread factory, and pre-schools. The city has a national nuclear center with several branches - geology, nuclear physics and nuclear power engineering.
7	Ridder	1786	Metal ore deposits. In 1786 the first deposits of gold, silver and polymerase were discovered. In 1850, the ores from the Ridder deposit were commended in London.
8	Serebryansk	1952	The main industry is electricity generation and the production of personal respiratory protection.
9	Zhanatas	1969	In Zhanatas, phosphorite ore is mined at the Kok-Jon deposit and a wind farm is being built with the China Corporation.
10	Karatau	1963	The center of the chemical industry. Extraction, primary processing and supply of raw materials was carried out. There are facilities for the production of fur products.
11	Aksay	1936	The Karachiganak oil field was discovered.
12	Balkhash	1932	There is a branch of the West Kazakhstan Technological University, an agricultural technical school, gas industry enterprises, a railway station and newspaper publications.
13	Zhezkazgan	1939	The city's economy is based on metallurgy, with oil deposits nearby. There is a city-metallurgical plant. Poor quality of drinking water, air pollution.
14	Carajal	1950	There is a new and richest iron-manganese ore deposit.
15	Saran	1954	The economy is characterized by industrialization. It produces hard coal, limestone and raw materials for building materials.
16	Satpaev	1954	A land with a rich copper ore reserve. Here there is a deposit of cuprous sandstone, which is the second-largest in the world.

17	Temirtau	1909	A city of high culture. There is a choreographic ensemble at international level.
18	Shakhtinsk	1955	Food processing companies are on the rise. Four coal mines for coal production
19	Abay	1949	Abay garment factory. There is a functioning central hospital.
20	Arkalyk	1956	Listed as a depressed city with a very high unemployment rate. Bauxite deposits, raw material for aluminum production.
21	Zhitikara	1939	There were 12 gold mines and 2 chemical plants. 100% asbestos was produced. Gold-bearing ore is mined.
22	Lisakovsk	1960	The Lisakovsky University of the Rudnetsk Industrial Institute is functioning. 305 small and medium-sized enterprises.
23	Rudny	1955	Iron ore deposits were discovered, Rudny is a city of metallurgists and builders. Rich in attractions.
24	Zhanaozen	1964	Rich in oil
25	Aksu	1899	Deposits of hard coal in the Lake Ekibastuz area were found.
26	Ekibastuz	1898	Coal mining, power generation, production
27	Kentau	1952	There are brick factories, a building materials factory, a clothing factory. There are mines where copper, lead and silver were mined.
Note - compiled by the authors			

All characteristics and components of the development potential of monotowns interact with each other: thus, a negative condition concerning one of them will inevitably affect the other, and vice versa. On this basis, it is possible to form the directions of monotowns ' development using the tools of territorial marketing. As scientists Tovma, N.A., Shurenov, N.B., Bimendiyeva, L.A., Kozhamkulova, Z.T., Akhmetova, Z.B. note, the development of the application of territorial marketing tools contributes to improving the quality of life. (Tovma, N.A., Shurenov, N.B., Bimendiyeva, L.A., Kozhamkulova, Z.T., Akhmetova, Z.B). We believe that monotowns can be developed along the following lines (Table 3).

Table 3 - Anticipated directions of monotowns ' development in the Republic of Kazakhstan on the basis of territorial marketing tools.

№	Cities	Industry for development	Rationale
1	Stepnogorsk	Mining	Introduce new technologies and investments to increase and extract ores.

			To build shopping and entertainment centers. To strengthen jobs.
2	Khromtau	Leader in chrome mining.	To improve the city's infrastructure to improve the well-being of its citizens.
3	Tekeli	Tourism	There is potential for development of tourism - picturesque mountains, Saiga waterfall.
4	Kulsary	Oil	A refinery could be built to refine oil to sell petrol and car oils to the market.
5	Altai	Tourism	It is a picturesque place. The Hamir River flows into the Bukhtarma.
6	Kurchatov	Nuclear	Build a modern nuclear power plant to produce electricity.
7	Ridder	Mining	Develop tourism. Attract investments to increase ore extraction.
8	Serebryansk	Chemical industry	Build additional capacity to increase capacity of air purification filters at Serebryanskiy inorganic plant.
9	Zhanatas	Chemical industry	Increase output of bauxite, phosphate rock. Allocate investments to rehabilitate the phosphate industry.
10	Karatau	Light industry	Rejuvenate the fur enterprise
11	Aksai	Oil	Increase the extraction and sale of oil
12	Balkhash	Tourism, science	Build a fish processing factory. Universities - The Kazakh Fisheries Research Institute, which can apply for grant and programme-targeted funding, is functioning.
13	Zhezkazgan	Transport industry	It has the potential to become a logistics center. As it connects north-south, west-east.
14	Karajal	Mining	Introduce new technologies and investments for ore mining
15	Saran	Chemical	To develop agriculture, to develop manufacturing.
16	Satpaev	Metallurgical	To develop the metal industry.
17	Temirtau	Metallurgical	Develop small and medium-sized businesses.
18	Shakhtinsk	Coal	Develop coal mining.
19	Abay	Coal	Develop coal mining
20	Arkalyk	Coal	Develop white and black marble deposits.
21	Zhitikara	Mining	Build an asbestos factory and develop markets.

22	Lisakovsk	Mining	Rebuild the chemical f factory.
23	Rudny	Mining	Introduce new technologies in ore production and mining
24	Zhanaozen	Oil	Build oil and gas refinery, establish production of machine oil.
25	Aksu	Mining	Increase the capacity of the power plant by building power units and sell electricity to countries, as well as the possibility of supplying electricity to the railway for the development of electric trains.
26	Ekibastuz	Coal	Construction of shopping malls with cinemas. Which will create more jobs.
27	Kentau	Mining	Need investment to mine and process polymetallic ores. Increase construction of excavators for sale in domestic market of other monotowns in Kazakhstan.
Note - compiled by the authors			

It is worth noting that there is currently no separate legislation that regulates the development of monotowns; however, there are separate laws that refer to them in one way or another.

For example, Law On Environmental Protection , 2006; Law On local government, 2001; Law On architectural, urban planning , 2001 and others. For the revival of monotowns it is necessary to adopt a strategy for the development of monotowns of the Republic of Kazakhstan, which should include tools of territorial marketing.

Thus, the development of monotowns can be achieved by using the tools of territorial marketing, namely:

1) preservation and attraction of able-bodied population, bringing them up to the level of world standards of personnel attraction,

2) Retention of enterprises with scientific potential,

3) attraction of investment,

4) implementation of transportation functions,

5) developing vocational education system

6. Attracting tourists,

Application of all above mentioned instruments will allow development of monotowns.

5 Conclusion

Thus, in the course of the study we have studied various approaches to the revival of monotowns. The main indicators of monotowns ' development for 5 years have been analyzed using a triangulation approach, which

combines several methods: observation, interview, survey, questionnaire and analysis. At the same time, it has been noted that there are still problems related to staff drain, demography, wages, unemployment in monotowns of the Republic of Kazakhstan. At the same time, the study identified the factors influencing the development of this problem. The specific features of each of the 27 monotowns in Kazakhstan are considered. Recommendations for the development of each monotowns on the basis of territorial marketing are offered. At the same time the strategy of development of monotowns with the use of territorial marketing tools is constructed.

6 Acknowledgement

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The importance of digitalization of the Islamic finance

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Abstract

This article will consider the trends of digitalization of Islamic financial instruments. In the current realities, digitalization concerns all branches of human activity. The most important resource for making any decisions is information, and the key factor in this area is the speed of processing and exchange of information. To achieve such goals, new systems for collecting, transmitting, and processing information are being created every day. To understand the scale of changes in the market of financial instruments, the authors conducted studies of changes in the number of digital products in the financial market of Kazakhstan. This trend is also observed in the world market, of which Kazakhstan is a part. Considering that the main engine of any market is the consumer, the authors conducted a study on the change in the number of users of digital products and transactions. From the studies obtained, it follows that for the successful implementation of Islamic finance tools, it is necessary to adhere to the trends that are observed in the market.

Keywords. Islamic finance, digitalization, payment cards, Islamic cards.

JEL codes: G01, G20, G21

1 Introduction

We live in an age of information and technology. As Winston Churchill said, "Whoever owns the world owns the information." The most expensive resource of the twenty-first century is information. And the key factor in using this resource is the speed of receiving, processing, and transmitting the information. This is the most important aspect that decides a lot in our time. It is important to understand these skills concerning information are important in all sectors and levels of human activity. Touching on the topic of digitalization in all industries, we would like to focus on finance. This industry is one of the most advanced in the field of digitalization. It is understandable, the science of the most liquid asset needs a special approach.

68% of the world's business leaders call digital transformation a top priority for their companies. The COVID-19 pandemic played an important role here. Organizations were forced to adapt to new realities: to transfer

employees to remote work, and to revise the approach to service and document management.

The financial sector was one of the first to introduce information technology into work. Over the past 10 years, applications have appeared that allow to perform some operations without leaving home. And even online banks that do not have branches at all. The development was slow and only in 2020 the digitalization of banks began to develop faster — otherwise, it was impossible to keep customers in the new conditions. As a result, the companies that managed to pick up the trend were the winners.

Against the background of the spread of COVID-19, the financial markets were dealt a severe blow, which caused the whole world to have an urgent need to rethink the system and introduce new tools [6].

One of the indicators of successful digitalization of finance is still payment cards. In our country, every year more and more people are switching to digital methods of payments and money transfers. We can consider in more detail the data on the payment card market of Kazakhstan. During the research, the authors carried out an analysis of the payment transaction market of the Republic of Kazakhstan. In this article the statistical data of the National Bank of the Republic of Kazakhstan were considered. From where the current data concerning the payment transaction market were taken.

2 Literature review

The purpose of this review is to clarify all the existing trends in the financial market in order to forecast the further course of all events. To achieve these goals, the authors conducted data analysis on open sources.

It was done a review of statistical data on the website of the National Bank of the Republic of Kazakhstan. This resource is the most top-end and accurate data bank. The authors analyzed data on changes in the number of ATMs and digital terminals. The following resources used by the authors is the website kursiv.kz . From this source, the authors analyzed the state of the global financial market after covid restrictions. Information was taken from this resource that the coronavirus pandemic accelerated the digitalization process. More detailed data on the trend change in the financial market of the world were observed in the EU and CIS countries. As for Islamic finance, the growth of Islamic banks also implies an increase in interest from users, as discussed in this resource.

To review the Kazakh market of Islamic finance, the authors took data from the Kazakh Islamic financial website tayyab. This service is one of the services that carry out financial services activities on the territory of Kazakhstan. The authors analyzed the state of users of Islamic financial products. The set goals were achieved by analyzing data from the resource.

Also, from the results obtained, it became clear that the number of users of Islamic financial services is increasing every year. It was not without an analytical report from PwC. Data on the change in the number of users of digital payment methods was obtained from this journal. In the financial market of Kazakhstan, there is an increase in favor of digital payment methods and money transfer, which also include subjects of Islamic finance.

3 Methodology

Statistical and comparative methods of analysis were used in this study. The initial data and financial reports of the organization were obtained from open sources. The authors conducted a comparative analysis of data changes in comparison with the reporting date and previous years.

4 Results and discussion

As of September 01, 2022, 61.8 million payment cards are in circulation. The most common are debit cards, whose share is 78.39%, and the share of credit cards is 18.51%. Debit cards with a credit limit and prepaid cards account for 3.10%. In August 2022, the volume of transactions using payment cards of Kazakhstani issuers amounted to 11.4 trillion tenges, the number – 810.1 million transactions. At the same time, compared to the same period in 2021, the number of non–cash transactions increased by 33.3% and reached up to 788.1 million transactions, the volume - by 39.8%, reaching 9.5 trillion tenges. The holders of payment cards carried out 21.9 million cash withdrawal operations for 1.9 trillion tenges. There is a decrease in the number of cash withdrawal operations compared to August 2021 by 1.1%. At the same time, the volume of cash withdrawal operations increased by 7.1%. The main share of non-cash transactions in Kazakhstan is carried out via Internet /mobile banking (64.5% of the total number of transactions and 82.4% of the total volume of non-cash payments and money transfers) and POS terminals (35.5% and 17.3% of the total number and volume of non-cash payments and money transfers). Cash withdrawal operations were mainly carried out through ATMs (98.9% and 91.0% of the total number and volume of cash withdrawal operations). [1].

From the first table, we can understand that the market for plastic cards in Kazakhstan is growing very fast. The population of Kazakhstan prefers electronic payment systems. This is confirmed by an 89% increase in the number of payment acceptance terminals in one year. It is also worth paying attention to reducing the number of ATMs. This means that people have started to cash out less often. Which can also have a positive impact on the fight against the shadow economy and corruption distortion in general [5].

Table 1. Kazakhstan payment card market

Indicators	01.09.2021	01.09.2022	Change	Change in %
Number of cards in circulation (thousand units), including:	**55 745,70**	**61 777,60**	**6 031,90**	**10,8**
- Local systems	18 164,30	20 952,70	2 788,40	15,4
- International systems, including:	37 581,40	40 824,90	3 243,50	8,6
- Visa International	27 130,50	30 962,90	3 832,40	14,1
- MasterCard Worldwide	8 659,80	8 217,20	-442,60	-5,1
Number of POS terminals (pcs.), including:	356 258	674 033	317 775,00	89,2
Number of ATMs (pcs.), including:	12 771	12 570	-201,00	-1,6

As for Islamic bank cards, their market share in Kazakhstan is significantly small, but in recent years there has been a significant increase. For example, as of February 2023, the first Islamic fintech of Kazakhstan, Tayyab, issued its one hundred thousandth card. If we take into account the data for September 2022, this entity accounts for only 0.1% of the market share. However, if to look at the launch date of the project itself from July 2021, the company has issued 100,000 cards in a year and a half. Based on this situation, the question arises whether Islamic fintech companies should enter the market of Kazakhstan [3]. Worth it, because the number of online banking users is growing every day. For a more detailed overview, let's pay attention to the overview of the payments market.

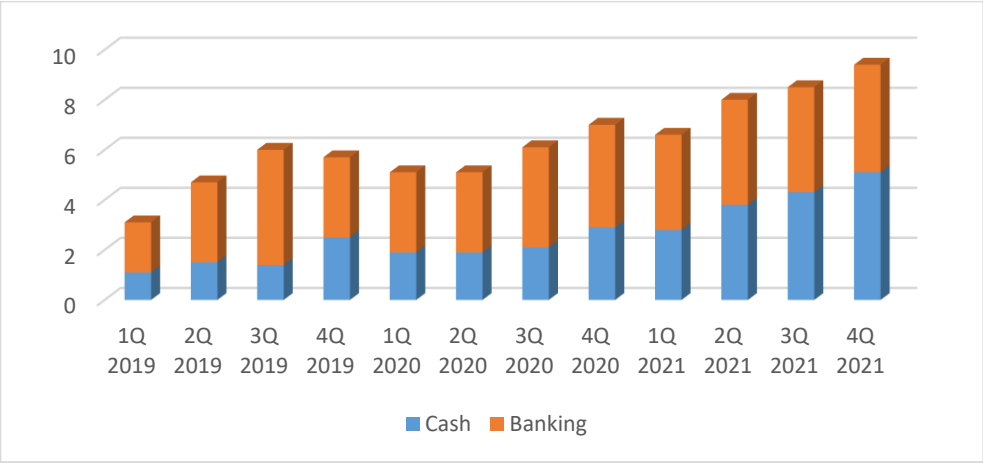

Figure 1. Dynamics of changes in the volume of payments by quarter, trillion tenge

Over the period from 2019 to 2020, the cash payments market has seen a general trend of growth by an average of 8% quarterly. A similar trend is observed in non-cash payments, but with a faster growth rate, on average by 14% quarterly. At the same time, abnormal jumps in growth and falls are observed in 2020, which is explained by the COVID-19 pandemic and a change in consumer preferences [10].

The pandemic led to a worldwide quarantine, restrictions affected almost all small and medium-sized businesses, which led to market stagnation in the second quarter of 2020. However, this situation provoked delayed demand and an active transition to online, which led to a significant increase in payments in the third and fourth quarters of 2020 by 19% and 15%, respectively.

The market shows a general trend to increase the number of payments in Kazakhstan. In 2021, the amount of cash payments increased by 31%, and non-cash payments by almost 2.5 times compared to 2019. Cash settlement in 2019 was used to pay for goods for 13.8 trillion tenges, which accounted for 70% of all retail payments. However, 2020 and 2021 showed a trend for a decrease in the use of cash as a percentage of the total volume - 66% and 55%. Accordingly, the share of non-cash payments grew. The average amount of cash withdrawals increased by 84% in 2021 compared to 2019, which most likely indicates an increase in wages and a decrease in the frequency of cash withdrawals from ATMs. At the same time, the average check for non-cash payments decreased by 7%. The change in the average check is justified by an increase in the total amount of payments in the Republic of Kazakhstan, as well as a multidirectional trend in the number of transactions. From 2019 to 2021, cash withdrawal transactions decreased by 17%, and non-cash transactions increased by 168% [4].

The rapid growth of non-cash payments is due to changes in consumer demands and the emergence of new payment technologies. According to data for 2021, the amount of non-cash payments amounted to 14.5 trillion tenges, which is 82% more than the value of 2020. At the same time, in 2020, the increase relative to 2019 was at the level of 37%. It is worth noting that the frequency of payment (the number of transactions) via cashless settlement is also growing, as indicated by an annual increase in 2020 and 2021 of 34% and 77%, respectively

Although the COVID-19 pandemic and restrictive measures accelerated the transition from cash payments to non-cash payments, the active demand for non-cash payment methods began earlier: since the first quarter of 2019, we have seen an increase in the amount due to pay via POS terminals. According to the NBRK, in 2019, the number of offline POS

terminals increased by 27%, from 126 thousand to 161 thousand, which may mean an increase in demand for card payments. Already in 2019, the amount of non-cash payments accounted for one-third of the total payments market.

The worldwide lockdown, the boom in online deliveries, remote work, the development of retail e-commerce and the spread of innovative technologies have made their own changes in consumer behavior. The decrease in the amount of payments in the first half of 2020 was due to the initial economic shock and job losses. One of the confirming factors is the decrease in the level of employment of the population to a minimum value of 65.7% over a 17-year period. However, by the end of the second half of 2020, growth is noticeable, which continues its trend in 2021. Despite job cuts and unemployment, caused by the closure of many small and medium-sized businesses in 2020, nominal revenues by the end of the year, namely in the 4th quarter, increased by 15.5% compared to the previous quarter, due to which a strong growth of 27% can be justified [2].

The new crisis caused by the COVID-19 pandemic has provided the basis for creating a safer and more sustainable payment system. Many market participants have adapted to the new conditions through digitalization, improved their business models and processes, and expanded the range of services and services offered. As a result, these factors helped to create greater consumer confidence in online purchases, which can be observed from the growth in the share of non-cash payments through online POS terminals in the second half of 2020. In 2021, the trend for convenience and safety continued. New ecosystems with multi-vector consumer services are being created, thereby covering an increasing market share (Figure 2).

The amount of online payments has increased 2.9 times since 2019, and the number of transactions has increased 2.7 times due to the changed consumer behavior - people began to trust online purchases more. Other reasons for this growth were: the successful introduction of mobile commerce and banking ecosystems, the development of delivery services and incentive systems such as cashback [9].

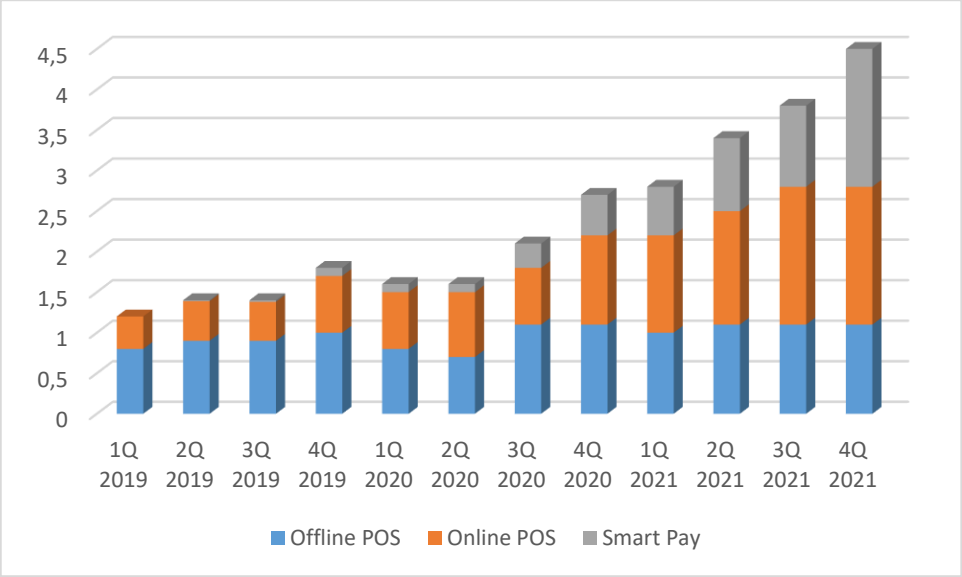

Figure 2. Dynamics of changes in the volume of payments by quarter, trillion tenge

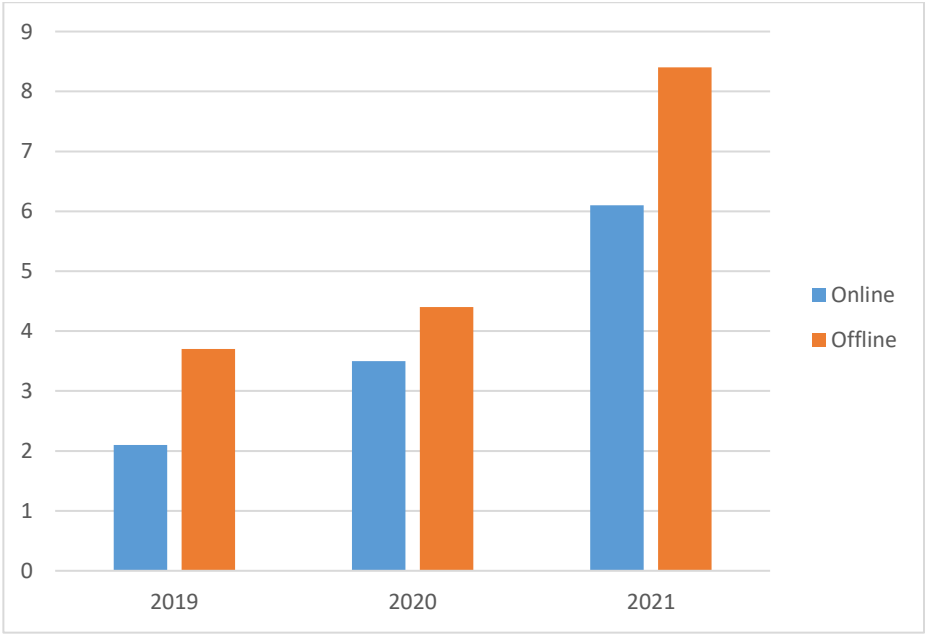

Figure 3. Change in the amount of non-cash payments from 2019 to 2021

Despite the rapid development of the online market, there is also a significant 2.3-fold increase in the amount of offline payments from 2019 to 8.4 trillion tenge and 2.6-fold increase in the number of transactions to 1.4 billion. However, it can be noted that the largest jump in the amount of non-cash payments is mainly accounted for by Smart Pay* with a maximum annual growth of 6.4 times over a two-year period. This trend is caused by the convenience and security of users, as well as mass availability to pay with the use of new technologies (Figure 3) [7].

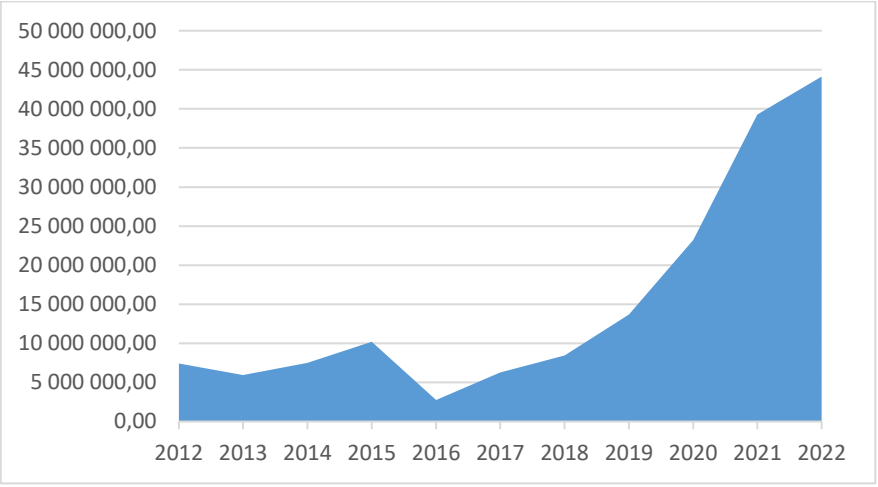

Figure 4. Change in the Murabaha asset portfolio

Given the excellent potential of the Kazakhstani market, it can be assumed that this market has a strong potential for the entry of various Islamic fintech projects. The most important open question in this situation is how Islamic banks live in this market. To do this, it is needed consider the portfolio of an existing Islamic bank in Kazakhstan (Figure 4). The diagram shows that the bank's portfolio is growing, which means that the bank is developing. And against the background of other financial entities, the bank can exist quite well [8].

5 Conclusion

According to the conducted research, it can be concluded that digitalization is very important for all industries and doubly so for the finance sector. The analysis of payment systems of Kazakhstan was carried out. The result shows that online payment and money transfer methods are beginning to prevail. An analysis of Islamic banks was also carried out. There are practically no Islamic banks in this market, but this does not mean that there are no prospects for Islamic banks in the market. An analysis of the portfolio

of Al Hilal Bank was carried out, which showed that the bank has a noticeable growth. Thus, we came to the conclusion that the financial market of Kazakhstan is developed in terms of digitalization, and if Islamic financial companies want to introduce themselves and compete with other banks, they need to digitalize their products, since every year more and more people make a choice in favor of online.

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Development of the financial market in the context of anti-crisis management

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Abstract. The article examines the features of the financial market, gives its characteristics, and provides for anti-crisis management of the financial market, which has been developed in many countries after the global crisis. The study is devoted to the consideration of the existing mechanisms of anti-crisis management on the example of the financial market of Russia and Kazakhstan. The consequences of the practice of using these mechanisms and the possibilities of their improvement at the global level are being studied. The development of the financial market allows us to conclude that it belongs to the most dynamic and complex phenomena of modern economic theory. In a functional sense, the modern market is a system of markets, among which an important role belongs to the financial market. The financial market is an integral part of the financial system, which can successfully develop and function only in market conditions. An objective prerequisite for the existence of a financial market is the discrepancy between the need for financial resources from a particular subject of market relations with existing own sources of financing.

Keywords: sustainable development; financial market; financial services; financial institutions; anti-crisis management
JEL classification: M21, G01, G10, F63

1 Introduction

The influence of globalization processes and the formation of the world financial market led to the formation of special financial instruments. Understanding their essence is necessary for effective risk management, pricing control, creation of active regulation and assessment of the level of interaction in the financial market. As a result of the study, the need for a step-by-step integrated approach to the study of the interaction of elements of the financial market has been identified.

In addition to information and communication technologies, the development of transport systems, the main engine of globalization is economic activity. This ensures the continuity of production and markets in different countries through trade in products of tangible and intangible

resources, the movement of capital and information across the borders of individual countries, interconnected ownership networks and the duration of the existence of international companies.

Globalization can be understood as the main direction of development, which is aimed at achieving a world free of pronounced national borders at the present stage. This development of events in the field of economic and social activity accompanies several positive and negative consequences, which include insufficiently prepared enterprises of post-communist countries (Financial market of the Republic of Kazakhstan).

In any country, financial markets are mechanisms for the distribution and redistribution of capital (long-term income) between lenders and borrowers through intermediaries, including banks. Financial instruments are a means by which supply, and demand can influence the distribution and redistribution of capital between economic entities. Thus, financial instruments are various market instruments of a financial nature, i.e., securities, monetary obligations, and foreign currency.

One of the key tasks of state regulation of financial markets is to ensure an appropriate level of protection of consumers of financial services and create the necessary conditions for the stability and stability of the financial sector (Financial market of the Republic of Kazakhstan).

And one of the most urgent and fundamentally important issues today is strengthening the financial system and ensuring the growth and social development of the national economy. This requires the efforts of both state institutions and the population, the intellectual potential of scientists and the concentrated energy of entrepreneurs. The irreversibility of the positive shift achieved for the first time in economic stability and overcoming the crisis depends on common efforts and effective actions.

2 Literature review

According to the first approach (essential), the financial market is a set of relations arising in the process of circulation of financial instruments. Such relationships are not limited to asset purchase and sale transactions and in most cases are based on the interaction of more than two people. Market relations have an economic character and can be considered as an element in the general chain of production, exchange, and consumption of goods. The emphasis on relations, which are the leading characteristic of the market, is made by M.V. Gridchina (Gridchina M. V., 2010), With M. Yesh (Yesh S.M., 2011), J. Marshall (Marshall J.F., 2008).

Methods and techniques of functioning of the financial market, which form its mechanisms, are the basis of the technological approach. Moreover, for the completeness of the characteristics, the mechanisms themselves must be supplemented with tasks and goals, for the solution or achievement of

which innovative tools and mechanisms are used. Proponents of the approach are V.Yu. and L.V. Presnyakov, who consider the transformation of "inactive funds into loan capital" to be the main function of the market (Bulatov, 2015), S.I. Yuri, who defines minimizing costs and maximizing the reliability of concluding transactions as the main tasks of market infrastructure, A.Y. Smolyanskaya and O.D. Vasilik see the purpose of financial mechanics in the redistribution of financial resources, L.N. Pavlova, identifying the financial market and the capital market, limits the functionality of the mechanism to "managing the flows of monetary resources, means of payment that generate income" (L.N., 2013).

3 Methodology

Features of the financial market of Kazakhstan in the conditions of the economic crisis. Strengthening the trust of individual consumers and investors in financial markets by increasing their security, improving financial literacy, and expanding the availability of financial services. This goal acquires its specificity in the conditions of digitalization of financial and economic relations, which changes the nature of interaction between suppliers of financial products and services to consumers, shortens the path of the client, leads the mass consumer to riskier segments of the financial market, turns investing into a special process that requires qualifications, as well as attention and time. In Kazakhstan, the first wave of the global crisis hit already in August 2007, and anti-crisis measures were urgently needed to save the banking sector.

Kazakhstan also felt the effects of the global financial crisis in 2018-2019 after a decade of rapid growth fueled by the production and export of hydrocarbons. Before the crisis, the country demonstrated good macroeconomic indicators, including a large, consolidated budget surplus, rapid growth of foreign exchange reserves and a state fund accumulating revenues from the oil sector. Nevertheless, negative signs of the crisis have become noticeable, such as rising inflation, falling unemployment, sharp wage growth and low labor productivity.

However, a favorable global hydrocarbon market protects Kazakhstan's economy by limiting the impact of the global crisis in 2009. Consolidated fiscal surplus, low public debt, increased foreign exchange reserves and state funds provided a positive rating from rating agencies until the fall of 2010; high GDP growth (about 6%) in the first and second quarters of 2009 was also associated with record prices for hydrocarbons.

Kazakhstan's fiscal policy remained stable in 2008-2009, maintaining a budget surplus and a low level of public debt. In 2009, budget revenues were secured by higher oil prices. The introduction of tariffs on oil exports since

May 2008 has played an important role here, which has led to a threefold increase in customs revenues.

The slowdown in business activity, the decline in oil prices and tariff rates led to a decrease in budget revenues. Nevertheless, budget expenditures increased annually faster than economic growth due to revenues from the sale of hydrocarbon resources, the share of which in exports increased from 40% to 60%, and GDP growth decreased to 3.2%. The impact of the global crisis on the economy of Kazakhstan was felt most strongly when the volumes of trade, construction, financial activities, manufacturing, transport, production and distribution of electricity, gas and water significantly decreased.

Describing the course of events, the global crisis continues to have an impact on the financial markets of Kazakhstan. Although the liquidity crisis has led to a decrease in banks' external liabilities, and banks have tightened their capital requirements and external borrowing conditions, borrowing from the non-banking sector continues to grow.

However, the development of such important financial products as credit, deposits and leasing has already begun in Kazakhstan. Their role in the market economy is to accelerate the formation of initial capital, which is very important in conditions of insufficient investment in Kazakhstan (Financial market of the Republic of Kazakhstan).

In addition, despite the repeated increase in salaries of civil servants, there is a strong differentiation of financial incomes of the population in our republic. If this problem is solved in the future, it may lead to an increase in tax revenues to the budget of the Republic of Kazakhstan.

The current monetary policy of the republic is aimed at creating a favorable business environment, implementing the country's strategic development goals, and creating conditions for further stable socio-economic development. Thus, according to operational data, in 2014 the production of goods and services amounted to 40% and 52.6% of GDP, respectively.

It should be noted that thanks to anti-crisis measures during the global financial and economic crisis, the country ensured economic growth, putting Kazakhstan on the path of sustainable and recovery growth.

After the financial crisis, Kazakhstan again demonstrated high rates of economic growth: real GDP growth in 2010 amounted to 108.3%, and in 2011 -107.5%. The economic growth was mainly due to an increase in domestic demand and rising prices for export products (oil and energy), as well as attracting investments into the country and implementing a national program to accelerate industrial and innovative development of the economy. 237 projects worth more than 1 trillion tenge were launched next year and about 20,000 jobs were created (Financial market of the Republic of Kazakhstan).

Features of the Russian financial market in the context of the economic crisis

The formation of the financial industry of the Russian Federation in modern conditions is carried out in conditions of internationalization, increased interest in the financial market, expansion of agreements on the contribution of funds to the most developing industries, the volume of cross-border investment transactions and growing competition from global financial facilities. These circumstances have led to the fact that the Russian financial market has achieved certain results, but it is insufficiently positioned on the world market (Bank of Russia).

At the stage of development of market relations, the Russian financial market has the following characteristics:

- Significant differences in the level of development in different regions;
- A limited number of names of financial instruments used;
- The predominance of commercial banks;
- The narrowness of the financial market with two sectors: the foreign exchange market (US dollar) and the market of equity securities (short-term and long-term government debt obligations) (Globfin.ru.).

As a result, derivative financial instruments directly affect the state of the national currency, namely the ruble, increasing pressure on it, causing negative changes in the exchange rate against other foreign currencies and, as a result, deepening the crisis. Unfortunately, neither derivatives nor other financial instruments have a clear definition in Russian legislation. As a result, the processes in the financial market are currently beyond the control and necessary regulation.

It should be recognized that the attempts of the Bank of Russia to formulate rules for regulating, supervising, and controlling the activities of credit institutions in the financial market and to establish appropriate accounting are unable, due to circumstances, to have the desired universality from the point of view of participants, target assets and penetration into the conceptual and terminological apparatus. Also, I would like to note that the weak side of the Russian financial market is a small share of assets of non-credit institutions dominated by the banking system, which, unfortunately, does not provide a sufficient level of internal financing.

One of the current priorities in the financial sphere of the Russian Federation is the creation of a global financial center in Moscow: in 2008, the Government of the Russian Federation approved the "Strategy for the Development of the Financial Market until 2020". According to this document, the main long-term goal is to create a global financial center as an exchange system between organizations in need of financing and investors willing to place and invest their funds (Federal Financial Markets Service).

4 Results and Discussion

The Central Bank of the Russian Federation has significantly increased its presence in the foreign exchange market and conducted significant operations on the sale of foreign currency in 2021, despite its stated intention to switch to an inflation targeting regime by 2022 and implement measures aimed at increasing the flexibility of the exchange rate mechanism. These measures were prompted by the desire of the Central Bank of Russia to slow down the rate of depreciation of its currency in the light of unfavorable economic and geopolitical conditions abroad. Such an interventional policy of the Central Bank does not contradict the goal of switching to inflation targeting, since the transmission effect of the exchange rate on prices has made the depreciation of the ruble one of the main factors accelerating inflation in 2021. However, the expenditure of international reserves to maintain the exchange rate of the national currency ultimately proved ineffective, and the actual size of the weakening of the exchange rate reached a critical level (Gorbatenko I.A., 2015).

In this regard, financial market participants, including credit institutions, may be advised to take the following measures:

- Set individual (separate) OVP limits for each dealer;
- Introduce stricter control over the activities of dealers in financial markets (limiting the scope of their activities on underlying assets/products);
- Create a follow-up control system with appropriate rack codes and approval deadlines;
- Develop and establish internal mandatory limits on counterparties for each type of transactions, including futures and related physical transactions;
- Establish internal procedures for the preservation of administrative tapes with records of dealers' execution of transactions on Reuters and telephone records of conversations about the execution of transactions;
- Clarify the task of drafting legal documents, including settlement forward agreements, and require that they provide for sanctions in case of non-compliance by both parties with the pre-agreed content of the second part of the settlement forward to give them legal force in court.

Traditionally, in Russian and foreign practice, the division of the financial market is based on the maturity of financial instruments, and the financial market is divided into the money market and the capital market. The money market provides for raising funds for a short period, no more than one year, and the objects of transactions in this market are short-term financial instruments.

The use of financial market instruments allows financial and credit institutions to manage their liquidity, and the National Bank to use this market to regulate the monetary system of the country.

An important factor in the effective functioning of the economy is the formation of effective mechanisms of financial influence and regulation that

allow the Central Bank of Russia, through specific instruments, to influence the formation of the resource base and business activity of credit institutions and stabilize the monetary cycle. The monetary policy of the Central Bank of Russia has a direct impact on all economic processes. First, the organization of business activity and the standard of living of the population depend on the level of inflation.

The implementation of the long-term concept of financial sector development will be achieved through the entry of financial sector sectors into leading positions in the region, namely from the following actions:

• Creation of the most liquid and affordable Kazakh securities market in the CIS and Central Asia.

• Creation of the most liquid foreign exchange market for major currencies in Kazakhstan.

• Formation of financial institutions in Kazakhstan (banks, pension funds, insurance companies and other financial institutions) as the largest regional financial institutions capable of meeting the financial needs of the CIS and Central Asia region, supporting, and promoting investments and interests of Kazakhstani companies in regional markets (Bank of Russia).

One of the tasks' facing Kazakhstan is to increase the efficiency of foreign trade. To do this, it is necessary, first, to optimize the commodity structure of imports and exports, to ensure balance and create new comparative advantages that will become the basis for the specialization of different industries and an important driver of the country's economic growth. An important element of the development of financial markets is a reasonable and consistent macroeconomic policy based on price and financial stability and fiscal stability. The main goal of corporate governance is to ensure effective transformation of factors of production and sustainable development of enterprises (Kadarova & Markovich, 2013).

Table 1. Main differences between standard and anti-crisis management

	Standard Management	**Anti-crisis management**
Procedure	Defining a strategy Defining goals Designation of functions Creating an organizational structure	Identification of the main causes of the crisis Crisis plan Ensuring coordination of actions Declaration of a state of emergency Identification of all capable employees of the company Identification of areas affected by the crisis

		Definition of the main decisions of the head
Communications	Compliance with the hierarchy Exchange of information between different levels of management	Direct communication of the main crisis researchers with other employees as needed
Responsibility	Organizational structure and functional classification	The main manager is responsible for the interconnectedness of tasks The chief executive does not adhere to the standard management system Crisis areas are considered separately
Awards and sanctions	They arise from the methods and evaluation of remuneration	Directly related to a separate task In case of failure, the researchers should be replaced
Control	Regular for each management level	In the short term, the state of recovery from the crisis and the time horizon of solutions are determined in advance. The manager evaluates the attitude to work
Managers' activities	Everyone is responsible for their area Direct subordinates become the object of management	The emphasis is on eliminating the root causes of the problem An active approach to all those involved in crisis management
(Kadarova & Markovich, 2013)		

In crisis situations, management is determined not by the performance of functions in accordance with the hierarchy, but by the distribution of tasks. At each level, employees are assigned certain tasks, and they are responsible for their implementation. The first step in overcoming the crisis is to support owners and top managers in implementing these changes. The differences between standard management and crisis control are listed in table 1.

All enterprises during their existence face constant changes in equilibrium, periods of prosperity and manifestations of various crises. These crises are an integral part of the life cycle of each business unit, and the only difference is what happens inside the enterprise. Some enterprises successfully cope with crises, no matter how many times they occur, while others cannot cope even with the first signs of a crisis. Just as one can describe the life cycle of an enterprise, one can describe the process of crisis

management of a business by describing the sequence of events from the moment of the crisis to its resolution.

5 Conclusion

In conclusion, it can be noted that the financial policy of any state should be aimed at building such a financial mechanism that allows achieving the strategic and tactical goals stated in the long-term program of socio-economic development of the country for the future with the greatest efficiency. In a crisis, the task of financial policy is to minimize the time of transition from a recession to a revival of activity by involving all components: budget, tax, currency, and monetary policy.

The long-term realization of the vision of the financial sector development can be ensured by achieving leading regional positions by individual segments of the financial sector:

- formation of the securities market of Kazakhstan as the most liquid and affordable market in the CIS and Central Asia;

- formation of the most liquid foreign exchange market in Kazakhstan by the main types of currencies;

- formation of Kazakhstan financial institutions (banks, pension funds, insurance companies and other financial institutions) as the largest regional financial organizations capable of meeting the needs of the CIS and Central Asia region in financial resources, as well as supporting and promoting investments and interests of Kazakhstani enterprises in regional markets.

The structure of the domestic financial system directly contributes to the qualitative and quantitative growth of the economy by providing technologically advanced intermediary services.

Over the two decades of independence, the system of economic and social relations of Kazakhstan has undergone complete changes: financial stabilization was mainly achieved after the start of global economic reforms in 1994, the privatization of all state property is nearing completion, production is on the rise. Prices have been almost completely liberalized, and restrictions on foreign trade have mostly been lifted (Financial market of the Republic of Kazakhstan).

The main problem in the financial sector is that the quantitative growth of Kazakhstan's budget revenues and all other important financial indicators was achieved due to the depreciation of the tenge against the dollar and income from the oil industry, and since the entire financial and economic system depends on the market values of these raw materials on world markets, a deep recession, in our opinion the opinion may lead to a recession.

As for Russia, addressing issues of sustainable development is also important for fully building relations with foreign partners from among friendly countries that are also moving in this direction, especially in terms of

the "green" agenda. The integration of ESG risks by foreign countries into the regulation of the financial sector may lead to an increase in the reserve rates for transactions with Russian financial market participants financing "dirty" industries, even from friendly countries. The introduction of cross-border carbon regulation and the expansion of its perimeter will inevitably affect producers of fuel, raw materials, and materials. It is important for Russia not to be among the laggards in implementing the principles of sustainable development, which will be fraught with increased risks for both the economy and the financial sector, so it is necessary to continue moving in this direction.

In the near future, the Bank of Russia will focus primarily on continuing work on the development of the sustainable financing mark

The task of a balanced way out of the crisis is one of the key problems of the current global economy for the governments and central banks of most countries of the world. The dynamics of global financial markets, fluctuations and the direction of capital flows will largely depend on how successfully this task will be solved. The strengthening of the previously ultra-soft monetary policy during the crisis and large-scale fiscal stimulus in most countries during this period significantly increased the propensity of investors to risk (in search of profitability), stimulated the private equity markets and led to a significant increase in the value of assets in global financial markets.

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Financial technology development in banking during the Covid-pandemic

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Abstract

Financial technology has changed the whole concept and revolutionized the banking sector. Fintech has a significant impact on the banking sector by changing the ways in which banking sectors used to operate. As FinTech has enabled and meet the banking sector more accessible to people from all corners during the Covid-pandemic. Therefore, in the article author tried to study the various factors that promote financial technology and to investigate various other alternatives in the successful implementation of financial technology in the banking sector for the benefit of society. To create a good understanding of the application of financial technology in the banking sector and the transaction of banks from traditional to modern approaches a Descriptive Research Design is being used which can better help understand the significance of financial technology in the lives of people in the times of pandemic. Furthermore, a Constructivist Research Paradigm is being used in the study where the data is being collected from various primary sources in the banking industry that have implemented the tools and techniques of Financial Technology in their banking approach during the times of pandemic. Fintech has enabled banks to remain open and functioning despite the health and safety restrictions imposed by the pandemic. In the article various collaborations of Financial Technology with banking services have been described and discussed. The significance of digital banking especially in times of crisis like the pandemic and the effect and impact that it has made on the lights of customers have been highlighted. The article covers the important aspects of financial technology and its uses.

Keywords. Financial technology, banking, innovation
JEL codes: G21, F65, O31

1 Introduction

Financial technology which is the terminology used to describe all Financial Services such as online banking facilities, online transactions using mobile and net banking, trading online, buying and selling of cryptocurrency, and all the other technologies that facilitate the consumers in availing smooth

financial services from financial institutions and banks by replacing the traditional methods.

Financial technology has changed the whole concept and revolutionized the banking sector. Fintech has a significant impact on the banking sector by changing the ways in which banking sectors used to operate.

Fintech comprises a vast range of innovative products that are helpful in the transformation of the financial industry. The various tools of financial technology include mobile wallets, online banking facilities, mobile payments, and so on. These platforms use high-technology authentication and encryption to protect the sensitive financial information of the customers. Investment management has become easier with the development of financial technology. Many robotic advisors are taking up the place of traditional investment managers and advisors Robotic managers of investment management like Wealthfront, Betterment, and so on.

There are a number of advantages of incorporating Financial Technology in the banking sector as the uses of FinTech in times of crisis are immense and unavoidable, especially during a pandemic when the government is imposing various protocols for social distancing and safeguarding the citizens from further spread of the infection. FinTech has province to be beneficial for contactless transactions.

The expansion of internet connectivity and implementation of high-speed network connectivity has enabled the smooth implementation and running of digital banking by the government. For the easier resolution of grievances and issues, Chatbots with the help of Artificial Intelligence (AI) have proven to be useful to the customers as well as reduce stress to the banks and their branches. Covid has brought about a digital transformation in the country where banking is available anytime, anywhere. Fintech in banking has mainly been popular due to its ease of use and accessibility.

Covid 19 has been treated more as an opportunity than a pandemic. One of the most positive aspects of a pandemic that caused an opposite change in society as well as the banking sector is the introduction of digital banking at the right time. Artificial intelligence and machine learning (ML) are constantly supporting this cause of digitalization in the banking sector and converting scenarios in financial institutions.

The banks have to drastically increase their attention on digital security and data protection (Bykanova, 2020, 42-51). This pandemic has also introduced electronic documentation in the banking industry.

Among the huge range of advantages that are related to internet banking, a few of them are greater accessibility which arises from the helpful free and easy bank account opening, applying for loans, transfer of money, payment of bills, and so on. Nowadays, e-banking can also be used for applying for credit cards, applying for various life insurance and other

insurance easily, analyzing the profiles of applicants for loans, and taking payments through various online payment methods.

Since the digital banking approach does not require a physical branch, it has its own advantages and disadvantages. Digital banking is highly dependent on the internet and the availability of networks which might be a challenge in case of network bandwidth issues. There are also known such regulations surrounding digital banking that are free of errors or perfect. There might always be loopholes that give entry to fraud and scams. On the other hand, many other advantages of digital marketing are that it is safe and private in nature. Transactions are quicker than traditional alternatives, it can be assessed anytime and anywhere.

Covid 19 has brought over a number of challenges in the banking sector. Due to the financial crisis as the result of lockdowns and overall economic loss due to the infection the banking sector had to suffer massive pressure in terms of income and low profitability.

The sustainable performance of the banks is maintained through online banking. Online banking has saved a large number of lives during the time of the Covid 19. In spite of there being several advantages to the digital banking system, it is not free of problems and challenges, some of them being employees lacking the adequate training and expertise to handle the digital aspects of banking successfully, lack of proper data protection policies and regulations, many times the customers have to face malfunctioning of technology (Khanra et al., 2021). Transforming from traditional to online banking creates continuity and resilience in the banking system.

2 Literature review

Financial technologies have revolutionized the banking industry in recent years. FinTech solutions have enabled banks and financial institutions to optimize their operations, provide better services to their customers, and increase their overall profitability (Chang et al., 2000). This has led to the emergence of new business models, such as mobile banking and online banking, which have further transformed the banking landscape (Riza, 2021). Furthermore, FinTech has enabled banks to develop new services and products, such as peer-to-peer lending, digital currencies, and blockchain technology (Chaveesuk et al., 2021). These advancements have enabled banks to provide more convenient services to their customers and streamline their operations. As a result, the banking industry has seen remarkable growth in recent years (Kumar & Sharma, 2018). The evolution of financial technologies in banking has enabled banks to offer their customers a wide range of services and products with greater convenience, efficiency, and security (Lam, 2017). Recent developments such as online banking and mobile banking have enabled customers to manage their finances without

having to visit a physical branch (Kiyosaki, 2018). In addition, the introduction of artificial intelligence and blockchain technology has made financial transactions more secure and efficient (Baraniuk, 2019).

Early adopters of financial technologies in banking have included JPMorgan Chase, Bank of America, and Wells Fargo. These banks were among the first to develop and implement technologies such as mobile banking, digital wallets, and blockchain. These services have allowed customers to access their banking information from their smartphones, pay bills electronically, and securely store financial data. The use of these technologies has enabled banks to increase customer satisfaction, improve efficiency, and reduce costs (Alber & Dabour, 2020). The emergence of financial technologies has revolutionized the banking sector, allowing for the greater accessibility of digital banking services and increased customer experience (Savitha & Hawaldar, 2022). Banks can now offer customers more personalized services than ever before, such as automated wealth management, seamless account opening, and smoother loan application processes (Marcu, 2021). This has resulted in a more efficient banking experience, with customers able to access services in a faster and more convenient manner. The rise of FinTech has had a disruptive impact on traditional banking. It has enabled the emergence of new banking models and services, such as online banking, and automated investment advice (Candy et al., 2022). These new services have allowed consumers to access financial services more quickly and easily, with lower costs and more convenience than ever before. This has shaken up the traditional banking landscape and has pushed banks to become more innovative and competitive (Purba et al., 2021).

Over the past few years, the FinTech industry has revolutionized the way banking services are provided to customers. FinTech companies have made it easier and more cost-effective for customers to access banking services. This has resulted in an improved customer experience when it comes to banking. One of the major ways FinTech has improved the customer experience in banking is by offering more digital services. FinTech companies are able to use technology and data to provide customers with faster and more convenient banking services. This includes online banking, mobile banking, and other digital services such as peer-to-peer payments, automated bill payments, and more. These digital services are making banking more accessible and convenient for customers, which is improving their overall experience with banking. Another way FinTech is influencing the customer experience in banking is by offering more personalization. With the help of AI and ML, FinTech companies are able to offer customers tailored banking services, such as personalized loan options, tailored investment advice, and more. This is allowing customers to access services

that are tailored to their specific needs and preferences, which is resulting in a better customer experience.

FinTech is also improving the customer experience in banking by making it more secure. FinTech companies have made it easier and safer for customers to access banking services. This includes the use of biometrics, two-factor authentication, and other security measures to ensure that customers' accounts and data are secure. This is providing customers with peace of mind when it comes to banking, which is further improving the customer experience. The FinTech industry is having a major impact on the customer experience in banking. FinTech companies are making banking more convenient, more personalized, and more secure, which is resulting in a better customer experience. The new frontier of financial technologies in banking is advancing rapidly and has the potential to revolutionize the way banks do business. This new frontier is based on the concept of using technology to provide digital banking services to customers. This includes the use of mobile and internet banking, digital wallets, and artificial intelligence technologies. Mobile banking allows customers to access their banking accounts, perform transactions, and transfer funds using a mobile device. This technology has made banking much more convenient and accessible, especially for those who may not have access to a traditional banking branch. Banks are also able to offer more innovative services such as real-time payments, person-to-person transfers, and even virtual cards. Digital wallets are becoming increasingly popular as a way to make payments and store funds securely. This technology allows customers to store their payment information in a secure digital wallet, which can then be used to make payments anywhere online. Some digital wallets even allow customers to make payments in different currencies. Artificial intelligence technologies are being used to improve customer experience and reduce costs. For example, banks are using AI to detect fraud and improve customer service. AI can also be used to optimize the customer experience by suggesting products and services tailored to individual customers. Banks are using blockchain technology to create more secure and efficient financial transactions. Blockchain allows for the secure transfer of funds between parties without the need for a centralized intermediary. This technology can also be used to create secure digital currencies, which can be used to make payments and store funds.

The new frontier of financial technologies in banking is rapidly evolving and has the potential to revolutionize the way banks do business. Banks are now able to offer more innovative services and secure digital currencies, as well as improved customer experience through the use of AI and blockchain technology. This new frontier offers banks the opportunity to provide customers with better services while also reducing costs. According

to a report from the World Bank, the banking sector is witnessing a “new frontier of financial technologies". This new frontier is being driven by the emergence of a variety of technologies, such as blockchain, artificial intelligence, and cloud computing. These technologies are enabling banks to provide innovative and more efficient services to their customers. For example, AI is being used to automate mundane tasks, such as customer service and fraud detection, while blockchain is being used to facilitate secure and efficient payments. Additionally, cloud computing is being used to store customer data and facilitate online banking (Liu et al., 2019). Overall, these technologies are disrupting traditional banking practices and could potentially revolutionize the banking sector in the near future.

3 Methodology

To create a good understanding of the application of financial technology in the banking sector and the transaction of banks from traditional to modern approaches a Descriptive Research Design is being used which can better help understand the significance of Financial technology in the lives of people in the times of pandemic. Furthermore, a Constructivist Research Paradigm is being used in the study where the data is being collected from various primary sources in the banking industry that have implemented the tools and techniques of Financial Technology in their banking approach during the times of pandemic.

4 Results and Discussion

Fintech and its implementation in banking is very necessary for the current time owing to the benefits it can shower on society and at the same time the reduction of cost and improvement of profitability in the organization. Among the huge range of advantages that are related to internet banking, there are disadvantages as shown in Table 1.

Advantages	Disadvantages
Access anytime, anywhere 24/7	Highly dependent on the internet
Verification by high-technology authentication	Deficiency of the officers adequate training
Data protection and security	Lack of data protection policies
Contactless online transactions	Loops in regulations
Chat bots with artificial intelligence	Malfunctioning of technology
Electronic documentations	

The financial technologies in banking, such as blockchain, artificial intelligence, and cloud computing has revolutionized the banking sector and enabled new opportunities for customer service and financial inclusion. For

example, blockchain technology is helping to reduce transaction costs, provide more secure methods for authentication, and enable faster payments (Khan, 2021). Similarly, artificial intelligence is helping to provide more personalized services for customers, allowing them to receive personalized advice and financial guidance in real time (Kushwaha et al., 2020). Cloud computing is helping banks to reduce costs and increase efficiency, while also providing the opportunity to offer customers new and innovative services (Ling et al., 2016). Fintech is the use of technology to deliver financial services, including digital banking, digital payments, digital investments, and other financial services. Banks are using fintech to streamline their operations, reduce costs, and increase customer satisfaction. One of the most significant innovations in banking has been the introduction of digital banking. Digital banking refers to the use of online platforms to access banking services, such as checking accounts, deposits, transfers, and loan applications.

Banks are offering customers the ability to access their accounts from any location through a secure, web-based platform. This has enabled customers to manage their finances more easily and conveniently. Digital payments have also become increasingly popular in banking. Banks are now offering customers the ability to make payments and transfers electronically, as opposed to having to visit a physical location. This has allowed customers to make payments and transfers quickly and easily, as well as providing them with greater control over their finances. In addition, banks have also begun to offer digital investments. These investments are offered through online platforms, which allow customers to invest in stocks, bonds, mutual funds, and other financial products without the need to visit a physical location. This has enabled customers to manage their investments more easily and conveniently. Finally, banks have begun to offer a variety of other financial services, such as financial planning and advisory services, insurance, and foreign exchange. These services are typically offered via digital platforms, allowing customers to access them from any location. This has enabled customers to manage their finances more effectively. The introduction of innovations in financial technology has had a positive impact on the banking industry. Banks are now able to streamline their operations, reduce costs, and increase customer satisfaction. In addition, customers are now able to manage their finances more easily and conveniently.

Financial technologies are revolutionizing the world of banking. FinTech refers to the use of technology to improve banking services such as money transfers, payments, investments, and loan applications. FinTech startups are disrupting the traditional banking industry by providing technology-driven services that are faster, more efficient, and more secure (Nguyen & Nguyen, 2020). For example, mobile banking applications have

enabled customers to access their accounts quickly and securely, while artificial intelligence and machine learning technologies have enabled banks to automate customer service and provide faster loan applications (Kumar & Sharma, 2018). FinTech also offers a variety of services such as digital wallets, digital currencies, and blockchain technology (Ma & Kishore, 2019). Digital currencies, such as Bitcoin and Ethereum, use cryptography and decentralized ledger technology to enable secure and fast peer-to-peer transactions (Chen & Chang, 2017). Blockchain technology also has the potential to revolutionize the banking industry, enabling secure, transparent, and immutable record keeping (Li & Zhang, 2016). FinTech is revolutionizing the banking industry by providing faster, more efficient, and more secure services. With the continued development of FinTech services and technologies, the banking industry is likely to become even more innovative and efficient in the future.

Technologies such as artificial intelligence, blockchain, and the internet of things (IoT) are emerging in the banking sector (Li &Wang., 2019). AI is being used for automated customer services and for fraud detection (Nyandoro & Gecaga, 2020). Blockchain is being used to increase transparency and security in banking processes (O'Gorman, 2018). Moreover, the IoT is being used to enable real-time payments and better customer experience (Rong et al., 2019). Some of the most prominent emerging technologies in the banking sector are artificial intelligence, blockchain, cloud computing, biometric authentication, and predictive analytics. AI: AI technology is used by banks to automate tedious and repetitive tasks, and to provide better customer service. AI-enabled chatbots and virtual assistants are used to answer customers' queries in real time, while AI-powered fraud detection systems help to prevent money laundering and other financial crimes. Blockchain: Blockchain technology is revolutionizing the way banks keep track of and process financial transactions. It uses distributed ledger technology to store, validate, and manage transactions, making them more secure and transparent. Cloud Computing: Banks are increasingly using cloud computing to store and process customer data, allowing for faster access to information and improved customer service. Biometric Authentication: Banks are using biometric authentication, such as fingerprint and facial recognition, to verify customers' identities and protect against fraud. Predictive Analytics: Banks are using predictive analytics to analyze customer data and make better, informed decisions. This helps banks to better understand their customers and provide tailored services. These are just a few of the emerging technologies revolutionizing the banking sector.

As technology advances, banks will continue to innovate and use new and emerging technologies to provide better services to their customers. Mobile banking is the act of making financial transactions on a mobile device

such as a smartphone or tablet (Gosmati, 2020). Mobile banking services offer a convenient, secure, and efficient way for customers to manage their finances from virtually anywhere with an internet connection. In addition to making payments and conducting transactions, a range of mobile banking services includes monitoring account balances and viewing account history, setting up automatic bill payments, transferring funds between accounts, and viewing investment portfolio and credit score information. Mobile banking is a type of banking service where customers can access banking and financial services through their mobile phone or another mobile device. Customers can use mobile banking to check their account balances, transfer money between accounts, pay bills, and more. Mobile banking is becoming increasingly popular as it is more convenient than traditional banking, and customers are more likely to use mobile banking for their banking needs. Mobile banking is usually accessed through an app, which customers can download from their device's app store (Bengtson et al, 2018).

The app will provide access to the customer's banking account, as well as other services such as transferring money, paying bills, and more. Customers may also be able to access their banking information through their mobile browsers. Mobile banking is also very secure as it uses encryption and authentication to protect customers' information. Customers will need to enter a username and password to access their accounts, and the app will also use two-factor authentication to add an extra layer of security. The convenience of mobile banking has made it increasingly popular with customers, as they can access their banking accounts from anywhere. Mobile banking is also more secure than traditional banking, and customers can be sure that their information is safe and secure. As banks embrace the use of Artificial Intelligence to improve customer service, efficiency, and security, they are beginning to realize the potential of this technology (Ramakrishnan et al., 2019). AI is being used in multiple ways to improve banking services, such as automating customer service (Kushwaha et al., 2020), providing personalized recommendations (Rong et al., 2019), and ensuring security (Duncan et al., 2018). For example, AI-enabled chatbots provide more efficient customer service by responding to customer queries in a timely manner, while AI-based risk assessment systems can detect fraudulent transactions in real-time (Kushwaha et al., 2020).

AI-driven personalization systems can also provide more tailored recommendations to customers based on their past financial transactions (Rong et al., 2019). AI-based security systems can help banks detect potential threats to their networks and prevent data breaches (Duncan et al., 2018). Blockchain technology has been gaining traction in the banking sector due to its potential to revolutionize the financial sector (Lam, 2019). It is seen as a more secure and efficient way to carry out transactions and store data (De

Filippi & Wright, 2018). Blockchain has the ability to reduce fraud and reduce the cost of conducting business by eliminating intermediaries (Kostovetsky, 2017). It can also be used to create digital identities for customers, streamline payments, and facilitate the transfer of assets (Haber & Stornetta, 2018). Additionally, blockchain technology can be used to streamline KYC (Know Your Customer) processes, provide secure and reliable data storage, and enable faster and more secure transactions (O'Gorman, 2018). By leveraging blockchain technology, banks can reduce their operational costs, increase efficiency, and mitigate the risk of fraud. Cloud computing has revolutionized the banking sector by providing banks with a host of innovative and cost-efficient services (Liu, et al., 2019). It enables banks to store, manage, and analyze data quickly and securely, allowing them to make more informed decisions and improve customer service (Azure, 2021). Cloud computing also helps banks reduce the cost of maintaining data centers and the need for physical space (Li & Wang, 2019). Furthermore, it helps banks improve customer service by providing real-time access to customer data, which allows them to respond quickly to customer inquiries (Chakraborty, et al., 2018).

Biometrics is increasingly being used in banking to authenticate customers and protect their data from fraud. For example, some banks are using facial recognition to authenticate customers when they log in or using fingerprints to verify their identity for financial transactions (Pereira, 2019). This technology can be used to verify customers quickly and securely, helping to keep customer data safe and reducing the risk of fraud (Baker, 2019). It is a form of identification that uses physical characteristics such as fingerprints, facial recognition, and iris scans to verify the identity of an individual. Biometric technology is being used to secure bank transactions and combat identity theft. Banks are able to use biometrics to verify a customer's identity when they are accessing their accounts or making transactions.

This ensures that only the authorized person is able to access the account and that any fraudulent activity can be quickly detected. Biometric technology is also being used for authentication purposes. Banks are using biometrics to ensure that customers are the ones logging into their accounts. This is done by using biometric scanners to scan a customer's fingerprint or facial features and then compare them to the stored biometric data. If the data matches, the customer is authenticated and can proceed with the transaction. Biometrics also offers banks the ability to improve customer experience. Banks are able to use biometric technology to quickly and accurately verify customers. This eliminates the need for customers to fill out lengthy paperwork or provide identification documents. It also allows banks to offer customers a secure and seamless banking experience. Biometrics is becoming

an increasingly popular tool for banks to use to increase security and provide a better customer experience.

As technology becomes more advanced and widely used, it will become an important part of banking and financial services. Financial technology, or fintech, has been a hot topic in banking for many years now. The rise of fintech has been driven by the emergence of digital technologies that have created new opportunities for the banking sector, from the transformation of customer service to the automation of operations and processes. The conclusion that can be drawn from the innovation regarding financial technologies in banking is that fintech has become an integral part of the banking sector. Fintech is no longer a novelty, but rather has become an essential part of the banking industry. Fintech has enabled banks to offer customers new and innovative services, such as mobile banking, digital payments, and automated investment services. In addition, fintech has enabled banks to streamline their operations and processes and reduce costs. Fintech has also opened new avenues for banks to create new products and services, such as robo-advisors and online lending platforms. The rise of fintech has also led to increased regulatory scrutiny, as governments seek to ensure that fintech does not disrupt the financial system. Banks must also ensure that their fintech solutions are compliant with the latest regulations in order to remain competitive. Banks must continue to invest in fintech and develop new solutions that can improve customer service and increase efficiency. Banks must also continue to monitor the latest developments in fintech and ensure that their solutions remain up-to-date and secure.

5 Conclusion

Financial technology has made it possible for banks to provide services, such as online banking, mobile banking, and digital payments, without the need for physical branches and staff. This has enabled banks to remain open and functioning despite the health and safety restrictions imposed by the pandemic. In response to the pandemic, banks have been forced to rethink the way they provide services to their customers. In order to meet the demands of their customers and remain competitive, banks have invested heavily in fintech solutions. For example, many banks have launched digital wallets and digital payment solutions, allowing customers to make secure payments and transfers without having to visit a branch. In addition, banks have also been investing in artificial intelligence and machine learning technologies. AI and ML technologies enable banks to automate processes such as fraud detection and customer service. By leveraging these technologies, banks can reduce the amount of manual labor required to provide services to customers. Furthermore, banks are investing in data analytics, which allows them to gain insight into customer behavior and preferences. This data can be used to

develop personalized services and offers tailored to the needs of individual customers. Banks have also been leveraging blockchain technology to improve the security and efficiency of financial transactions. Blockchain-based solutions provide a secure and immutable ledger of transactions, reducing the risk of fraud and providing customers with greater peace of mind.

Fintech solutions have:

- helped banks to respond to customer needs by increasing digital banking adoption, improving customer experience, and optimizing operating costs;
- enabled banks to provide access to financial services to vulnerable people and small businesses who have been disproportionately affected by the pandemic;
- allowed banks to reduce costs associated with physical banking operations and to improve the accuracy and speed of payment processing;
- revolutionized the banking industry in recent years, allowing for faster, more secure, and more efficient banking services;
- provided to access financial services in a safe and secure manner;
- enabled banks to provide customers with more personalized and automated services, such as digital payments, remote account opening, and digital wallet applications.

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Analysis of Market Responses to Lockdown Effect of Covid-19 Pandemic in Indonesia and Malaysia

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Abstract

The announcement of lockdowns in Indonesia and Malaysia due to Covid-19 affected the formation of stock price fluctuations because stock prices continued to change, known as volatility. Measurements on the stock market that occur as a result of an event use the market response that is determined by abnormal returns and trading volume activity. The purpose of this study was to analyze abnormal returns and trading volume activity on the lockdown effect in Indonesia and Malaysia. This type of research is quantitative. The samples used were 19 companies listed on the Jakarta Islamic Index which were consistently listed during the lockdown due to Covid-19 and the 10 best constituents on the FTSE Bursa Malaysia Hijrah Syariah. The data analysis technique used is the normality test using the Kolmogorov-Smirnov test and the significance test. The results of the study showed that there was no reaction to abnormal returns when setting the Large-Scale Social Restrictions policy and Imposing Restrictions on Community Activities in Indonesia, but there was a reaction to abnormal returns when setting the Movement Restriction Order policy in Malaysia. As for trading volume activity, there was no reaction to the enactment of the Large-Scale Social Restrictions policy, the Enforcement of Restrictions on Community Activities, and Orders to Restrict Movement in Indonesia and Malaysia

Keywords. Abnormal Return, Trading Volume Activity, Large-Scale Social Restrictions, Restrictions on Community Activities, Movement Restriction Order

JEL codes: A19, H51, I18

1 Introduction

In humans, coronaviruses cause respiratory tract infections that are generally mild, such as the common cold, although some forms of the disease, such as SARS, MERS, and Covid-19, are more deadly (Nur Rohim Yunus and Annisa Rezki, 2020). From 30 December 2019 to 8 April 2020, there were 16,511 people were examined with 13,555 negative results and 2,956 positive confirmed cases of Covid-19, 22 patients recovered and 240 died (Posma Sariguna Johnson Kennedy et al, 2020). On 7 November 2022,

Covid-19 cases increased by 3,828 people. Thus far, 6,525,120 of Covid-19 have been reported cases in Indonesia since President Joko Widodo originally made the announcement on March 2, 2020.

As a result of this disaster that hit the world, the term Lockdown emerged in several countries such as Indonesia and Malaysia. To overcome the impact of Covid-19, President Joko Widodo has decided in a Cabinet Meeting on March 31 2020 to handle the coronavirus case by implementing Large-Scale Social Restrictions/*Pembatasan Sosial Berskala Besar* (PSBB) which are no longer a discourse and allow local governments to limit activities carried out (Rosabella Elga et al, 2022). In addition to the Large-Scale Social Restrictions/*Pembatasan Sosial Berskala Besar* (PSBB) policy, the Indonesian government has also issued an emergency policy with the target of reducing the rate of transmission of Covid-19 contained in the Instruction of the Minister of Home Affairs Number 15 of 2021 concerning the Implementation of Covid-19 Emergency Community Activity Restrictions/*Pemberlakuan Pembatasan Kegiatan Masyarakat* (PPKM) in the Java and Bali regions which are in the business sector whose activities were suspended during the pandemic (Kadek Julia Mahadewi, 2021). Meanwhile, Malaysia began imposing a lockdown from March 18, 2020, to March 31, 2020 and extended it to April 14, 2020. Malaysian Prime Minister Muhyiddin Yassin again extended the Movement Control Order (MCO) policy or restrictions on the movement of citizens until May 12, 2020 (Nurfitri Nugrahaninsgsih et al, 2020).

The outbreak of Covid-19 may impact many financial markets. However, whether the observed financial market effects are direct (arising from concerns about the economic impact of the virus and its accompanying effects on investors' portfolio choices) or indirect (for example, due to contagion from other financial markets) is not yet clearly known and understood (Njamba Kapalu and Odongo Kodongo, 2022). The Central Statistics Agency/*Badan Pusat Statistik* (BPS) announced economic growth data as seen from the Gross Domestic Product (GDP) for the third quarter of 2020. Central Statistics Agency/*Badan Pusat Statistik* (BPS) had previously announced an economic contraction in the second quarter of 2020. Economic growth in the second quarter of 2020 decreased sharply to -5.32% compared to the second quarter of 2019 (year on year) (Teddy Kurnia Dwi Anggoro Kusumo Dewo, 2021).

Just like Indonesia, Malaysia also has Islamic stock indices, one of which is the FTSE Bursa Malaysia Hijrah Shariah Index (FTFBMHS) (Khoirunnisa Abidah et al, 2020). The same thing happened in Malaysia after the Malaysian government officially implemented the Movement Control Order (MCO) from 1 June to 14 June 2021 as a total lockdown for two weeks to reduce the number of Covid-9 sufferers, in Malaysia the state of the

Malaysian Stock Exchange has fallen. Reporting from Blomberg , Bursa Malaysia KLCI's FTSE Index experienced a 1.6% correction from the start of trading one week in May 2021. This correction was the deepest since March 31, 2021 (Margaretha Pieter et al, 2022). Transactions on the stock market always fluctuate every second, this is because stock prices continue to change which is known as volatility. To find out the volatility as a whole, a calculation of all existing stocks is used and it is called a stock composite index (Rusmita, 2022).

A Covid-19 event is an event that will be tested for its information content on stock movements in the capital market using the event study method (Nur Anita Chandra Putri and Andika Martin, 2021). The signal theory involves two parties management and outside investors to give signals (Reny Aziatul Pebriani and Rafika Sari, 2021). This theory also states that stakeholders will respond to the size of the company so that it has an impact on the value of the company (Fadilla Cahyaningtyas, 2022). In the concept of an efficient market, investors always take the available information into account when making decisions so that it can be reflected in the transaction price and become part of the market's current pricing (Chelsea Yulane Talumewo et al, 2021).

This reaction can be measured using returns and abnormal returns as price changes. Many potential investors and investors take advantage of certain events to obtain abnormal returns. When a market is inefficient, a return is higher than the typical return (Dewo, 2021). Apart from abnormal returns, another indicator that influences fluctuations in stock price changes in information content are by looking at trading volume activity. Trading volume activity is used to see the reaction of the capital market by looking at the movement of stock trading volume in the capital market (Nur Kemala Desti Alpidayana, 2022).

Christopher Tanasal et al (2021) research proves that the abnormal return and market capitalization variables are significant before and after an event both by the Wilcoxon test and the daily test, but for the trading volume activity variable, it is not significant before and after the event by either the Wilcoxon test or the daily test. Research by Mega Zahira Virtyani et al (2021) showed significant results on abnormal returns and insignificant differences on abnormal TVA, stating that the capital market reacted to Large-Scale Social Restrictions/*Pembatasan Sosial Berskala Besar* (PSBB*)* announcements due to Covid-19.

Based on the background above, measuring the market response that occurred as a result of the lockdown during the Covid-19 pandemic can be measured through several aspects such as abnormal returns and trading volume activity. So the researcher is interested in conducting research with the title "Analysis of Market Responses to Lockdown Effect of Covid-19

Pandemic in Indonesia and Malaysia (Studies on Companies Listed on Jakarta Islamic Index and FTSE Bursa Malaysia Hijrah Syariah Index)".

2 Literature review

Research by Margareth Pieter Joubert B. Maramis, dan Maria V. J. Tielung (2021), the title *"Reaksi Pasar Modal Terhadap Peristiwa Covid-19 (Lockdown) Tahun 2021 di Pasar Modal Malaysia (Bursa Saham Kuala Lumpur)"* with the type of research uses quantitative research. The sampling method used is saturated sampling, with the sample in this study taking the composite stock price index data and trading volume activity. Shows the results of this study show that the Covid 19 (lockdown) event on the Malaysian capital market (Kuala Lumpur stock exchange) had a reaction that caused the market to respond. This is evidenced by the combined stock price index and trading volume activity variables which show significant results before and after the event using a paired sample t-test.

Research by Njamba Kapalu and Odongo Kodongo (2022) the title "Financial Markets Responses to Covid-19: A Comparative Analysis" with an event study of major news and policy announcements related to Covid-19, Regression analysis, and contagion for empirical strategy. Shows Deploying different empirical techniques, we find, unlike some papers in the literature that group countries and run panel regressions, that the effects of Covid-19 on the financial markets differed by country depending on the way the outbreak was managed.

Research by Lailatul Fauziah and Lintang Venusita (2021) the title The reaction of capital markets Indonesia Singapore Malaysia, and Thailand towards the announcement of lockdown policy during the beginning of the covid-19 uses the event study method and is based on secondary data from news portals and websites. The results show that the announcement of the Covid-19 lockdown policy did not significantly influence the reaction of the capital market but was still used as a basis to make investments decision. The announcement of the Covid-19 lockdown, both before and after the announcement did not have a significant effect on abnormal returns and trading volume activity in Indonesia, Singapore, Malaysia, and Thailand capital markets.

2.1 Signaling Theory

Signaling theory emphasizes the importance of information issued by the company on investment decisions from outside the company. In the signaling theory, every action has the potential to carry information (Putri and Martin, 2021). Interpreted as a theory that focuses on the increases or decrease in market prices and how those changes impact investors' decisions (Ilyas Sa'adah, 2022).

2.2 Market Efficiency Theory

Market efficiency theory is a theory that discusses the price or value of securities that fully describes all the information available on that information. The concept of market efficiency is the relationship between the price or value of securities with efficient information, whether the information received can affect the movement or changes in new stock prices (Alriani Rori et al, 2021).

2.3 Event Study

An Event Study is a study that studies market reactions to an event whose information is published as an announcement. An event study can be used to test the information content of an announcement and can also be used to test the efficiency of a semi-strong market (Elga et al, 2022).

2.4 Abnormal Return

Abnormal return is the difference between the actual return and the expected return. The excess of the actual return beyond the typical return is known as anabnormal return (Jogiyanto Hartono, 2018). So, it can be concluded, that abnormal returns happen as a result of certain events or events, such as, national holidays, political climate, extraordinary events, stock splits, initial offerings, suspends, and others (Elga et al, 2022).

2.5 Estimation Period

The estimation period is generally the period before the event period and is days involved before the event date to find out whether there is an information leak (whether the market has heard the information before the information was announced) (Rori et al, 2021).

2.6 Trading Volume Activity

By the characteristics of the movement trading volume activity in the market one can use that instrument to observe how the capital market responds to information. Stock trading volume is an illustration of the condition of securities traded in the capital market. Changes in stock trading volume on the capital market indicate stock trading activity on the stock exchange and reflect investors' investment decisions. If the capital market reacts to information, there will be a change in stock trading activity on the stock exchange (Febria Rahim et al, 2022).

2.7 Lockdown

Lockdown is a popular term during the Covid-19 pandemic. Lockdown is not only a term used in handling public health but includes geographical and non-geographical aspects. The equivalent of the word lockdown in Indonesian is a regional quarantine which means limiting the entry or exit of people in an area, carried out as a form of handling the potential spread of certain diseases or hazards (KBBI, 2016).

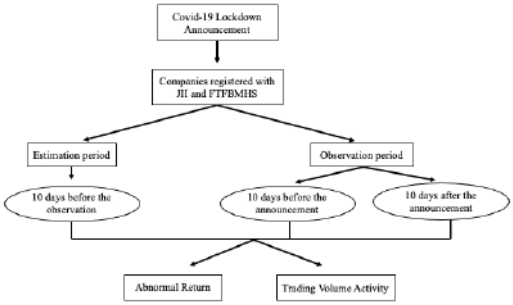
2.8 Jakarta Islamic Index

The Jakarta Islamic Index (JII) is an Islamic stock index that was first launched on the Indonesian capital market on July 3, 2000. One of the sharia stock indices on the Indonesia Stock Exchange provided that the shares are by following per unit and do not conflict with sharia principles. Starting from the collaboration between PT Danareksa Investment and PT Jakarta Stock Exchange (now IDX). Aims to increase investor confidence in investing in the capital market based on sharia principles and not contradicting what is prohibited in Islam (Novita Kusuma Maharani, 2017).

2.9 FTSE Bursa Malaysia Hijrah Syariah Index

In the Malaysian capital market, there is an index called the FTSE Bursa Malaysia Hijrah Syariah Index (FTFBMHS), this index is designed to be used as a basis for sharia investment products that meet the screening requirements of international sharia investors (Desy Trishardiyanti Adiningtyas, 2018). The FTSE Bursa Malaysia Hijrah Index (FTFBMHS) is an index to be used as a reference for sharia-based investments in Bursa Malaysia (Oktana Indriatna Jatnika, 2017). Securities included in the index are screened by the Sharia Advisory Council (SAC) Malaysia and a leading global sharia consultancy, Yasaar Ltd, with clear guidelines (Jatu Indri Puspasari, 2019).

2.10 Research Framework



3 Methodology

This research is descriptive with a quantitative approach. This research approach also uses the Event Study method which measures the level of abnormal returns (Nurul Susianti and Naili Rahmawati, 2020). The data source used is a secondary source obtained from the website www.idx.co.id in the form of data on all companies listed on Jakarta Islamic Index (JII) and www.ftse.russel.com for companies listed on FTSE Bursa Malaysia Hijrah Syariah Index (FTFBMHS), and www.yahoo.finance for some other necessary data. Of the 30 stocks indexed by Jakarta Islamic Index (JII), only 19 issuers were used as samples because they were consistent on Jakarta Islamic Index (JII) list for 7 consecutive periods. The sampling technique in this study used a purposive sampling method. The normality test in this study used the Kolmogorov-Smirnov (K-S) test. If the data is normally distributed,

the Paired Sample (t-test) or paired t-test will be used. While the data is not normally distributed, the hypothesis test used is a non-parametrically Wilcoxon Signed Ranks Test (Anastasia Krizia et al, 2020). The significance test used is using a probability value of 5%. If t-count > t-table, then the second hypothesis has a significant abnormal return (Virtyani et al, 2021). TVA calculation is done by comparing the number of company shares traded with the total number of company shares outstanding during the study period (Talumewo et al, 2021). This consists of an estimation period of 30 days and a window period of 21 days, namely 10 days before the announcement date (D-10), 1 day at the time of the announcement (even date, H=0), and 10 days after the announcement date (D+10).

4 Results and Discussion

Table 1

Test Statistics[a]

	AAR After PSBB Policy Determination - AAR Before PSBB Policy Issuance
Z	-.561[b]
Asymp. Sig. (2-tailed)	.575

Source: Data processed (SPSS), 2023

Results in AAR before normal distribution, and vice versa in AAR after abnormally distributed. So the first hypothesis testing uses the Wilcoxon Signed Rank Test method because one of the data is not normally distributed. The test results in table 4.1, show that the event of estabilishing the PSBB policy gets an Asymp value Sig. (2-tailed) of 0.575 which is greater than the acceptable signification value of 5% (0.05). Looking at the test results above, the event of estabilishing the PSBB policy as measured by Average Abnormal Rerturn stated that there was no significant effect.

Table 2

Paired Samples Test

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)

Pair 1	AAR Before PPKM Policy Extension - AAR After PPKM Policy Extension	.0019700	.0129811	.0041050	-.0073161	.0112561	.480	9	.643

Results in AAR before normal distribution, as well as in AAR after normal distribution. So the first hypothesis testing uses the Paired Samples t-test method because both data are normally distributed. The test results in table 2, show that the PPKM policy determination event obtained the Asymp value Sig. (2-tailed) of 0.643 which is greater than the acceptable signification value of 5% (0.05). Looking at the test results above, the program for extending the PPKM policy as measured by Average Abnormal Return. So the test estabilishment of the PPKM policy on May 10, 2022 has no significant effect, there is a difference in AAR.

Table 3

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	AAR Before PPKM Policy Extension - AAR After PPKM Policy Extension	-.0026400	.0049356	.0015608	-.0061707	.0008907	-1.691	9	.125

Results in AAR before normal distribution, as well as in AAR after normal distribution. So the first hypothesis testing uses the Paired Samples t-test method because both data are normally distributed. The test results in

table 3, show that the PPKM policy determination event obtained the Asymp value. Sig. (2-tailed) of 0.125 i.e. greater than the acceptable signification value i.e. at the rate of 5% (0.05). Looking at the test results above, the program for extending the PPKM policy as measured by Average Abnormal Return. So the result test states that the extension of PPKM policy with AAR after the extension of PPKM policy on October 4, 2022 has no sifnificant effect, there is a difference AAR.

Table 4

One-Sample Kolmogorov-Smirnov Test

		AAR Before MCO Policy Assignment	AAR After MCO Policy Assignment
N		10	10
Normal Parameters[a,b]	Mean	-.808300	.002400
	Std. Deviation	2.8865012	.0063828
Most Extreme Differences	Absolute	.509	.281
	Positive	.289	.281
	Negative	-.509	-.231
Test Statistic		.509	.281
Asymp. Sig. (2-tailed)		.000[c]	.025[c]

Source: Data processed (SPSS), 2023

The normality test with Kolmogorov-Smirnov (K-S) in table 4 above, shows the Asymp results. Sig. (2-tailed) of AAR 10 days before and 10 days after MCO in the 10 best constituents listed on FTFBMHS obtained values of 0.000 and 0.025 respectively of their supposed values (5% or 0.05). The results in AAR before MCO policy determination are abnormally distributed, as well as in AAR after abnormally distributed MCO policy determination. So it is stated to have an effect which means that there is a difference between AAR before the determination of the MCO policy with AAR after determining the MCO policy.

Table 5

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			

Pair 1	ATVA Before the Exit of PSBB Policy - ATVA After the Exit of PSBB Policy	-.0127700	.0804356	.0254360	-.0703101	.0447701	-.502	9	.628

Results in ATVA before normal distribution, as well as in ATVA after normal distribution. So the first hypothesis testing uses the Paired Samples t-test model test method because both data are normally distributed. The test results in table 5, show that the event of setting the PSBB policy obtained the Asymp value. Sig. (2-tailed) of 0.628 greater than the acceptable signification value of 5% (0.05). Looking at the test results above, the program for extending the PSBB policy as measured by Average Trading Volume Activity. So the result of the study stated that there no significant influence.

Table 6

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	ATVA Before PPKM Policy Extension - ATVA After PPKM Policy Extension	-.0001800	.0006088	.0001925	-.0006155	.0002555	-.935	9	.374

Results in ATVA before normal distribution, as well as in ATVA after normal distribution. So the first hypothesis testing uses the Paired Samples t-test model test method because both data are normally distributed. The test results in table 6, show PPKM policy extension event on October 4, 2022, obtained the Asymp value. Sig. (2-tailed) of 0.374 greater than the acceptable

signification value of 5% (0.05). Looking at the test results above, the PPKM policy extension event on May 10, 2022, as measured by the Average Trading Volume Activity. The result of the study states that there no significant effect.

Table 7
Test Statistics[a]

	ATVA After PPKM Policy Extension - ATVA Before PPKM Policy Extension
Z	-1.687[b]
Asymp. Sig. (2-tailed)	.092

Source: Data processed (SPSS), 2023

The results in ATVA before normal distribution, while in ATVA after distribution are abnormal. So the first hypothesis testing uses the Wilcoxon Signed Rank Test method because one of the data is not normally distributed. The test results in table 7, show PPKM policy extension event on October 4, 2022, obtained the Asymp value. Sig. (2-tailed) of 0.092 greater than the acceptable signification value of 5% (0.05). Looking at the test results above, the PPKM policy extension event on October 4, 2022, as measured by Average Trading Volume Activity. The result states that it had no significant effect.

Table 8
Test Statistics[a]

	ATVA After MCO Policy Exit - ATVA Before MCO Policy Assignment
Z	-.952[b]
Asymp. Sig. (2-tailed)	.341

Source: Data processed (SPSS), 2023

The results in ATVA before distribution are abnormal, while in ATVA after normal distribution. So the first hypothesis testing uses the Wilcoxon Signed Rank Test method because one of the data is not normally distributed. The test results in table 8, show that MCO policy determination event obtained the Asymp value. Sig. (2-tailed) of 0.341 i.e. greater than the acceptable signification value of 5% (0.05). Looking at the test results above, the MCO policy setting event was responded to negatively by market

participants after the MCO policy setting event as measured by the Average Trading Volume Activity, but it was declared to have no effect.

The share price of JII companies that were consistently active before and after the Covid-19 lockdown in the entertainment industry tended to increase. Namely XL Axiata, Media Nusantara Citra, and Telecommunications companies which on average showed an increase in stock prices after the announcement of PSBB and PPKM in Indonesia. Likewise, the food and beverage and pharmaceutical industry companies have experienced an increase in stock prices in several companies such as Indofood CBP Sukses Makmur, Indofood Sukses Makmur, Japfa Comfeed Indonesia, and Kalbe Farma. Some factors cause no difference in stock returns before and after the Covid-19 announcement in Indonesia, including the possibility that information about Covid-19 has been leaked, so the market does not respond aggressively to information about the announcement circulating (Chika Anindya, 2021).

Different from the normality test results on abnormal returns due to PSBB and PPKM in Indonesia, there was a reaction to abnormal returns due to MCO in Malaysia which is in line with this study. This is because investors have lost confidence in the Malaysian government in overcoming the pandemic and are taking profit-taking actions with the existence of the MCO policy which triggers abnormal returns on companies listed on the FTFBMHS.

In the phenomenon of the announcement of Covid-19 as a pandemic by the World Health Organization, it can be seen that the content of information in the Covid-19 lockdown announcement is not strong enough (Putu Elfira Permata and Ayu Ketut Rencana Sari Dewi, 2021). So the market does not show a reaction to this event. This lockdown announcement cannot be said to be a positive (good news) or negative (bad news) signal because there is not enough change in stock trading volume.

Insignificant trading volume activity indicates that this lockdown announcement has weak information content and investors do not feel any strong signals as a result of this announcement. The results of this study are in line with the research of Putu Elfira Permata Sari et al (2021) previously said that there was no significant difference in trading volume activity during PSBB and PPKM in Indonesia. Similarly, the research of Lailatul Fauziah and Lintang Venusita (2021) resulted in no reaction during the MCO lockdown in Malaysia in his research.

The effect on Trading Volume Activity after the announcement occurred was due to investors who tend to apply a wait-and-see strategy. Wait and see is a strategy where investors wait, observe, and analyze stock movements. During this strategy, investors do not make stock transactions

either selling or buying. This is done until investors find the right momentum to sell their shares again.

5 Conclusion

Based on the results of hypothesis testing, it can be concluded that MCO had an abnormal reaction at the time of setting the lockdown policy in Malaysia. However, PSBB and PPKM did not have an abnormal reaction at the time of setting the lockdown policy in Indonesia. As for trading volume activity, PSBB, PPKM, and MCO, there was no market reaction at the time of the lockdown policy in Indonesia and Malaysia. This shows that the establishment of lockdown policies gave the market reaction to several events in the capital market.

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International experience in supporting agriculture in the post-pandemic period

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Abstract

The purpose is to study and analyze the international experience of supporting agriculture in the post–pandemic period. Methods: the theoretical and methodological basis of the research is the system-structural and system-functional approaches to studying the world experience of supporting agriculture in the post-pandemic period, which requires the use of various methods of scientific analysis, such as monographic, comparative, statistical, mathematical and economic analysis and others. Results: as international experience shows, agriculture cannot be effective and successful without practical support. In view of the important role of agriculture in ensuring food security, the leading countries of the world invest heavily in supporting agricultural producers, thereby regulating the food market and contributing to the social, economic and environmental development of rural areas. As a result, a new agricultural policy is being introduced in the countries of the European Union, which is aimed at the sustainable future development of agricultural producers, providing targeted support to small farms and giving more flexibility for adaptation in post-pandemic conditions. Conclusion: in most countries, support for agriculture includes support for the agricultural sector: the provision of various kinds of subsidies, subsidies, benefits, etc. Support of agriculture in the post-pandemic period contributes to the growth of agricultural production in the countries of the world.

Keywords: international experience, agriculture, in the post-pandemic period, income, farmer, socio-economic development, production, policy, environmental, strategic plans, eco-schemes, consulting services

JEL codes: Q1, Q14, Q18

1 Introduction

The global coronavirus pandemic has affected all economic sectors, including agriculture in Kazakhstan, which was significantly affected by three main factors: the depreciation of the tenge, fluctuations in demand, and the disruption of the global supply chain due to restrictions on movement

between certain countries. The pandemic has also seriously affected support for agriculture around the world.

The global impact of the COVID-19 epidemic on agriculture requires an immediate and long-term response. First of all, in order to develop the necessary actions, it is necessary to analyze and understand the direct consequences of the current pandemic on agricultural and food systems. As a result, it is necessary to properly understand the risks, vulnerability, resilience and systemic shifts of agricultural systems in order to adapt to the current situation. Therefore, a thorough literature review and analysis is needed to help relevant authorities around the world develop appropriate policies to deal with the impacts of COVID-19 on agriculture.

In the post-pandemic period, the agricultural management and support system is a rather complex process that affects farmers' incomes, agricultural production, the agricultural market, the rural environment, and relations between farmers and other organizations. Today, in many developed countries, agricultural support includes state support for the agricultural sector, such as: support for various types of subsidies, benefits, grants, etc., for example, in some countries, state investments in agriculture exceed the market value of agricultural goods by 1 ,5-2 times.

Support for agricultural producers in the post-pandemic period contributes to the development of agriculture in the countries of the European Union, the USA, Canada and other food exporting countries. In the countries of the European Union, agricultural subsidies average 49%: Norway - 77%, Finland - 71%, Sweden - 59%; Japan - 66%, etc. [1]. Therefore, issues related to international experience in supporting post-epidemic agriculture in the post-pandemic period are becoming especially relevant today.

The main purpose of this study is to assess international experience in supporting agriculture in the post-pandemic period.

Therefore, to achieve the above goal, the following tasks were set and performed:

- analyzed in the post-pandemic period support for agriculture, which is carried out by the European Commission in the EU countries;
- reviewed and evaluated the new Common Agricultural Policy (CAP) of the European Union;
- considered in the post-pandemic period the international experience of supporting agriculture in the USA and Canada.

2 Literature review

Popescu GC, Popescu M [2] conducted a full review of the impact of the COVID-19 pandemic on European agricultural systems, compliance with restrictions and relationships with authorities and made some recommendations for managing such circumstances in the future. They also

provided a clear picture of the difficulties and challenges European farmers have faced during the pandemic. Farmers had problems with farming technology and sales of agri-food products. They stated that agricultural systems in the EU are weak and that the sector needs to be actively monitored and supported in order to maintain food security during the crisis.

MacArthur and McCord [3] emphasized that this could affect key agricultural factors affecting yields such as fertilizer, seeds and water. In Europe, the production, distribution and marketing of fruits and vegetables have been particularly affected by the pandemic. Stay-at-home restrictions in Europe have affected food prices and distribution, which may affect food security [4]. Restrictions during the pandemic have led to fragmentation of food distribution systems. Accordingly, central banks and government agencies have taken measures to stimulate the economy [5]. Deaton, B. J. in a team of researchers examined the impact of the COVID-19 pandemic on Canada's food security using three variables: farm financial stability, transport, and international exchange. Capital flows, maintaining transport and international exchanges are strategic measures to ensure food availability in the long term [6].

While many studies have focused on the potential impact of the COVID-19 pandemic on the agricultural sector, very few have attempted to explore the impact of the pandemic on agriculture through direct interviews with local farmers and analyzes of their responses, impressions and expectations.

3 Material and research methods

The object of the study is the world experience in supporting agriculture. The theoretical and methodological basis of the study is the system-structural and system-functional approaches to studying the world experience in supporting agriculture in the post-pandemic period, which requires the use of different methods of scientific analysis, such as monographic, comparative, statistical, mathematical and economic analysis and others [7; 8]. By applying the generalization method, the main directions for supporting agriculture in foreign countries were determined. Using the methods of abstract-logical tools, the main conclusions and proposals were formulated. The publication is based on official data from The new common agricultural policy: 2023-2027.

4 Results and its discussion

Today, agriculture is an important industry that contributes to ensuring food security and stable socio-economic development of the country, especially in the post-pandemic period. The uniqueness of the agricultural sector lies in the fact that it is a source of raw materials for other industries.

The significantly high level of processing and availability of agricultural production ensures food security in the country.

Impact of COVID-19 on agricultural systems. The concerted efforts of the world to suppress the virus by containing human activity have irresistibly triggered financial shocks and costs that have affected the agricultural and food production system. A sharp decline in demand for commercial and restaurant products, associated with a reduced workforce and less storage capacity, has led to farmers throwing away much of their produce. The quarantine is seriously affecting the availability of labor for time-limited agriculture such as picking vegetables, crops and fruits. These effects are penetrating deep into the food production sector and the global economy as the problem worsens day by day. The impact of the covid-19 pandemic on the agricultural sector can be divided into five categories: food security, labor availability, agricultural system resilience, agricultural system interconnection, and others [9]. The impact of COVID-19 is graphically shown in Figure 1.

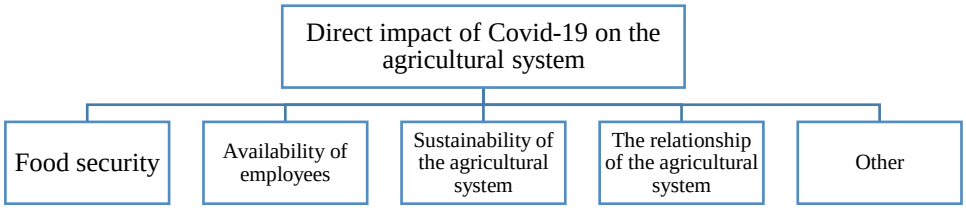

Figure 1 The impact of COVID-19 on the agricultural system*

**Note: compiled based on the source [10]*

Food security. Due to the loss of income and temporary workers, the purchasing power of food is reduced. Panic buying destroys the market supply system. People store up more food than they require, for fear of not having time. Perishable products, such as fruits, vegetables and milk, deteriorate due to transportation restrictions. Food security means having unrestricted access to food sufficient to meet their basic needs. If immediate action is not taken, a food disaster is looming, hurting the most vulnerable people. Keeping global food supply systems healthy and limiting the impact of the pandemic on the food management system must be a priority. Short-term crises are mitigated by social services, which act as an umbrella. About 820 million people worldwide who suffer from chronic hunger and do not receive enough calories for a normal life belong to the first vulnerable group [11]. This group of people cannot tolerate disruption to livelihoods or access to food that could be caused by the COVID-19 outbreak. Smallholder farmers are the second vulnerable group as they may not be able to work their land or go to markets to sell their crops or buy seeds and other essential commodities.

Availability of labor force. The economic and social shock caused by the COVID-19 epidemic is a global phenomenon that has affected people from all walks of life. Restrictions on transport hindered the movement of workers, severely affecting the horticulture, livestock and food industries. Plantation and harvesting is difficult due to a shortage of skilled workers. Skill development is difficult due to isolation. The impact of COVID-19 on worker availability varies by nature of employment, location, type of work, and age of workers. Workers have become insecure due to a lack of formal security and recognition, a social security system, and limited benefits from institutional sources [10]. A number of major European agricultural producers, including France, Germany, Italy, Spain and Poland, are in a particularly vulnerable position. More than a quarter of the food produced in the country depends on about 370,000 permanent seasonal migrant workers, according to Coldiretti, the Italian organization that represents farmers. Some 100,000 agricultural workers may not be able to come to Italy this year, a figure that could be double that of France. In Germany, where some 286,000 seasonal migrant workers work each year in fruit, vegetable and wine production, the government is exploring various ways to mobilize enough workers for the harvest, including direct flights for agricultural workers and the issuance of temporary work permits for asylum seekers. The European Commission issued practical guidance on 2 April 2020 to Member States to facilitate cross-border travel of seasonal workers in critical occupations, including food workers, while taking all necessary measures to prevent the further spread of the pandemic [12].

Sustainability and interconnectedness of the agricultural system. Major differences in economics, technology, demography, ecology and social environment create difficult conditions for many farming systems [13]. Border restrictions, travel bans and quarantines have added threats to the agricultural sector, especially for perishable products (European Commission, 2020). The resilience of the agricultural system to the COVID-19 pandemic is another metric to measure the impact of COVID-19. Small farms that mainly use family labor are less dependent on external hired labor, more sustainable than large farms that depend on external labor [13].

The outbreak of the COVID-19 virus is having a profound impact on international relations that goes far beyond the agri-food sector workforce. Export restrictions of various countries create a barrier to the entry of agricultural products into the market. Flight and port closures hinder the international supply chain. For the sake of "food sovereignty", few countries have seriously influenced the global system of agro-marketing.

Other consequences. The COVID-19 epidemic has had a significant impact on the behavior and activities of mankind, and agriculture has not been left out. Food security has been severely affected by restrictions on

movement; purchasing power has declined; on the contrary, the demand for food has increased, as well as an unbalanced impact on the most vulnerable groups of the population. The increased focus on public health and sanitation creates more competition for vital resources, especially water. The impact on achieving SGD becomes more complex. Research work is very difficult in the agro-industrial complex. Impact of supply chain and processing disruptions on animal welfare.

As international experience shows, agriculture cannot be efficient and successful without practical support. In view of the important role of agriculture in ensuring food security, the leading countries of the world are investing heavily in supporting agricultural producers, thereby regulating the food market and contributing to the social, economic and environmental development of rural areas.

Impact of COVID-19 on selected sectors of agriculture. It should be noted that the European Commission of the European Union notes that today, in the post-pandemic period, farmers and agricultural producers face many different problems. Since food security is still a priority development in the policy of the European Commission, therefore, it cooperates with the countries of the European Union and industry enterprises, while monitoring the situation and responding to it in a timely manner. As for the support of agricultural producers, the following situation is observed here (Figure 2): from 2005 to 2020, there is an increase in the income of farmers, but in 2020 you can see that there was a slight decrease compared to 2019. However, it should be noted that from 2013 to 2018 the level of support for agriculture in EU countries is lower than in previous years.

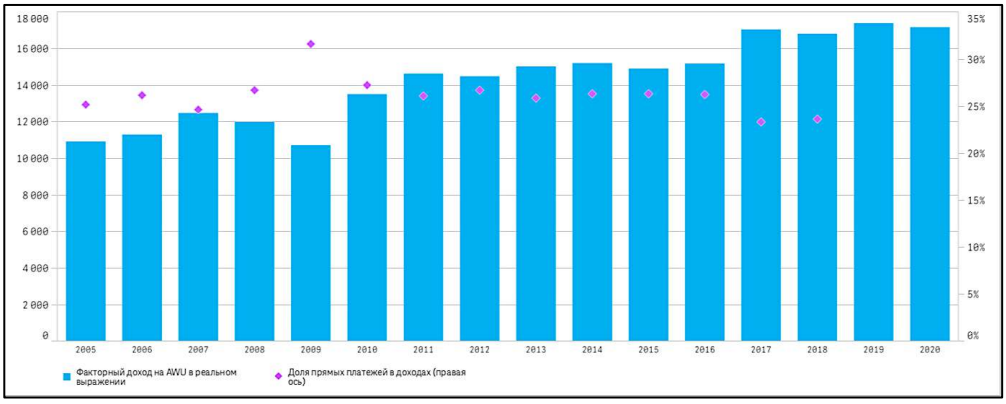

Figure 2 - Level of income of farmers and support provided in the countries of the European Union*

** Note: Compiled based on source [10]*

In 2020, there is a downward trend in prices for vegetable oils, meat and biofuels, and the same trend is observed for agricultural products. Compared to the baseline, prices will be lower in 2021 for some types of lamb and pork. The impact of COVID-19 on livestock production is largely unknown and undefined. Although formal estimates are not yet available, recent results indicate that the livestock supply chain has been disrupted. Poor milk performance also affected this sector, which fell by an average of 4.6% in 70 countries and even fell by 29% and 19% in the US. (IFCN (International Farm Comparison Network), 2020). Consequently, COVID-19 is estimated to have cost the cattle sector $13,617,418,450 in economic losses. Many livestock keepers and traders have lost access to national and international markets and, as a result, reduced their income. In the US, the price of pigs fell by 27% due to restrictions on movement. Demand for grain also declined as a result of reduced use of ethanol as a fuel. As a result, the cost of production increases. Prices for soybeans and other oilseeds have also fallen recently. The USDA is implementing a CFAP program for agricultural, livestock and dairy farms to help them cope with the loss of income caused by COVID-19. The restoration of border inspections in Europe has made it difficult to transport live animals, affecting the industry.

The illustration for 2020 is more mixed, with grains and biofuels above and below baseline. The COVID-19 pandemic around the world has greatly impacted open water fisheries. For example, at the peak of the coronavirus crisis in the United States of America, catches across the country were down by 40 percent. The fall in demand led to lower prices for fish and fish products. Fresh fish sales fell by 30% in France, Italy and Spain. In addition, several seafood trade events around the world have been cancelled, resulting in the loss of deals between large buyers and suppliers who depend on these regional events. Global aquaculture production is currently expected to decline by around 1.3%. [11].

The volume of agricultural production in 2020 decreased by 1.4%. Compared to the 2015–2019 season averages. sugar production decreased by 12%. During the first wave, the flower and plant sector suffered a significant financial loss of 4.12 billion euros. COVID-19 slows down the production of vegetables, fruits and honey. Due to the EU travel ban, this also causes labor shortages during the harvest season. Raise the price of agricultural inputs, including pesticides, fertilizers and seeds, among others. In addition to school closures, businesses and motels are seeing a decline in food demand (OECD, 2021). The largest group of farmers in Italy has launched the #MangiaItaliano (Eat Italian food) campaign. The Italian Ministry of Agriculture has allocated 6 million euros for farmers involved in agriculture, food and forestry, dairy farming and animal husbandry.

Policies for the development of agribusiness in the EU countries. In Germany, the government has temporarily extended the "70-day rule" for seasonal agricultural workers, who can now work up to 115 days until the end of October 2020 without paying social security contributions. It raised the limits on additional income from temporary work and farmers' pensions. Paid sick leave has also been adjusted so that where the Infection Protection Act is in effect, the amount received is equal to the worker's net wages for the first six weeks and then equal to the sickness benefit. In Italy, under Cura Italia stimulus measures, the eligibility requirements for unemployment benefits for agricultural workers were relaxed and a lump sum of €600 was paid to vulnerable workers, including agricultural workers. Employees earning less than 40,000 euros per year who must be present at the workplace are entitled to a one-time tax-free allowance of 100 euros.

Ultimately, all of the above will lead to the official adoption of the Common Agricultural Policy (CAP) reform on December 2, 2021. The new approach to agriculture, which will go live in 2023, focuses on being more equitable, greener and more productive in CAP.

The main goal of the new agricultural policy is to ensure a sustainable future for European agricultural producers, provide targeted support to small farms and give European Union countries more flexibility to adapt to local conditions. [9].

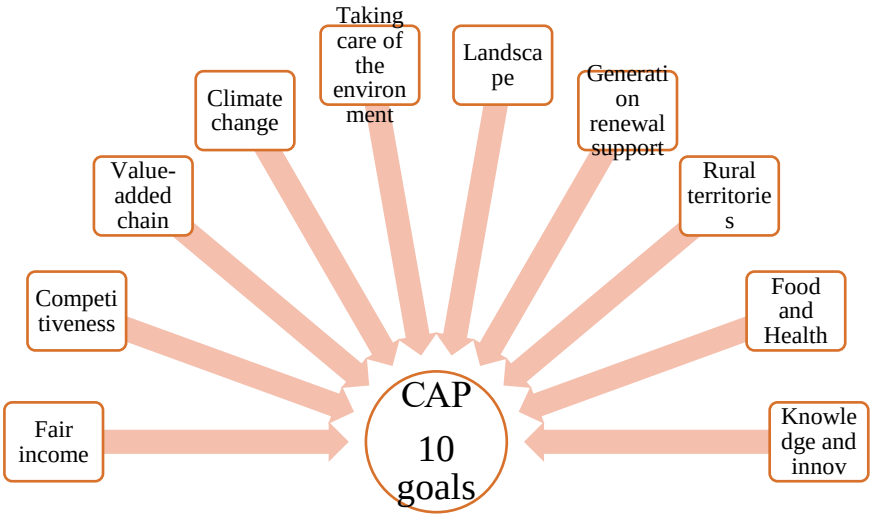

Figure 3 - Main objectives of the new common agricultural policy*
**Note: Compiled based on source [10]*

According to the new course of the common Agricultural policy, agriculture will be supported in the post-pandemic period in order to achieve the goals of the European Green Course.

Before the common agricultural policy for the period 2023-2027, it is planned to implement ten main key goals (Figure 3), which are mainly focused on social, environmental and economic goals. These goals will become the basis on which the countries of the European Union will develop their strategic CAP plans.

It should be noted that I agree with Figure 2, today the main course of the ATS is aimed at the active development of green architecture (Figure 3) and as a result, support goes primarily to those farmers who adhere to this course of development. Also, green architecture focuses on eco-schemes, that is, at least 25% of the budget is direct payments that are planned to be allocated to support eco-schemes, that is, creating incentives for climatic and environmentally friendly methods and approaches of farming, such as: organic farming, agroecology, carbon farming etc., as well as improving biodiversity and animal welfare [14].

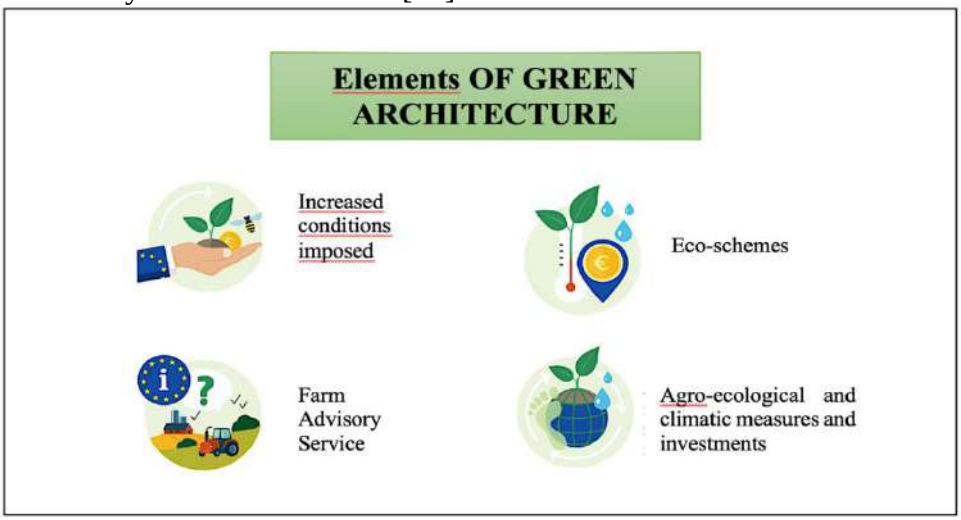

Figure 4 – Basic elements of green architecture*

** Note: Compiled based on source [10]*

It is worth noting that as part of the development of this new policy - CAP, support to agricultural producers is mainly provided through consulting services (Figure 4): it is planned that the consulting system will use a wide range of economic and environmental data to provide technological and scientific information-advice to farmers. It is worth noting that agroecological and climatic measures and investments are such support of the European Union, which will be aimed at improving ecosystems, increasing the efficiency of resource use and will give a new impetus to the transition to a low-carbon, climate–resilient economy in the world. It is worth noting that agroecological and climatic measures and investments are such support of the European Union, which will be aimed at improving ecosystems, increasing

the efficiency of resource use and will give a new impetus to the transition to a low-carbon, climate–resilient economy in the world.

Agribusiness development policy in the USA and Canada. Agriculture in Canada receives substantial support from the state in the amount of 6-8 billion dollars. At the same time, low indicators are observed in Canada, which are determined by a unique system of state monopoly on the purchase of cheese, milk, eggs, poultry and is called "supply management". Specially created by the state enterprises control the promotion of the above products on the domestic market, regulate local production and impose import restrictions through high duties reaching 200%. On the other hand, such a system allows Canada to indirectly support agriculture, but at the same time the negative effect of such intervention is also visible: consumers are harmed, since prices for final agricultural products in Canada are 30-300% higher than in other countries. As a result, there is such a situation: consumers support domestic agricultural producers at their own expense.

It should be noted that support is provided through various programs and services to agricultural producers, for example, such as: AgriStability, a program to reduce the risk of pesticide poisoning, AgriInvest, which help improve the cultivation and production process of agricultural products and food. It is worth noting such a program as: "Building the Future 2" (CA2), which includes several programs (GRE) that help agricultural producers cope with the risks of price instability and reduced productivity.

As for the support of agriculture in the United States, it has played an important role in the country's economy since the country's founding. The mechanism of state management of agriculture covers a wide range of areas: from supporting the consumption of local food in the United States and abroad, and to the development of renewable energy sources in rural areas.

As a result, the main instruments of the US government's support for agriculture are direct and indirect accounting (DIA), as well as support for pricing of basic agricultural goods, which is carried out through loans secured by agricultural products through Commodity Credit Corporation - Commodity Credit Corporation under the US Department of Agriculture [15].

5 Conclusion

1. At the present stage of development in most countries, support for agriculture includes support for the agricultural sector: the provision of various kinds of subsidies, subsidies, benefits, etc. The support of agriculture in the post-pandemic period contributes to the growth of agricultural production in the countries of the European Union, Canada, the USA and other countries that are the main exporting countries of agricultural food.

2. As international practice shows, the functioning and successful development of agriculture is impossible without effective support. Today, the European Commission of the European Union notes that farmers and producers face a number of difficulties, as a result, ensuring food security remains one of the priorities of the European Commission.

3. The Common Agricultural Policy (CAP) is a new direction in agriculture that focuses on a fairer, greener and productivity-based CAP. One of the significant goals of the SAR is green architecture. It is the green architecture that focuses on eco-schemes: at least 25% of the direct payments budget is planned to be allocated to eco-schemes, creating incentives for climatic and environmentally friendly methods and approaches of farming. Also agro-ecological and climatic measures and investments - EU support will be aimed at improving ecosystems.

4. It is worth noting the global experience of supporting agriculture in Canada and America, as these countries are world leaders in the production of agricultural products. In Canada, low indicators are observed, which are determined by a unique system of state monopoly on the purchase of cheese, milk, eggs, poultry and is called "supply management".

5. It is the support of agriculture in the United States that has played an important role in the country's economy since the country was founded. The mechanism of state management of agriculture covers a wide range of areas: from supporting the consumption of local food in the United States and abroad, and to the development of renewable energy sources in rural areas.

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Models of Social Research in the Development of Digital Infrastructure

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Abstract

This study provides a literature review of research on social research models and describes their role in transforming digital processes, analyzing the features of the current stage of development of digital platforms and platform tools. The authors focus on digital platforms for research and development. Based on the literature review, the paper identifies the elements of the digital social research infrastructure, types of models of the digital social research infrastructure, and the main tools of these models. The development of the digital infrastructure for social research is a hot topic today as digitalization simplifies many social research management processes. As a result, the following types of models of the digital infrastructure of social research were identified: integrated system, application programming interface, virtual research environment, metadata, and lack of infrastructure.

Keywords. Digitalization, Digital Technologies, Social Research Model, Digital Platform

JEL codes: O32, M29

1 Introduction

Today, the global digital space is influenced by major technological innovations and the accumulated data sets they have created (integrated social networks) that companies like Apple, Google, Facebook, Amazon have at their disposal. On the one hand, LIFO (last in - first out) data structure or stack technologies offer scientists great empirical and analytical opportunities. On the other hand, such technologies reduce the amount of research using traditional social studies. This, in turn, leads to an inevitable process where standard social research is replaced with new social media methods.

It is useful to understand the concepts of technological innovation used in the digital space. For example, technological innovations in digital communications embodied in the shift from the information web (Web 1.0) to the interactive web (Web 2.0) present new opportunities and challenges for

social research. The development of Web 2.0 and the high accessibility of the World Wide Web through portable and widespread devices are contributing to the generation of new forms of data, new methods for analyzing this type of data, and new services (Edwards et al., 2013). The difference between Web 1.0 and Web 2.0 is that the second one contains more interactivity and content for users, being a modern version of the Internet. Users actively use Web 2.0 to exchange information on the network. Active participation in the network by Internet users is the main difference compared to the previous version, since in the past users could only consume information. According to researcher Allan (Allan, 2009) there should be web portals with web services to provide a whole infrastructure for researchers that includes all academic disciplines. This virtual research environment in the form of portals should use Web 2.0 technology (O'Reilly, 2005), social media solutions (Wang, Carley, Zeng & Mao, 2007) and provide a virtual research environment for searching big data, indexing and posting papers. The appearance of this term dates back to 1999, with the transition of the Internet to the creation of content and interaction with Internet users. Websites for publishing information, social networks, web applications such as Instagram, Vkontakte, Facebook, Twitter and others began to appear. According to research by scientists, the scientific environment is becoming a networked, global environment, which has been confirmed by research on patterns of scientific collaboration and science (Smith et al., 2011). This trend has called for a research environment where scientists can share their research, have access to software and access to data, access to resources through the use of a web browser. There are the following types of different environments: science gateways (Wilkins-Diehr, 2007), virtual research environments (Carusi & Reimer, 2010), collaborative labs (Wulf, 1993), inhabited information spaces (Snowdon, Churchill, & Frécon, 2004) and digital libraries (Candela et al., 2011). Cyberinfrastructures (Cyberinfrastructure Council, 2007) and e-Infrastructures (e-Infrastructure Reflection Group, 2010) implement these environments. These frameworks implement services ranging from access to portals with resources in repositories, to access to management systems with more advanced services provided. Also, the use of these resources, the availability of access on demand, and the economy are in line with cloud computing (Foster et al., 2008) and grid computing (Foster & Kesselman, 1998).

Digital social research focuses on the application of digital technologies to social science research. They encompass quantitative and qualitative approaches, including new data sources, automatic information mining techniques, social network analysis, digital collaboration tools, etc. (Spiro, 2014; Zhuravleva, 2015; Morana et al., 2014).

In this context, each of these models of social research is valuable at the national and international levels: access to data allows for comparative

research and improving the quality of scientific work in general. Therefore, it is very important to explore tools, approaches, and models of social research and service activities in the context of the digitalization of the economy. In order to facilitate it, digital social research platforms have been created in many countries of the world, which help researchers in finding and working with the necessary information. In some cases, data and information can be found on these digital resources, and sometimes information from government sources.

The adaptation of digital infrastructure, virtual research tools, and cyber tools in social research is one of the directions of e-social science (Morana et al., 2014). It encompasses not only the informatization of various research activities, the digitalization of libraries and archives but also the creation of unified research infrastructures existing only in the virtual space of the Internet (Aschauer, 1989). There exist the following standard methods and text services as Canonical (Blackwell & Smith, 2019), EpiDoc (Cayless et al., 2009)

These services are used to solve epigraphic and textual problems. Researchers are also creating digital workflows covering different functional categories, e.g. Perseus (Crane, 2022).

Today, digital platforms are of great importance in digital transformation (Gössling and Michael Hall, 2019; Idowu and Elbanna, 2020; Kiesling, 2020). Digital platforms have changed interactions on the Internet, communication on the network (Instagram, Whatsapp, Twitter, Facebook), including making online food purchases (Glovo, Volt, Alibaba, Amazon, eBay) online taxi calling (Uber, Yandex), mobile banking, resource use and online entry to medicine (Damumed, polyclinic sites, Airbnb), purchase of goods and services (Apple pay, Alipay, Paypal), research and development activities (ResearchGate, Google Academy, Sci-Hub, Scopus, Web of Science, EPIC) and so on. The development of digital platforms has an impact on innovation and innovation activities. For example, the authors Myrick and Jeppesen (Myrick & Jeppesen, 2020) found that property rights affect major innovations in digital platforms. Also, researchers (Hein et al., 2019) confirmed this phenomenon in their study of Internet of Things B2B platforms.

Facebook has been assessed as an entity that considers the interests of society in the digital space by researchers (Nooren et al., 2018). Facebook's revenue is delivered by advertising as one of its revenue models. Facebook has potential network effects, with over 1.9 billion users, influencing the platform's innovation activities.

The impact of digital platforms on students and researchers in education is also significant, affecting aspects such as access to information and knowledge, socialisation, collaboration, career plans. Basically, the

application of digital platforms in education and research affects the dynamics of socialisation, access to information and learning. Thus, the transmission of knowledge and information in educational institutions has undergone great changes (Miño et al., 2019). However, the implementation of these changes does not consider the possible risks to the mental and physical health of students and researchers. There are also cybersecurity risks that need to be investigated.

Digital platforms make it possible to effectively solve problems in various subject areas, be useful both for business and civil society and for the scientific community, primarily for the formation of research competencies. Therefore, it is very important to understand the concept of digital infrastructure for social research, investigate modern models, and develop recommendations for adapting their experience to the conditions of Kazakhstan.

2 Literature review

Since the late 1980s, the issue of the impact of infrastructure assets and infrastructure on economic systems began to be vigorously discussed in the scientific community.

So, in 1989, David Aschauer's work was published on the relationship between the volume of state expenditure for the period 1945-1985 and the total productivity of the United States economy. According to Aschauer's research, it was concluded that a unit of social capital pays off through productivity growth in about a year. The author analyzed the slowdown in productivity growth due to the slowdown in infrastructure investment (Aschauer, 1989).

However, A. Munnell believes that there are no specifically substantiated cause-and-effect relationships that have been established in Aschauer's work. Investments made in public infrastructure have a positive impact on growth and output, Munnell believes (Munnell, 1992).

The use of information and communication technologies, servers, local networks, and the spread of broadband Internet are digital infrastructure assets. How broadband Internet affects economic growth has been discussed in the works of Waverman and Roller, Agarwal and Datta, Gillet, Crandall, Jamison and Holt and others. The works of scientists such as Castaldo, Nipo, Bagchi, Pradhan, Mallik, Niebel paid attention to the influence of information and communication technologies on the improvement of economic systems.

With the increasing availability of data and the growth of interdisciplinary research on a global scale, a digital social research infrastructure based on advanced GRID technologies which provide access to large-scale, complex, heterogeneous, and widely distributed data repositories, as well as the means for their high-speed computation and scientific

collaboration-is developing. However, technically powerful GRID technologies do not always offer appropriate solutions to the needs of researchers and can sometimes be difficult to implement in practice. In most cases, therefore, social sciences use Web 2.0 technology-based solutions for their research purposes. They provide user-friendly services through simple protocols and web-based user interfaces. Web 2.0 provides flexible solutions for researchers to provide advanced computational tools and services, increasing public participation in the development of research resources (Popova, 2015).

Conducting social research involves the formation of specialized research infrastructure and software associated with the emergence of new methods, approaches, information technologies, models, and others. The peculiarity of social sciences in the digital environment is the close relationship with the humanities, as there are common techniques, services, tools, projects, and electronic cooperation (Wessels & Craglia, 2007). There are five models of the digital infrastructure of social research: 1) virtual research environment; 2) integrated system; 3) metadata; 4) application programming interface; 5) lack of infrastructure (Zhuravleva, 2015).

Models define the interfaces, roles, communities, and relationships present. Based on the identification of commonalities between the models, it is possible to form cross-sectoral collaboration and implement interfaces of data, information, and knowledge (Kemman, 2018). The Virtual Research Environment model does not target a few scientists, but rather a large group of scientists. This model is appropriate for large infrastructure projects. This model includes procedures for providing access to certain resources, research management, data analysis and use, publication of scientists' research, intellectual property protection (Priddy et al., 2016). The TTO is the system for transmitting the technical and scientific results and deals with licensing and patenting (Ulanin, 2017). A virtual research environment is a digital environment, which is created at the request of the community and provides data according to the requirements of the community with the protection of intellectual property rights, in particular copyrights (Kireyeva et al., 2020). The advantage of the model is that it is user-friendly, and scientists are given the ability to search for information. The disadvantage is that it is expensive, as not all information is available, it has to be purchased.

The "integrated system" model implies an infrastructure with a set of data, tools, and analysis. This model includes architecture, using database and application servers; aimed at working in computing networks (Candela et al., 2013). The "interface" model is becoming the most popular among scholars conducting social research, as today the use of digital technology and web portals can provide surveys and questionnaires. This model is a set of functions, structures, procedures in a form understandable to the IT

professionals (Boikov et al., 2010). The metadata model is based on describing publications, objects, or assets, contributing to the usefulness of the data. There is an application programming interface (API), which is a set of ready-made functions, procedures, constants, classes and structures to facilitate the creation of user program modules in the solution and execution of production tasks. For example, there are social research metadata schemes such as ISO 19115, ISAD, DC, and others (Kamnev, 2016). The next model is to research without a defined infrastructure, only with a set of data and tools.

This approach is not expensive because it does not need funding. It is basically up to the developers to decide on the specifics of what tools and data to create. The disadvantage of this approach is that it is not always possible to quickly discover the tools. Essentially, these tools may not be understood by scientists, which makes it difficult for them to position themselves, as different tools may be needed for different research problems (Gomez et al., 2016).

Based on the literature review, the digital infrastructure of social research is understood as a set of conglomerates of researchers, diverse in composition and structure, and the necessary tools, approaches, and data that are based in the Internet space and are actively used for conducting social research.

3 Methodology

The methodological basis of the study was based on the results of scientific publications, achievements of global economic science on the formation and development of social research models in the digital infrastructure. To identify models of social research in digital infrastructure, it is important to analyze the literature review of this area of knowledge.

In this study, system-structural and functional approaches were used in working with the literature review. The methods of systematization and synthesis of information were also used.

In Figure 1, the visualization of the main elements of the digital social research infrastructure was suggested.

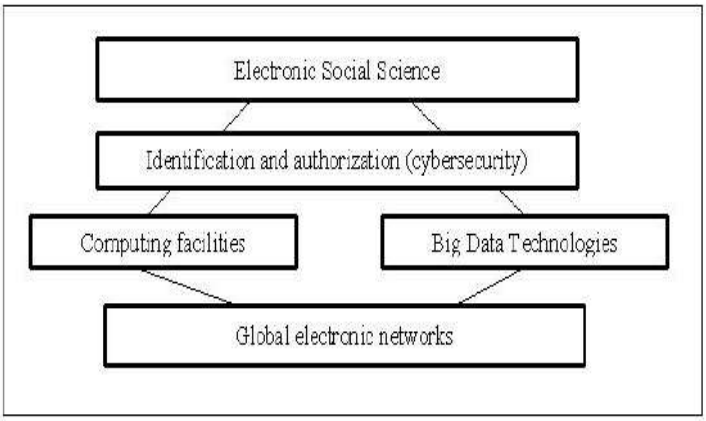

Figure 1. Elements of a digital infrastructure of social research

The social research model is a self-developing network of technological systems, technical devices, intelligent models, software, communication practices, databases for the efficient production, distribution, and exchange of scientific data and new knowledge in a distributed digital environment.

In doing so, it encompasses a variety of entities, from individual initiatives to global communities. Models of social research in the digital infrastructure were considered and their basic specifics were given. The paper presents tables with the elements of the digital infrastructure of social research and with the models of the digital infrastructure of social research, compiled according to the above-mentioned sources. The elements of social research digital infrastructure include global electronic networks, computing tools, big data technologies, identification and authorization, electronic social science.

4 Results and Discussion

The specific nature of social research determines the complexity of creating specialized software and research infrastructure. This is due to the accelerated emergence of new mathematical methods, models, approaches, as well as new information technologies, which in turn affect social research methods. The peculiarity of social sciences development in the networked digital environment is determined by close interconnection with digital humanities at the level of common tools, techniques, services, as well as e-collaboration and common projects.

Table 1 shows the models and tools of the digital social research infrastructure.

Table 1 - Models of digital social research infrastructure

Type	Data	Tools	Benefits	Restriction
Integrated system	Centralized	Centralized	Specificity	Rare stability
Virtual research environment	Distributed	Centralized	User-friendliness, search capability	High cost, generality
Application programming interface	Centralized	Distributed	Specificity, stability	Inconvenience for the user
Metadata	Distributed	Distributed	Cheapness, specificity	Lateness
Lack of infrastructure	Distributed	Distributed	Cheapness, specificity	Lack of search capability
Note - compiled from the source [18]				

The social research model represents an integrated system approach in which infrastructure is created that contains both a data set or several consistent data sets, as well as related tools for their study and analysis. Five models of social research in the development of digital infrastructure are identified.

Similar models for researchers in finding and working with the necessary information are being developed not only in Europe but also in the USA, China, South Korea, Japan, etc. Generally, researchers are interested in the patterns generated by the aggregate interactions of online users, which allows for a deeper use of social network analysis to support management decisions.

Digital platforms were classified according to various parameters in the form of five blocks. These categories were identified where we conducted a thorough analysis and detailed description. Thus, the main models of social research in the context of the development of digital infrastructure were considered. Each model consists of a minimal set of unifying concepts and relations in the field of social research. At the same time, there is no single model of the digital infrastructure of social research. The models discussed above are not unified, some of them integrate with the existing physical infrastructure. The choice of a particular model is determined by various factors: the tasks to be solved, efficiency, cost, ease of use, personal preferences of the scientist, etc.

5 Conclusion

The rapid development of digital technologies is an integral part of the social environment, becoming a new means of communication. In turn, the development of social research models, the emergence of new information processing methods and tools, leads to the need to optimize information and knowledge management to prevent information loss, as well as to support geographically dispersed research teams and the possibility of remote working.

Based on the literature review, the digital social research infrastructure is understood as a set of conglomerates of researchers, diverse in composition and structure, who are based in the Internet space and actively used for social research. The study considers various research studies dedicated to the analysis of models of social platforms and related events based on big data arrays. They reflect research methods, techniques, and algorithms, enabling researchers to implement them to solve problems.

So, we can distinguish the following types of social research digital infrastructure models as an integrated system, application programming interface, virtual research environment, metadata, and lack of infrastructure. In addition, as can be seen from the above, digital platforms are divided based on different measurements. This highlights the multidimensional nature of digital platforms and the need to take this diversity into account when studying digital platforms of social research. Therefore, future research on digital social platforms should consider the nuances of different types of platforms when classifying, analyzing, and summarizing the results of their research.

The development of social research digital infrastructure models is not only taking place in Europe but also in Asian countries, the USA, and others. Social research methods can now be conducted online using social media. In accordance with the experience of using digital social research, digital research should be complemented with traditional research. The application of digital infrastructure in social research greatly expands the opportunities for scholars in education, experience, and so on. Through the emergence of virtual activities that are linked to research projects and the functioning of various schools of thought, networks of researchers are formed in which contemporary information is exchanged between researchers, efforts and resources are pooled.

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Analysis and Evaluation of the Impact of Foreign Direct Investment on the Economy of Kazakhstan

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Abstract

Foreign direct investment (FDI) is widely considered as an essential form of capital inflow and a key factor in promoting economic growth in many countries. This is particularly true for developing nations, emerging economies, and countries that are currently in the process of development, as FDI is a major contributor to their economic progress and empowerment. This research paper aims to conduct an empirical analysis of the impact of FDI on the economy of Kazakhstan between 1991 and 2020, specifically on its key economic growth indicators, such as GDP. FDI has recently gained significant attention in Kazakhstan due to its crucial role in the country's economy. The study utilized the causal research method and employed well-known econometric models, namely, linear regression and vector autoregression (VAR), to analyze and evaluate the impact of FDI on the economy of Kazakhstan. The results of the study indicate that FDI and exports have a statistically significant impact on Kazakhstan's GDP, while gross domestic product and exports have a positive impact on FDI.

Keywords: Foreign direct investment, GDP, linear regression, correlation, cointegration, vector autoregression (VAR).

JEL codes: E22, F21

1 Introduction

Many economic science theories describe the impact of foreign direct investment (FDI) on the national economy. Often, existing theories do not contradict each other but only consider investment issues from different positions, emphasizing one or another factor.

The development of foreign trade and processes of multiplicative influence of capital have led to cardinal changes in the structure of production of goods and services involved in world trade and contributed to the acceleration of regional and global integration processes. At the same time, the current negative trend in the world markets and the growth of geopolitical tensions in many regions hurt the global economy in general and Kazakhstan in particular. For example, the risk of imposing secondary sanctions on some domestic companies suspected of involvement in double exports to the Russian economy.

Under these conditions, the development of integration cooperation, the deepening of economic interaction, and the formation of a capacious internal market in Central Asia are of paramount importance. The changing role and strengthening of the positions of Central Asian countries in the Eurasian region in connection with the Russian-Ukrainian war and Russia's economic isolation favor the search and development of new interstate trade and investment ties, too. Central Asian integration is becoming an essential factor in the sustainable development of the countries in the Eurasian region.

Our study focuses on the empirical analysis and assessment of the impact of foreign direct investment (FDI) on the economy of Kazakhstan. FDI is the most crucial element in ensuring sustainable growth of a country's economy, including Kazakhstan. It is generally recognized that they significantly contribute to many countries' economic growth (Coy & Comican, 2014). In essence, FDI is an international investment that allows the investor to exert significant influence over managing an enterprise outside the country of origin (Solomon, 2011).

The paper is structured as follows: firstly, the literature review is performed, the second part presents the data and methodology of the applied model, and the discussion of the results and conclusion are presented in the last parts.

2 Literature review

FDI plays a significant role in stimulating investment activity in the global economy under various circumstances. For instance, global FDI inflows reached $154 billion in 2019 (UNCTAD, 2020). Over the past 25 years, the proportion of developing countries in total FDI inflows has significantly fluctuated, increasing from 15% in 1990 to 46% in 2013 before declining to just over 20% in recent years. It is worth noting, however, that the motives behind these international capital flows remain different from those associated with FDI inflows to developing nations despite the shifts that have occurred in recent decades. For example, pursuing agricultural or mineral resources is now less critical than in the early 1900s. Meanwhile, the current direction of these flows is highly complex and influenced by various factors linked to the competitive environment in which firms operate, their distinct characteristics, and economic conditions in both the home and host countries.

During the early 1990s, the volume of FDI began to increase steadily, prompting an upsurge in economic literature examining its impact on growth outcomes. Generally, FDI can affect growth through a direct or narrow channel and an indirect or broad channel. Through the direct channel, FDI can support and complement capital accumulation by increasing domestic investment in host economies. Conversely, FDI's growth-promoting property

can go beyond mere physical capital accumulation. Accordingly, Farrell (2008) defines FDI as a "package of capital, technology, management, and entrepreneurship" that enables a firm to operate and provide goods and services in a foreign market. Ultimately, FDI can be viewed as a "composite package" consisting of fixed capital, new technology, advanced production techniques, managerial expertise, and innovative skills (Mello, 1999).

The importance of FDI in Kazakhstan's economy cannot be overstated. Despite efforts to liberalize the economy and attract foreign investment since gaining independence, the country still heavily relies on oil and natural resources for more than 70% of total FDI. In 2019, FDI inflows were $3.1 billion, a slight decrease from the previous year, with the oil industry and metallurgy being the primary sources of investment. Retaining current investors and attracting investment in other sectors remains challenging for the country. The COVID-19 pandemic has also affected new project announcements, causing an 86% decline. However, FDI in Kazakhstan grew by 19% in 2020 due to expansion in construction and trade. The completion of Chevron's project to expand the Tengiz oil field, one of the most significant foreign investments in the country, is expected in 2022.

Kazakhstan has significantly improved its investment climate, which various international organizations have recognized. In addition to the World Bank's Doing Business report, Kazakhstan ranked 25th out of 190 countries in the 2022 Index of Economic Freedom, published by The Heritage Foundation. The country has implemented various reforms to improve its business environment, including simplifying the registration process for new businesses, reducing the time and cost of obtaining permits, and improving access to credit. The government has also established special economic zones and industrial clusters to attract investment in priority sectors such as agriculture, information technology, and tourism. Overall, these efforts have helped to attract FDI to Kazakhstan and promote economic growth.

The purpose of the study is to analyze and evaluate the impact of foreign direct investment on the economy of Kazakhstan. In connection with the purpose, the objectives of this work are: a theoretical review of the existing empirical literature on the relationship between FDI and economic growth; the collection of necessary data for the construction of the econometric model, the construction of econometric models for GDP, FDI and export indicators; Interpretation of the models based on the results obtained.

We have compiled a comprehensive database of GDP, FDI, and export indicators spanning from 1991 to 2020 to conduct an empirical study on the impact of FDI on GDP in Kazakhstan. The sources for data are the statistical databases of the World Bank, the National Bank of Kazakhstan (NBK), and the National Bureau of Statistics of the Agency of Strategic Planning and Reforms of the Republic of Kazakhstan.

The current paper utilizes the endogenous growth theory formulated by Balasubramaniam in 1996 and empirical growth models from existing literature. To examine the impact of FDI on economic growth, the study employs an econometric model that includes a multiple regression model and a vector autoregression (VAR) model to establish causal relationships among the variables. The VAR model, initially introduced by Sims in 1980, is used to conduct more rigorous analyses.

According to Karimi (2009), neoclassical and endogenous growth models approach the issue from different angles and serve as the theoretical foundation for most empirical research examining the correlation between FDI and growth.

Solow's (1956) standard neoclassical growth models propose that FDI can enhance capital stock and promote growth in the host economy by funding capital formation (Brems & Hans, 1970). However, due to the decreasing returns to capital in neoclassical growth models, the impact of FDI on growth is comparable to that of domestic investment. FDI only has a "short-term" effect on growth as countries move towards a new steady state. On the other hand, endogenous growth models suggest that FDI is more effective than domestic investment as it introduces new technologies into the production function of the host economy (Borensztein et al., 1998). This is because the technological spillovers linked with FDI compensate for decreasing returns to capital and ensure long-term economic growth. Additionally, endogenous growth models posit that FDI can contribute to long-term growth by enriching the existing knowledge base in the host economy through workforce training and skills development (Hanson & Slaughter, 2003) and by introducing innovative management practices and organizational structures (De Mello & Jr.Luiz, 1999). Hence, through capital accumulation and knowledge spillovers (Niles, 2003), FDI plays a critical role in the host country's economic growth.

Therefore, from a theoretical perspective, it is reasonable to assume that a positive relationship exists between FDI inflows and economic growth in the host country. Furthermore, studies utilizing country-specific data provide more robust evidence supporting this relationship.

The causal relationship between foreign direct investment and gross domestic product growth can take two directions (Yalta, A). According to the "FDI-led growth hypothesis," FDI in host countries can stimulate growth by increasing the stock of capital, creating new jobs, and spreading technology. Conversely, the "market size hypothesis" suggests that the host country's rapid GDP growth that creates new investment opportunities may also generate increased FDI inflows. Even though it is predictable that FDI increases economic growth in the host country, Zhang (2001) showed that the

extent to which FDI contributes to growth depends on the country's characteristics.

Iamsirararoj and Doucouliagos (2015) conducted a meta-regression analysis and highlighted the positive relationship between growth and FDI, which was higher in individual-country studies than cross-country studies. Mahapatra and Patra (2014) confirmed the significant role of FDI in India's economic growth. The South Asian Association for Regional Cooperation (SAARC) was studied by Saini et al. (2014), Who showed that FDI positively affects real GDP, gross national income, and export growth but negatively affects financial position and trade openness. Similarly, Mahadika et al. (2017) used a vector autoregression model for Indonesia to prove a long-run relationship between GDP, FDI, and exports. Alshamsi et al. (2015) estimated a distributed-lag autoregressive model for the United Arab Emirates and concluded that GDP per capita has a significant positive relationship with FDI. In the case of South Africa, Sunde (2017) found a unidirectional causal relationship between foreign direct investment and economic growth. In contrast, an increase in FDI, according to Granger, causes economic growth in Malaysia. In contrast, Akinlo (2004) found that FDI positively affects growth in Nigeria, but this effect is insignificant after a long lag. Also, Yalta (2013) noted no statistically significant relationship between FDI and economic growth in China. A study on Turkey from 1992-2007 by Temiz and Gokmen (2014) proved no significant relationship between FDI and economic growth in the short and long term. An overview of the research papers, the impact of FDI on economic growth by country, is presented in Table 1.

Table 1. Overview of research papers, the impact of FDI on economic growth by country

Author (-s)	**Observed period**	**Database**	**Methodology**	**Study's result**
Lee (2013)	1971–2009	19 countries of the G20	Cointegration tests and models with fixed-effects.	FDI stimulates economic growth.
Tekin (2013)	1970–2009	18 less-developed countries.	Granger-causality panel.	Granger-cause GDP FDI in Benin and Togo Granger-cause GDP FDI in Burkina Faso, Gambia, Madagascar, and Malawi
Voytovich, Klimavichen, Pilinken (2019)	1997–2014	11 Central and Eastern European (CEE) countries.	Granger Causality Test and Vector Autoregression (VAR).	Causality, according to Granger, GDP and FDI are interrelated.

Kuzmina et al. (2014)	1895–1914	Russia.	OLS and IV-2SLS regressions.	The higher prevalence of illicit payments and the burden of management organizations, law enforcement, and criminals reduce FDI.
Uddin (2019)	1972–2016	Pakistan.	Multivariate OLS regression and VAR system.	Democracy increases incoming FDI in the short term, while a military government substantially impacts FDI in the long term.
Sârbu & Carp (2015)	2000–2013	Romania.	OLS and Johansen cointegration.	FDI has a positive impact on economic growth
Belascu et al. (2018)	1999–2013	5 CEE countries.	Least squares panel regression.	FDI has a positive impact on economic growth.
Silajdzic and Mehic (2014)	2000–2013	10 Central and Eastern European countries.	OLS with standard errors corrected to the PCSE panel (fixed-effect).	FDI contributes to economic growth.
Notes: Table compiled by the authors based on the literature used				

Regression analysis examined the relationship between FDI, economic growth, and exports, according to Borensztein (1998). The study was conducted in 69 developing countries over a period of two decades. They obtained a positive effect of foreign direct investment on the GDP growth. In the study of Dritsaki (2004), the VAR autoregression model was used to study the relationship between FDI, economic growth, and exports. Balasubramanyam (1996) investigated the role that FDI plays in growth in 46 developing countries with different trade policy regimes from 1970 to 1985. Based on cross-sectional panel data analysis, they found that FDI enhances growth in those countries with foreign-oriented trade policies than in domestic-oriented trade policies.

Based on the review of the above literature, most authors give positive effects on the impact of FDI on the recipient country's economy. The impact of FDI on the CIS economy was studied by Meyer and Klaus (2000); their study included data on Kazakhstan until 1997. Among the domestic scientists, Rakhmatullayeva et al. (2015) investigated the social effects of FDI in regions of Kazakhstan; the author proved that enterprises with foreign capital do not negatively affect the socio-economic development of regions of Kazakhstan.

We can say that foreign direct investment can have serious consequences, as they have different effects in the long term.

3 Methodology and specification of the model

A sample period of 30 years from 1991 to 2020 with an annual time series was chosen for the study. Data was collected from Various sources (World Bank, NBK, and others). This study uses Multiple linear regression analysis for econometric analysis, as more than one regressor is included in this model. Using OLS, we will obtain an estimate of the effect of the regressors on the outcome indicator.

Multiple regression model: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta n X n + e$, where: Y is the dependent variable, in our case, GDP (million USD); β_0 is the coefficient of Y; β_1, β_2, …, β_n are regressor coefficients; e is a random variable.

Next, to identify causal relationships between foreign direct investment, exports (exports as an additional variable), and economic growth, we used a stepwise procedure: unit root test, cointegration, and Granger causality test within vector autoregression (VAR).

This stage of building a vector autoregression model began by examining the stationarity properties of the series using the Dickey-Fuller (ADF) and Philip-Perron (PP) tests. This test is conducted primarily to avoid false regression, a common problem for most macroeconomic variables whose data formation processes follow a time trend. The ADF test procedure tests the null hypothesis that the variables have a unit root or are nonstationary against the alternative hypothesis that the variables are stationary. A vector autoregression model (VAR) will be constructed to estimate the long- and short-run relationships between FDI and the corresponding explanatory variables.

Both descriptive and quantitative analyses will be used in this paper. Charts such as graphs and tables will aid in descriptive analysis. Unit root tests will be conducted for all variables using the ADF and PP tests to determine their order of integration to eliminate false regression. In addition, the study will use Johansen's cointegration econometric methodology within the VAR to test for the cointegration of variables to obtain both short-term and long-term estimates of the relevant variables. A Granger causality test will also be conducted to determine the direction of causality between model regressors.

All estimates were conducted using the STATA software package.

4 Results and Discussion

GDP, FDI, and export data measured in millions of USD were taken from World Development Indicators (World Bank, 2020). Available annual data from 1991 to 2020 were divided into three periods: 1991-1998, 2000-2008, and 2009-2020. However, our analysis focuses on the third period, after

the 2008 recession, as Kazakhstan's highly ambiguous history of the pre-2015 period reduces its predictive power for the future. The fall of the GDP indicator in 2009 is related to the global financial crisis. There was GDP growth in 2011-2013, still not reached that level. However, in 2014, the decline in oil prices, high inflation, and political sanctions of the United States against Russia created a crisis period for Kazakhstan. The COVID-19 pandemic caused a GDP decline in 2020. All details of the indicators are presented in Figure 1.

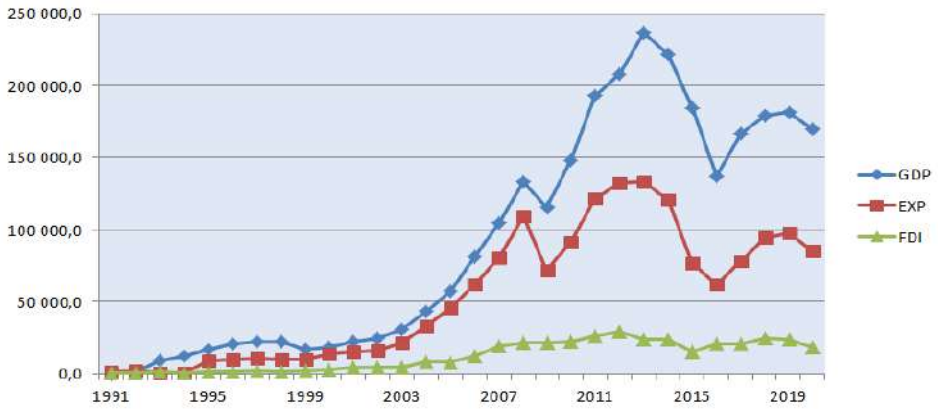

Figure 1 Kazakhstan's GDP, FDI, and export indicators, 1991-2020 (million USD)

Source: compiled by the authors based on data from WB (2020)

Before constructing a multiple regression model, we must analyze the variables' correlations. Figure 2 shows the correlation fields of GDP and FDI and GDP and export of the country. Based on Figure 2, the variables are linearly dependent.

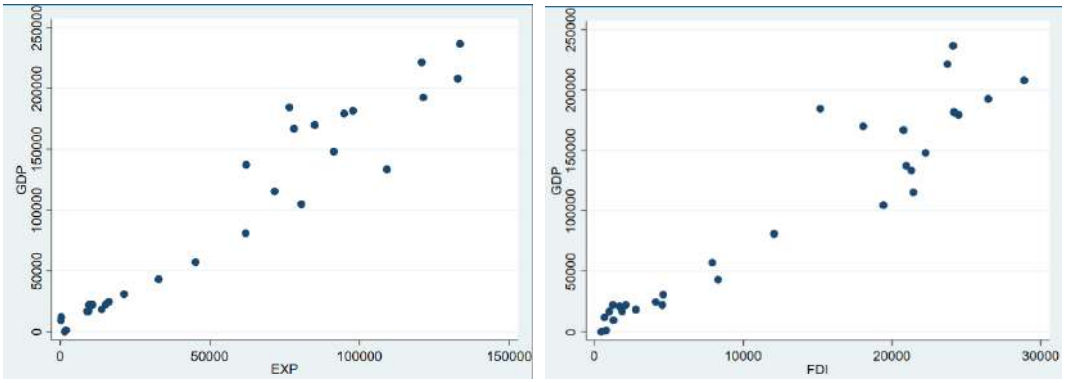

Figure 2 Correlation matrixes in graphical form between GDP and FDI,

GDP and exports (EXP)

Source: compiled by the authors based on NBK data (2020)

The multiple regression model has the following form: $Y = \beta_0 + \beta_1 LFDI + \beta_2 LEXP + e$, where Y is the indicator of GDP (million USD); β_0 is the coefficient of Y when X is 0; β_1LFDI is the logarithmic value of FDI (million USD); β_2LEXP is an export performance (million USD); *e* is a random variable. The logarithm calculation was made to reduce the time series variance and, therefore, ensure the stationarity of the time series.

The results of estimating the impact of FDI inflows on Kazakhstan's economy based on a multiple regression model using the STATA package show that FDI and exports explain 78.57% of the variation in GDP (R2=0.7857). However, some data points had high influence but were not excluded as they were not data entry errors. For such a case, robust regression is an excellent strategy to strike a balance between completely excluding unexplained effects and accounting for them equally in the OLS regression. Thus, the regression equation for Kazakhstan's GDP is as follows: *LGDP = 0.755 + 1.087* LFDI + 0.392* LEXP*, where 0.755 is the logarithm of GDP when the other variables are 0. The equation shows that a 1% increase in FDI will increase GDP by 1.087%, other things being equal. The coefficients of FDI are statistically significant at the 5% significance level, which confirms the positive relationship between FDI and economic growth in Kazakhstan.

The next part of the work uses the VAR model to identify the causal relationship between FDI, economic growth, and exports and get reliable results. The causality between the variables is investigated as follows:

$$Y_{1t} = \beta_{01} + \beta_{11}Y_{1t-1} + \ldots + \beta_{n1}Y_{1t-p} + \alpha_{11}Y_{2t-1} + \ldots + \alpha_{n1}Y_{2t-p} + X_{11}Y_{3t-1} + \ldots + X_{n1}Y_{3t-p} + e_t \quad (1)$$

$$Y_{2t} = \beta_{02} + \beta_{12}Y_{2t-1} + \ldots + \beta_{n2}Y_{2t-p} + \alpha_{12}Y_{1t-1} + \ldots + \alpha_{n2}Y_{1t-p} + X_{12}Y_{3t-1} + \ldots + X_{n2}Y_{3t-p} + e_t \quad (2)$$

$$Y_{3t} = \beta_{03} + \beta_{13}Y_{3t-1} + \ldots + \beta_{n3}Y_{3t-p} + \alpha_{13}Y_{1t-1} + \ldots + \alpha_{n3}Y_{1t-p} + X_{13}Y_{2t-1} + \ldots + X_{n3}Y_{3t-p} + e_t \quad (3),$$

where: Y_1 = GDP, Y_2 = FDI, Y_3 = Export, p = log length.

The model is tested on annual data for 1991-2020 using the STATA package. First, the Dickey-Fuller (ADF) test was used to check the stationarity of the data in the VAR model. The first attempt of the ADF test showed non-stationarity of the time series, so new data were introduced in the form of the first differences of this series. The second ADF test already showed the stationarity of the time series. This is confirmed by comparing the values of the ADF statistic with the McInnon critical values, which showed that the absolute values of the ADF statistic are less than the absolute values of McInnon at the 1% significance level, indicating that all data series in the VAR model are stationary.

The second step is determining the optimal lag length in the VAR model to eliminate the autocorrelation problem. For this purpose, it is necessary to analyze the values of the likelihood ratio (LR), the finite prediction error (FPE), and the Akaike (AIC) and Hannan-Quinn (HQIC) information criteria. Using the STATA package, we obtained that lag 4 is optimal, corresponding to the more significant LR value and the smallest FPE, AIC, and HQIC values. According to our analysis, this lag is optimal and used in all steps of the following VAR analysis.

Next, co-integration tests are conducted to determine the presence or absence of similarity in the movement and stability of the relationship between the variables under study. The Johansen cointegration test method was used for this purpose. The values of trace statistics and max-eigen value were found to be less than their critical values at a 5% significance level. In addition, the co-integration test results showed that the probability value is less than the actual level of 5%. Thus, the results of the Johansen test can be interpreted as the variables under study are cointegrated.

Thus, according to several tests conducted earlier, the variables are stationary. Next, we build VAR models to identify the relationship between FDI, exports, and GDP (table 2). The lagged values of time series variables act as regressors.

Table 2 Results of the VAR estimation model

Lags	**gapGDP**	**gapFDI**	**gapEXP**
L.gapGDP		0.225* (2.14)	1.461*** (3.35)
L4.gapGDP			-1.834** (-3.10)
L4.gapEXP	-1.140* (-2.31)		
L.gapFDI	1.866*** (3.78)		1.010*** (3.99)
L3.gapFDI	1.248* (2.20)		
_cons	-3465.1 (-1.14)	762.4 (1.07)	448.5 (0.15)
F- statistics	69.74901	43.09023	20.61568
R-sq	0.7361	0.6328	0.6119
Note: compiled by the authors based on NBK data in the STATA package			

Table 2 shows the statistical information for each variable: GDP, FDI, and exports. The number in the first bracket (()) shows the t-st. From the above estimation result of the VAR model, it can be seen that the economic growth variable (gapGDP) is statistically significantly affected by L.gapFDI, L3.gapFDI, L4.gapEXP, and L4.gapGDP as indicated by statistical values >

2.048 or < of -2.048. In contrast, constant C has no significant effect on GDP. While the significant variable gapFDI is significantly affected only by L.gapGDP and L3.gapEXP, the gapEXP variable is significantly affected by L.gapGDP, L4.gapGDP, and L.gapFDI. In the VAR specifications, not all lags are significant in each equation. Therefore, the next step is to select a significant lag for each model variable so that the regression model is obtained as follows:

$$GDP = -3465.1 - 1.140L4.gapEXP + \mathbf{1.866L.gapFDI} + \mathbf{1.248L3.gapFDI} \quad (1)$$

$$FDI = 762.4 + \mathbf{0.225* L.gapGDP} - 0.0394\ L3.gapEXP \quad (2)$$

$$EXP = 448.5 + 1.461\ L.gapGDP - 1.834\ L4.gapGDP + \mathbf{1.010\ L.gapFDI} \quad (3)$$

As can be seen from equation (1), the GDP of the current year is positively affected by both changes in FDI in the current year and its value three years ago. In other words, an increase in FDI inflows in the current year would increase the current year's GDP by more than their increase three years earlier. In contrast, an increase in exports four years ago would decrease the current year's GDP. Equation (2) shows the negative effect of exports on the change in FDI and confirms the positive relationship between GDP and FDI: an increase in GDP in the current year favors an increase in FDI inflows in the current year. The interpretation of equation (3) leads to the following conclusions. There is a positive relationship between GDP growth and exports in the current year, although GDP growth four years earlier may have led to decreased exports in the current year. There is also a direct relationship between FDI and exports in the current period: an increase in FDI will lead to an almost equal increase in exports.

Further, the Granger causality test and the Jarque-Bera statistic test were used, too. The first test is an analytical technique to identify a causal relationship between the variables under investigation. The null hypothesis (Ho) indicates that there is no relationship between the variables; the alternative hypothesis (Ha) indicates that there is such a relationship. The results of the Granger causality test in the model showed that the hypothesis Ho is rejected, thereby proving the existence of a causal relationship between economic growth and FDI from 1991 to 2020.

The Jarque-Bera statistic test tests the hypothesis that the residuals of the series under consideration have a normal distribution. According to the results of this test, hypothesis H_0 is not rejected; in this case, the time series obeys the normal distribution law at a 5% significance level.

5 Conclusion

The results of econometric modeling show that FDI and export indicators influence the change in the GDP indicator of Kazakhstan. FDI positively impacts the GDP indicator, so it can be argued that increasing FDI inflows to Kazakhstan can drive the country's economic development.

The paper further investigates the causal relationship between FDI, GDP, and exports in Kazakhstan. Annual data for 1991 – 2020 were used to construct the VAR model. For the modeling, the data were first adjusted for the calculations; GDP and exports were seasonally adjusted. Then, they were used for initial stationarity testing. The ADF results showed that all three time series are stationary for the first difference. This allowed the modeling to continue, and once the time lag was determined, the Johansen cointegration test was performed.

The test showed that there is a long-run relationship between GDP and FDI. The vector autoregression model also confirmed a positive relationship between FDI and GDP and between exports and GDP. This fact indicates that FDI positively impacts Kazakhstan's economy, and exports in an open economy stimulate economic growth. The study conducted by Balasubramanian argues that export-oriented countries can benefit more from FDI. As can be seen from the discussion of the empirical results, Kazakhstan is an export-oriented country, so there is a significant relationship between its economic growth and FDI. Thus, the results of the model show that it is foreign investment and exports that have a significant impact on the GDP indicator in Kazakhstan.

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The legal framework towards the circular economy in the Republic of Kazakhstan

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Abstract

The circular economy is an important topic of discussion among scientists and government bodies due to global environmental challenges. Kazakhstan, located in Central Asia, is an important regional player in the field of a circular economy. The country has taken significant steps to promote circular economy practices, with the goal of reducing waste, promoting sustainability, and creating economic opportunities. In this article, the legal framework in Kazakhstan that supports circular economy practices was explored. By using the method of policy analysis, the legal framework related to the circular economy in the Republic of Kazakhstan was identified. As a result of the analysis, it was revealed that there are a couple of legal documents, laws, and programs that support the transition to a more sustainable economy. However, the implementation of those laws in Kazakhstan faces several challenges.

Keywords: circular economy, sustainable development, Kazakhstan, waste management

JEL codes: K30, Q01, Q50.

1 Introduction

The circular economy model is gaining increasing attention worldwide as a way to achieve sustainable development and reduce environmental impact. The Republic of Kazakhstan, located in Central Asia, is not an exception. The country has been taking steps to create a legal framework that supports the circular economy, including introducing laws and regulations that encourage waste reduction, resource efficiency, and the reuse and recycling of materials. This study examines the legal framework towards the circular economy in the Republic of Kazakhstan, exploring the key laws, regulations, and initiatives that have been put in place to promote sustainable development and environmental protection.

The Republic of Kazakhstan is a country located in Central Asia and is the ninth-largest country in the world. It is also one of the most resource-rich countries in the region, with abundant reserves of oil, gas, and minerals. With

its vast natural resources, Kazakhstan is faced with a challenge of balancing economic development with environmental protection.

This article consists of introduction part, literature review, methodology, results & discussion section, and conclusion.

2 Literature review

The circular economy has emerged as a promising model for sustainable economic growth, which aims to decouple economic development from resource consumption and environmental degradation (Arruda et.al, 2021). The circular economy is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems. In order to promote the implementation of the circular economy, legal and regulatory frameworks play an important role. This literature review aims to provide an overview of the importance of laws and regulations for the circular economy.

Circular Economy: Definition and Principles

The circular economy is an economic model that aims to create value by keeping resources in use for as long as possible, minimizing waste and pollution, and promoting the regeneration of natural systems (Geissdoerfer et.al, 2017). In a circular economy, the concept of waste is eliminated, as all resources are reused, recycled, or regenerated. The circular economy is based on three principles: designing out waste and pollution, keeping products and materials in use, and regenerating natural systems (EMAF, 2013).

Importance of Laws for the Circular Economy

The circular economy requires a legal and regulatory framework that supports the implementation of circular practices. Laws and regulations can promote the efficient use of resources, reduce waste and pollution, and promote the regeneration of natural systems. The legal framework can also provide incentives and support for businesses and consumers to adopt circular practices (Zhu J. et.al, 2019). One of the main functions of the legal framework is to provide clarity and certainty for businesses and investors. The legal framework can provide guidance on the rights and responsibilities of businesses and individuals, and can set standards and requirements for the use of resources and the management of waste. Clear and predictable legal frameworks can reduce transaction costs, facilitate investment, and promote innovation (De Melo et.al, 2022).

The legal framework can also provide incentives for businesses and consumers to adopt circular practices. For example, taxes and charges on the use of non-renewable resources can encourage the use of renewable resources and promote the development of circular supply chains. Subsidies and grants can support the development of circular technologies and infrastructure, and

can promote the adoption of circular practices by businesses and households (Guarnieri et.al, 2023).

In addition, the legal framework can promote transparency and accountability in the management of resources and waste. Laws and regulations can require businesses to report on their resource use and waste generation, and can establish penalties for non-compliance. This can promote the efficient use of resources, reduce waste and pollution, and promote the regeneration of natural systems (Christensen et.al, 2021).

Case Studies

Several countries have developed legal and regulatory frameworks that support the circular economy. For example, the European Union has adopted several directives and regulations that promote the efficient use of resources and the management of waste. The EU Waste Framework Directive sets out a framework for waste management, including measures to prevent waste generation, promote reuse and recycling, and ensure the safe disposal of waste. The EU Circular Economy Action Plan aims to promote the circular economy and reduce the environmental impact of economic activities.

The Netherlands has also developed a legal framework that supports the circular economy. The Dutch Waste Management Act establishes a hierarchy of waste management, which prioritizes waste prevention, reduction, and reuse over disposal. The act also regulates the collection, transportation, and disposal of waste, and sets standards for the management of hazardous waste. The Netherlands has also developed a circular economy program, which includes measures to promote the efficient use of resources, reduce waste and pollution, and promote the regeneration of natural systems.

3 Methodology

When researching the legal framework of a circular economy in Kazakhstan, several research methods can be appropriate. In this study, a policy analysis method was conducted. This research method involves analyzing policies related to the circular economy in Kazakhstan, such as government strategies, plans, and programs (Vining et.al, 2015). This method can be useful for understanding the policy goals and objectives of the circular economy in Kazakhstan and how they are being implemented.

4 Results and Discussion

Kazakhstan, a country located in Central Asia, has recognized the potential of the circular economy as a way to promote sustainable development and diversify its economy. In recent years, Kazakhstan has implemented a number of policies and initiatives to support the transition to a circular economy. This policy analysis will provide a comprehensive analysis of the policy framework related to the circular economy in

Kazakhstan, including an overview of the policies and initiatives, their strengths and weaknesses, and potential impact.

Kazakhstan's policy framework for the circular economy is grounded in its strategic plan, the "Kazakhstan 2050 Strategy," which sets a goal to become one of the top 30 developed countries in the world by 2050. One of the key pillars of this strategy is the development of a green economy, which includes the circular economy. Kazakhstan has also adopted the Sustainable Development Goals (SDGs) of the United Nations, which include a target to implement the 10-year framework of programs on sustainable consumption and production.

Policy Overview:

National Waste Management Program (2021)

The National Waste Management Program aims to improve the management of solid waste in Kazakhstan by reducing waste generation, increasing recycling and reuse, and promoting the use of modern waste treatment technologies. The program includes measures to improve waste collection and disposal infrastructure, to support the development of waste sorting and recycling industries, and to increase public awareness of waste management issues.

- Strengths: The program provides a comprehensive framework for waste management, with clear goals and targets. It includes measures to promote the circular economy, such as the development of recycling industries and the promotion of waste reduction and reuse.
- Weaknesses: The program does not address some important aspects of the circular economy, such as the design of products for circularity and the use of renewable resources. The program also lacks clear mechanisms for monitoring and evaluation.

Green Economy Concept (2013)

The Green Economy Concept sets out the principles and priorities of Kazakhstan's green economy development. The concept includes measures to promote sustainable production and consumption, including the adoption of circular economy principles. The concept emphasizes the need to shift from a linear to a circular economy, and to promote the use of renewable resources.

- Strengths: The concept provides a broad vision and strategic direction for Kazakhstan's green economy development, including the circular economy. It emphasizes the importance of sustainable production and consumption, and the need to shift away from a linear economy.
- Weaknesses: The concept lacks specific targets and actions for implementing circular economy principles. It also does not provide clear mechanisms for monitoring and evaluation.

Digital Kazakhstan (2018)

The Digital Kazakhstan program aims to develop Kazakhstan's digital economy and promote the use of digital technologies in various sectors, including the circular economy. The program includes measures to develop digital platforms for waste management and recycling, to promote the use of smart and connected products, and to improve resource efficiency through the use of data analytics.

- Strengths: The program recognizes the importance of digital technologies for promoting the circular economy. It includes measures to develop digital platforms for waste management and recycling, which can improve efficiency and transparency.
- Weaknesses: The program does not address some important aspects of the circular economy, such as the design of products for circularity and the use of renewable resources. It also does not provide clear mechanisms for monitoring and evaluation.

Laws and other legal documents:

Environmental Code of the Republic of Kazakhstan (2007)

The Code provides the legal basis for environmental protection and sets out the rights and obligations of individuals, organizations, and the state in this area. It covers a range of issues related to environmental protection, including the use and conservation of natural resources, environmental impact assessment, waste management, and pollution control.

One of the key features of the Environmental Code is the requirement for environmental impact assessment (EIA) for any activities that may have a significant impact on the environment. The EIA process includes the identification of potential environmental impacts, the assessment of the significance of those impacts, and the development of measures to mitigate any adverse effects. The EIA process is mandatory for activities such as the construction of new industrial facilities, the exploration and extraction of minerals, and the development of infrastructure projects.

The Environmental Code also establishes a framework for the management of hazardous waste. It requires that hazardous waste be identified, classified, and appropriately managed in accordance with the Code's provisions. The Code also sets out the requirements for the transportation, storage, and disposal of hazardous waste and establishes liability for any damage caused by the improper handling of such waste.

In addition to the Environmental Code, there are several other laws and regulations that govern environmental protection in Kazakhstan. These include the Law on Air Protection, the Law on Water Protection, and the Law on Environmental Monitoring. These laws provide additional requirements

and standards for pollution control, water and air quality monitoring, and the protection of natural resources.

Kazakhstan has also ratified several international agreements and conventions related to environmental protection, including the Convention on Biological Diversity, the Kyoto Protocol, and the Paris Agreement. These international agreements require Kazakhstan to take action to address climate change, conserve biodiversity, and reduce greenhouse gas emissions.

Despite the existence of a comprehensive legal framework for environmental protection in Kazakhstan, there are still challenges in implementing and enforcing these laws. Enforcement of environmental regulations can be weak, particularly in the regions where the state capacity is low. There is also a need for increased public awareness and participation in environmental decision-making processes.

5 Conclusion

Kazakhstan has taken significant steps to promote the circular economy and create a legal framework that supports sustainable development and environmental protection. The country's efforts to reduce waste, promote resource efficiency, and encourage the reuse and recycling of materials will contribute to achieving its sustainability goals and ensure a better future for its citizens. The legal framework towards the circular economy in the Republic of Kazakhstan includes the Environmental Code, the Law on Waste, the Law on Environmental Impact Assessment, the Law on Energy Efficiency and Renewable Energy Sources, the National Program for the Transition to a Green Economy, etc. The Environmental Code of the Republic of Kazakhstan sets out the legal basis for environmental protection, including the requirement for environmental impact assessment and the management of hazardous waste. However, there are still challenges in implementing and enforcing environmental regulations, which requires continued efforts from the government and civil society organizations.

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Prospects for the development of the digitalisation of Kazakhstan's logistics fulfillment centres

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Abstract

With the growing requirements at the state level for the digitalisation of any process in any field of activity, one of the promising areas for digitalisation has also emerged - the logistics industry. Kazakhstan is currently facing global challenges and a qualitative change in the entire logistics infrastructure would definitely bring a positive economic effect. The goal of this study is to review the study of the digitalisation of logistics processes mainly in fullfilment centres as well as in classic logistics centres. The research methodology is based on descriptive and comparative types. Inductive method was also applied.

It should be emphasised that, judging from the authors' previous studies in Literature Review block, the digital era has not yet fully embraced the logistics sector in Kazakhstan, but significant changes are already taking place. One of the best solutions, in our opinion, would be the comprehensive implementation of the Digital Twin as one of the promising digital logistics solutions. In any case, for the comprehensive development of Kazakhstan's logistics complex, digital technologies should prevail over more outdated logistics solutions.

Keywords: fulfillment centres, digitalization, Digital Twin
JEL codes: R4, R40, R49

1 Introduction

At present, the economies of many countries have undergone significant changes due to the impact of global geopolitical processes. Global challenges have also affected the Republic of Kazakhstan. There are undoubted advantages for our country, such as the new economic realities. The global review of logistics systems gave impetus to Kazakhstan in terms of focus on re-creation of the Silk Road system, as well as opening up of new ultra-modern logistics routes and international hubs.

Building full-scale Fulfillment Centres on the territory of Kazakhstan will be one of the key innovative solutions both in terms of providing goods to our country and in terms of global international logistics cooperation. The

main task of fulfilment centres is quick distribution of current and incoming stock to customers of any nature, whether they are B2C retail customers or large B2B wholesale customers. Any supplier of food or non-food products will be able to send their goods seamlessly to a fullfilment partner, thereby significantly reducing the financial costs of maintaining their storage facilities, as well as optimising and redesigning their system logistics chain.

The object of this study is the fullfilment centres of the Republic of Kazakhstan. The subject is the digitalisation of logistics processes, which is an important aspect of the impact within the fullfilment structures. The digitalisation of elements of logistics fulfilment will have a positive impact on the functioning of these logistics fulfilment centres, as well as accelerating delivery processes and improving a number of internal processes.

Due to its geographical location, Kazakhstan has all the resources to become the number one country in logistics and also to be an ideal supplier of goods of any nature both for EAEC member countries and for longer-distance transport. To some extent, Kazakhstan could be compared with the so-called "window to Europe". In any case, a comprehensive implementation of digital technologies is necessary for the quality logistics operation of warehousing and transport processes in the Republic of Kazakhstan. Accordingly, the purpose of this study will be to examine the study of the digital processes of the Republic of Kazakhstan in the context of logistics warehouses and fullfilment centres on the basis of the works of Kazakh and international scientists. Based on the goal of our study, it is advisable to identify two key objectives:

- To analyse the authors' previous works in the literature review section;
- To propose a digital tool suitable for the realities of Kazakhstan, based on the best foreign research.

The practical relevance of this study is based more on the review of the prevalence of digitalisation in logistics in the Literature Review section, which will serve as a basis for subsequent works and source data analysis.

1 Literature review

According to Raimbekov et al, the globalisation of markets requires an innovative approach in terms of transport and logistics infrastructure development - a transition from single to network-based (Raimbekov et al., 2016). Undoubtedly, in order to expand the logistics image of the Republic of Kazakhstan, the network of logistics chains should be built in such a way that it is mutually beneficial both for our country and other countries in this global chain.

According to Sandugash et al., the application of just-in-time (JIT) technology allows suppliers to deliver material resources or finished products

to a particular point in the supply chain at the very moment when they are needed. Most modern logistics systems that use this scheme focus on short components of logistics cycles, which requires the logistics chain links to react quickly to changes in demand and, consequently, the production programme (Sandugash et al., 2018). By linking the just-in-time technology to just-in-time fulfilment centres, the result and total revenue for the CEO of a particular fulfilment or logistics centre will be very significant. Just-in-time technology will allow business owners to optimise their warehousing facilities for goods other than just-in-time deliveries, because a just-in-time delivery system involves regular and uninterrupted supply of goods to customers. In this way, goods passing through this technology will always be in motion, which will undoubtedly free up storage space for other product areas.

According to the authors Serikbekuly and Mutanov, the key business process in need of re-engineering in Kazakhstan's small and medium retail companies in the FMCG distribution chain is the distribution process and logistics system, as it should ensure the timely and constant availability of essential goods in the right quantity on retail shop shelves, which is the link between the producer of goods and its end consumer (Serikbekuly & Mutanov, 2019). If we view these authors' statements through the prism of logistics fullfilment centres, these same fullfilment centres can ensure that the necessary flow for FMCG distribution is maintained at all times. By setting up the supply chain in the correct way, the suppliers-fultilier-end user or suppliers-fultilier-FMCG company, and expanding the nomenclature base of local and international suppliers, supply problems will be almost completely eliminated. After that, the customer satisfaction rating will improve significantly.

Saktaganova et al. believe that Kazakhstan's transport and logistics complex, international transport corridors and bridges provide a nexus in creating a Eurasian transcontinental bridge and ensuring sustainable development in Kazakhstan (Saktaganova et al., 2018). If an analysis is conducted by finding the critical path and identifying the weak links that cause any deliveries to get stuck, it would make sense to place the top of the largest fullfilment centres around the most problematic logistics routes. In this way, Kazakhstan will be almost an ideal place to solve all logistical problems with deliveries and will provide local and international transport in the best possible way.

In Selmier's view, in terms of location, Kazakhstan is the best country to benefit from and exploit logistics opportunities along the new Silk Road, and investments in the Belt and Road Initiative confirm this good location. But there are at least four key challenges in Kazakhstan's quest to become a logistics linchpin in the BRI. Each can be partially or fully addressed through

investment and continued development, and consideration of each helps us assess risks in more detail and allocate funding more effectively. In ascending order of investment allocation there are four key indicators: 1, Kazakhstan has a small population in a very large country; 2, containerisation in all its forms is underdeveloped; 3, railway gauge in Kazakhstan (and in all former Soviet Union countries) is larger than in China and Europe; and 4, facilities for transport, handling, processing, administration and financing are still underdeveloped. Each of these indicators increases transport costs, makes logistics chains more complex and pushes the search for other, more optimal supply networks. (Selmier II, 2018). If one speculates about building global fullfilment centres in the ring of the new Silk Road, a number of problems will be solved in a positive way. Nevertheless, at the moment there are indeed a number of challenges that need to be addressed from the perspective of building an ideal logistics world in Kazakhstan, this concerns both transport systems and other logistics components.

Kredina et al. believe that it is worth noting the fact that the logistics industry in Kazakhstan has problems such as disorderly competition, poorly developed transport infrastructure, and uneven distribution of resources, which are a barrier to further economic growth. In recent years, Kazakhstan has developed a mixed economy, a transport services market and many logistics processes have been intensively developed. It is therefore natural that digital transformation has started to ensure that the core processes of the Kazakhstani logistics industry become more efficient. Therefore, it is imperative to expand the logistics capacity as part of the development of digital transport and logistics services and to accelerate the transition from traditional to digital logistics. In addition, managing logistics processes and addressing research development in the context of digital transformation requires further research and rethinking of tools for sourcing and managing transport flows.

The digitalisation of the transport system and the automation of logistics processes offers an opportunity for the transition of a country's economy to global trade and industrial networks. This is a fascinating topic and has received coverage in a number of academic fields. However, the context of the relationship between logistics and ICT performance and the economy still needs to be explored (Kredina et al., 2022). We fully agree with these authors' statements, as the transition from traditional to digital logistics processes requires the undoubted introduction of IT solutions and the implementation of all possible digital technologies. In the case of fullfilment centres, the robotisation of certain processes within a company is becoming more and more prevalent every year. Abroad, innovative digital solutions have turned the work of robots into a clear mechanism. The robots receive data for specific actions in a given process directly from the configured digital

solutions; the system itself allows the robots to be monitored, thereby minimising the possibility of any error or technical malfunction. The more robotic and digital processes there are in fullfilment centres, the fewer jobs are allocated to rank-and-file human capital.

The authors of Yeargaliyev and Raimbekov believe that the influence of business in improving transport efficiency is very high and should not be reduced only to formulating government requirements. For example, at present, delivery speeds in Kazakhstan are 2-3 times lower than in Europe and the USA. Violation of drivers' work and rest time regimes is a common practice. The reason for this situation is the inability and unwillingness of employers to organise safe and efficient transport schemes, e.g. by the pulling arm system or by changing drivers at the reporting points of the truck with cargo. There is no need to build new roads or buy additional vehicles. Skills and clear organisational arrangements are needed. Businesses also need to make an effort to organise the workflow in moving traffic electronically. These and other actions are possible with appropriate organisational and technological culture of transport business. So far, in Kazakhstan, about half of transportation is carried out by cargo owners' vehicles on the principles of "subsistence economy", and the rest is carried out by vehicles of private individuals, whose purpose is elementary survival rather than development of efficient transport technologies. They are unable to renew the fleet of trucks and optimise its structure. Therefore, competitive foreign logistics and forwarding companies are winning on the Kazakhstani market. The state should ensure the formation of social institutions that stimulate the business structure to function in a way that meets its long-term strategic goals and the interests of society (Yergaliyev & Raimbekov, 2016). Fulfillment centres in practice need to incorporate digital solutions regarding the optimisation of freight vehicles and, consequently, drivers. Modern digital solutions also allow for the scheduling of transport movements in such a way that downtime is not created. Each vehicle will have its own individual timetable. On this basis, drivers will be fully responsive to requests according to a set schedule without compromising sleep and rest patterns.

According to the authors Alimbetov et al., the development of information systems in all industries has affected not only the sale of goods via the Internet, but also the distribution of market research, data collection, market participant analysis and the renewal of payment system processes between different individuals. Customisation of services, development of logistics, flexible pricing, process automation and remote business management play a key role in ensuring the competitiveness of companies. Big data analysis and management are coming to the forefront of the development of enterprises, industries and nations. Today, digital technologies are enhancing operational management capabilities that help

improve the speed and efficiency of management decisions. New organisations with digital business models are already emerging (Alimbetov et al., 2020). All the above-mentioned processes should affect the digital transformation of both fullfilment centres and classic logistics premises. In the long term, Kazakhstan should enter the global arena as a guarantor of a flawless logistics provider, in case classical logistics processes are transformed into digital ones as soon as possible.

Koperin et al. believe that the need to acquire competences in digital economy and digital logistics as part of modern training for economists is a prerequisite for them to acquire competitive skills in modern information systems during their studies. In this way, future specialists will be able to plan and manage all data sets, production processes and logistics in the enterprise. The authors analysed the dynamics of digital economy and logistics indicators in the Russian Federation. The authors considered integration of internal information systems and shared access to information to be a separate trend among companies. The share of organisations using enterprise resource planning (ERP) systems increased from 5.1% to 13.8% in the total number of organisations examined over this period, and the share of organisations using customer relationship management (CRM) systems from 4.1% to 13.2%, respectively. In addition, the share of organisations using electronic data exchange between their information systems and those of external counterparties increased to 64.9% of the total number of organisations surveyed in 2018, while the share of organisations using supply chain management (SCM) systems increased to 6.4%, respectively (Korepin et al., 2020). SCM is a more modern tool as a tool to build optimal logistics pathways. Some fulfilment centres may use several scheduling systems at the same time. But the goal of almost all of them is the same: a rapid transition to a digital business principle.

Thanks to the analysis conducted by Moldabekova et al, their study provides a comprehensive picture of the level of digital readiness and logistics performance in the context of countries and their respective development. The results show that a country's digital readiness is positively and statistically significantly correlated with the country's logistics performance. Thus, the overall underlying policy value can be seen in the fact that continuous investment in digitalisation improves logistics performance in countries. It is therefore necessary to introduce new digital solutions in the activities of logistics service providers to improve countries' logistics performance. Managerial implications for improving logistics performance through modern technology are as follows: integration of information systems in the provision of logistics services; making appropriate decisions while using ICT and digital technologies for planning and scheduling logistics activities; automation of processes and operations (loading/unloading, warehousing,

ordering, delivery, etc.); development and implementation of omni-channel logistics; better communication and development of closer links between customers To summarise, especially the proper integration and use of digital technologies to improve logistics efficiency provides a competitive advantage that contributes to economic development (Moldabekova et al., 2021). Absolutely all logistics processes should be subject to digitalisation. Strategically, the Republic of Kazakhstan has to build each and every element of the entire logistics sector, whether it is transport hubs or internal warehousing logistics system. If the focus is on financing logistics on a full scale, the state will notice an increased percentage of imports and exports in various directions in a few years' time.

ICT infrastructure trends in Agafonova's view are as follows: 1 "Digital transformation," or deep transformations in the IT system that enable companies to better manage customer acquisition, manage operations more effectively, and enter new markets. A key prerequisite for such changes is the criterion of infrastructure agility, which in practice is often achieved through infrastructure virtualisation, including cloud-based solutions; 2 The importance of application programming interface to improve business infrastructure. This eliminates downtime, increases both data storage capacity and computing capabilities of servers, and improves the efficiency of business IT infrastructure; 3 The transfer of data generation processes outside the corporate data centre; 4 The active development of decentralised data collection and processing based on Edge Computing technology. So-called "edge computing", i.e. computing performed on user devices rather than in data centres, shows higher efficiency compared to the traditional data centre model, which, according to experts, will significantly affect companies' infrastructure strategies; 5 Redefining the responsibilities of IT infrastructure support specialists. With the emergence of new management tools and the active use of cloud services, it will expand, leading to the need to account for changes in educational programmes and HR. In 2018, the global IT market was $3.69 trillion (up 4.5% from 2017) (Agafonova, 2020). This author certainly emphasises the importance of using IT solutions for the success of all operating systems. Cloud servers can digitise almost any human capital activity with particular success. The more automation and digital content contained within a logistics company, the more net profit the CEO will receive at the end of the quarter.

Guillén et al, suggest that new technologies are changing not only how businesses deal with customers and suppliers, but also the very nature of competition in many sectors, requiring new approaches to business strategies. In some markets, such as book and music distribution, information services, travel agencies and financial services, we are seeing a complete disruption of traditional ways of doing business, to name just a few of those most directly

affected by this technological revolution. There is no doubt that many of these emerging companies will disappear: their business models (the logical description of how a company does business, creates, delivers and captures value) are not sustainable, and the rate at which they are burning through cash is exceeding their ability to raise new capital or transform their operations into viable businesses that can start generating revenue. However, it should not be forgotten that they have led to a radical transformation of consumer patterns, defined new ways for businesses to relate to customers and suppliers and laid the foundation for different approaches to doing business. Their impact has given rise to competition based on the innovation of certain services at prices that have never been so low. Such transformations require reflection on the strategic approach of both traditional companies and new businesses created to exploit the opportunities offered by the Internet. Similarly, new technologies have brought with them new business models that are laying the groundwork for a major revolution in relationships between companies (known as B2B), and especially between suppliers and customers (Guillén et al., 2019). When it comes to the Kazakh realities, we believe that the change in business processes should concern both classic logistics centres and fullfilment companies. There is a need for a certain business scheme, which will rely more on digital transformation.

The transport and logistics system, according to Dyomin et al. The supply chain is an integral part of the logistics system. The supply chain involves the organisation, planning, control and management of commodity flows. The supply chain has several links, from the production of products to their delivery to the end user. Product manufacturing is the first link in the chain. At the production stage, it is necessary to determine the inventory to be RFID-coded and the format of the shipping unit. To determine the format of cargo units, the primary cargo unit is the cargo in transport packaging, e.g. crates, drums, bags, etc. As an aggregate cargo unit, a cargo package formed from a pallet of primary cargo units, i.e. cargo units in transport packaging, may be considered, depending on the volume of delivery. its procedure includes determining the maximum possible number of cargo units to place on the pallet, stacking options and probing capacity. Stacking standards for shipping units need to be developed for the previous step to be effective. RFID system testing determines the maximum possible number of cargo units per pallet, stacking variants of cargo units, antenna placement geometry, and sensing signal strength for the best readability of RFID transponders (Dyomin et al., 2020). Such technologies, which have been listed by the authors, are already a great advancement in terms of digitalisation of business processes. Going forward, the first stage of product manufacturing is also subject to digitisation. Robotic systems must replace human resources and obey the commands that the digital cloud will offer. In the future, depending on the

observation and efficiency of the process to be implemented, the reduction of human capital in favour of robotic systems and a single digital matrix can be reconciled.

Hryhorak et al. believe that key trends in the digital transformation of customer service logistics based on customer centricity include: personalisation of products, experiences and communications using digital technologies; transition to flexible management methods; formation of a qualitatively new marketing structure of enterprises (emergence of specialists in customer preferences and data processing); ensuring multichannelism in marketing communications; introduction of chatbots as one of the most effective ways to provide This would increase customer satisfaction with service and the quality of logistics services by about 3%; maintain loyal customers and attract new ones through loyalty programmes; enhance organisational culture through a customer centric approach to human resource management; optimise the cost of logistics organisation; and increase sales volume and profitability of sales (Hryhorak et al., 2020). Automated customer support by chatbots would allow the prompt and immediate provision of feedback to any link in the logistics chain, be it the supplier or the end-consumer. It would also make sense to apply the Wildberries system to warehousing and distribution logistics, where any end-consumer can track the status of an order and its form of readiness. It would also be possible to set up an automatic customer support chat room, with queries mostly answered by a robotic system.

3 Methodology

The research methods in this paper are predominantly descriptive and comparative. The method of induction was also applied, which allowed for reasoning in the literature review block of this study.

4 Results and Discussion

For the Kazakhstani reality, we propose a digital twin model for the large-scale development of logistics systems:

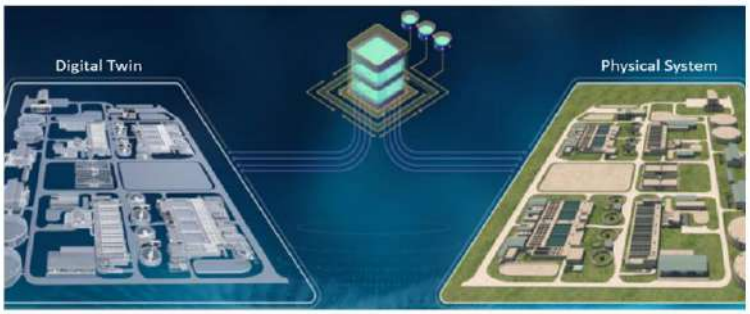

Figure 1 - 6. Visual Representation of Digital Twin

The Digital Twin will help to solve any logistics problem in the Republic of Kazakhstan. This innovative digital solution will help to design a logistics chain of any complexity in digital form, thus enabling a company to set up certain processes digitally, and then implement them after making all necessary adjustments. The advantage of the Digital Twin is that after entering information about a particular production logistic process into the virtual field, the necessary IT solutions and programs will be connected, after which the processes and errors of the real production will be set up virtually. Then, once the adjustments have been made, the process can be reproduced from the virtual to the real world. One of the main advantages is that robotic systems can be connected to the digital instruction in reality, so that the risk of errors in any logistics process can subsequently be reduced almost to zero.

5 Conclusion

Thus, it can be concluded that the Republic of Kazakhstan, due to its geographical location, has a great chance to fully develop logistics services, to be a major supplier of goods to the EAEU, as well as a conduit between Europe and the South Asian region. The digital transformation has not yet fully touched our country; therefore, it is necessary to draw on best international practices in implementing digital solutions in the logistics sector. The Digital Twin model is a promising, but by no means the only digital support for the implementation of logistics activities. The future results of the improvement of Kazakhstan's entire logistics chain will depend on the implementation of as many innovative digitalisation solutions as possible.

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Application of marketing digital technologies in high-tech road freight transportation projects

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Abstract

This paper presents an analysis of trends in the development of the global and domestic markets for transport and logistics services, in particular, the role of marketing digital technologies in IT projects for road freight transportation. A detailed analysis of the current state of existing high-tech IT projects in the market of electronic platforms has been carried out and factors constraining its further development, and specifics of the development of the segment of road freight transportation have been studied. The purpose of this article is to determine the contribution of digital marketing technologies to the renewal and reinvention of high-tech projects in the form of IT products in the road freight transport market in Kazakhstan. The paper discusses the development dynamics of the global market of transport and logistics services using the panel study method. Additional research methods used in this study are comparative analysis, generalization and synthesis, and methods of grouping and comparison. The authors present and substantiate a list of high-tech products that have the greatest impact on the formation of trends in the development of the global transport logistics market. Based on the study, key features, key success factors, and directions for further development of the Kazakhstani market of transport and logistics services are revealed. For example, due to the rapid development of IT technologies, in the next five years - in the period up to 2028, the market will continue to develop steadily with an average annual growth of about 5.7%. In addition, as the research results show, the situation with low activity in the application of the main marketing promotion of the main Internet portals for road freight transport shows that there is a lot of demand for SEO queries, but the promotion of IT projects such as Della and fa-fa is very low. Finally, research findings and provisions may be helpful as a guide for logistics and freight companies who plan to apply digital marketing in their activity.

Keywords. Digital logistics, marketing technologies, freight transportation, high-tech projects, IT projects.

JEL codes: M31, M37, O32, O33, R40

1 Introduction

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

The process of changing technological paradigms is complemented by other objective and subjective factors that create a complex system that requires subject study (Pantano et al., 2018). Currently, the transport and logistics services sector is in the process of accelerating the introduction of disruptive technologies (Parry & Kawakami, 2017) such as the Internet of things, artificial intelligence, machine learning, blockchain, virtual reality, augmented reality, drones, big data, robotics, and cloud computing (Majumdar et al., 2018; Blitz, 2021).

For example, the use of high-tech projects in the form of IT products that ensure the reliability and transparency of supply chain management, where road transport is directly involved, requires the recording, storage, and sharing of the same data by all participants in the process (Nuseir, 2020). IT technologies create the ability to trace from the consignor to the consignee, which ensures efficiency and reduces the risks of transportation operations. This is especially important in the transportation of food products when they are digitally tracked at every stage from suppliers to recipients.

The delivery of small cargo within metropolitan areas and large cities has now started with the innovation of drones, which offers advantages due to high speed, minimal costs, and adaptable delivery times (Perera et al, 2020). Postal companies in the world (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 in deliveries (DHL Global, 2022; Corrigan, 2020). Drones are operating at ever higher speeds, the logistics network is becoming decentralized with the growth of last-mile warehouses, resulting in reduced operating costs, overheads, and delivery times (Perera et al, 2020).

The above examples demonstrate the ever-increasing multi variability of transport and logistics systems and the difficulty of achieving key success factors for players in the domestic market segment such as KTZ, KazATO

and private companies providing their services in this area. Based on the foregoing, the purpose of the study was to analyze the key trends and the most important directions for the development of the global and domestic markets for transport and logistics services, as well as to identify the key success factors for business entities operating in the domestic market segment.

The difference between this study and previously published works is that it analyzes and proposes the use of digital marketing technologies, taking into account the specifics of the digital economy of Kazakhstan and allowing existing IT projects in road freight transport on the market in Kazakhstan.

According to the structure of the article, this paper reviews the literature, after which the materials and methods, and methodology of the study are described. Then the results of solving the problems of this study are presented: the task is related to the comparison of the current results of promotion in digital marketing for existing IT products in the road freight transport market, and the task is to develop a plan with a digital marketing approach for the renewal and improvement of projects in high-tech products in the market of transport and logistics services in Kazakhstan. The work ends with a discussion and conclusion.

2 Literature review

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 managing high-tech projects and are becoming increasingly important. Classification and official definitions of high-tech projects are not clear in the literature, but the discussion on the relevance of this topic is considered. Trends in economic development and global directions of innovative discoveries in different areas determine industries. The main component of the definition of such projects is industries that apply the latest high-tech technologies.

The phrase "technology" was first used in 1958 in The New York Times article advocating "Atomic energy" for Europe (The New York Times, 1958).

Toffler (Toffler, 2002) presented technology in a very figurative way, saying that "technology is the basis of economic change because new technologies not only imply or require changes in technology - they imply new solutions to social, philosophical and even personal problems, they change all intellectual activity, human environment and his worldview.

According to Cortright (Cortright, & Mayer, 2001), high-tech is a technology that is at the forefront: the most advanced technology available. The opposite of high tech is low tech, referring to simple, often traditional or mechanical technology that can be created and developed using the simplest methods and techniques.

It should be noted that high-tech projects involve the use of breakthrough technologies and innovations, which, in turn, need effective management. The successful implementation of such projects will contribute not only to the development of the competitiveness of transport and logistics services of domestic enterprises but also to the economy as a whole.

Archibald (Archibald, 2010) has researched in depth the management of high-tech projects and mentioned the lack of knowledge about the types and classification of high-tech projects, and prepared a group of projects that can be classified as high-tech projects according to the type of industry. Among the ten recommended categories of projects listed in his book, he identifies the following five groups of high-tech projects:

1. Aerospace/defense projects;
2. Projects of communication systems;
3. Projects of information systems;
4. Projects for the development of products and services;
5. R&D projects.

Summarizing all the authors, it can be noted that certain attention is paid to digital technologies, IT solutions, and their application in the field of transport and logistics services. In particular, in road freight transportation they can be noted as high-tech projects. Shipping companies are already using digital platforms where they post information about orders and look for contractors. And this is a big step towards automating processes, increasing their efficiency and transparency. Around such platforms, an ecosystem of digital services is formed that complements and expands their capabilities. Including helping companies work directly with performers. The logistics industry is quite conservative - many processes have to be managed manually, and the level of automation is still inferior to such areas as finance and retail. But the future of Kazakhstani logistics lies solely with digitalization, and the emergence of an ecosystem of digital services on the market will accelerate this process (Kursiv, 2022).

However, the activity of marketing campaigns to promote IT solutions and platforms is not relevant in Kazakhstan. There are barriers to promoting digitalization both on the part of market participants and on the part of users of embedded applications (Baimukhanbetova et al., 2023).

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

According to this task, the program considered the introduction of an intelligent transport system in the following areas

−Weighing system in motion.

−Toll collection system on road sections.

−Mobile road laboratories.

−Video monitoring and detection of traffic violations.

−Analysis and forecasting of climatic conditions for transportation.

−Implementation of artificial intelligence on roads.

For multimodal transportation within the transport and logistics system, the maximum introduction of automation of cargo transportation processes by all modes of transport is envisaged:

−Trucking

−Railway transportation

−Sea and river transportation

−Air transportation (Egov, n.d.)

Breakthrough projects, in particular, their results, can bring multimillion-dollar profits, improve the conditions and living standards of the population, and create and develop various advanced industries.

What is known about high-tech projects for the digitalization of transport and logistics services, in particular road transport, is that they belong to the category of those projects that use the latest achievements and the results of research and development in priority sectors and sectors of the economy.

A review of the literature helps to identify that high-tech projects in the form of IT products in the field of road freight transportation have insufficient use of marketing promotion channels and require development in several areas. The first is based on the use of marketing digital technologies in the field of transport and logistics services, the second involves a more accurate promotion of IT products that are no longer relevant for the general information content of the population, the third is based on a review of existing projects, showing the practical absence of digital marketing technologies such as SMM and SEO promotion.

3 Methodology

In the course of the analysis of the global and domestic markets for transport and logistics services, in particular, IT products focused on road freight transportation, primary and secondary data were used. As well as the research database, statistical and analytical information, international and domestic analytical reports, databases of patents and scientific articles, the google analytics platform, and Yandex metrics were used. The main research methods were general scientific methods of systemic and comparative analysis, generalization and synthesis, and methods of grouping and

comparison. When sampling the type of users of Internet search resources, a methodological analysis was carried out using panel and desk research tools.

4 Results and Discussion

According to the analytical agency Research and Markets (Research and Markets, 2022), the volume of the 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 the next five years - in the period up to 2028, the market will continue to develop steadily with an average annual growth of about 5.7% and 2027 will reach a volume of 13,326.3 billion dollars (Fig. 1).

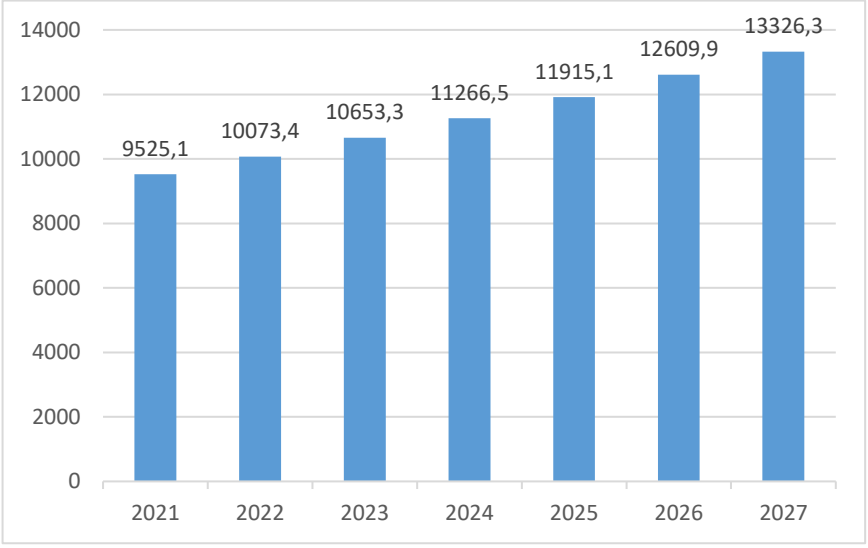

Fig.1. Dynamics of the global market of transport and logistics services, billion dollars (Research and Markets, 2022)

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 introducing innovations with high-tech products, including the development of IT solutions and systems in the field of transport and logistics services, which improves their product offering and leads to reduce costs, thereby improving competitiveness.

Analyzing the products used by participants in road freight transport at the moment in the domestic market and the space of Internet networks, it is found that there are several of the most popular Internet platforms used by market participants, these are Della.kz, fa-fa.kz, inDrive, Yandex.

The DELLA Internet platform has been successfully operating in the road freight transport market since 1995 and provides users with the services of 20 years of experience in organizing domestic and international cargo transportation. By posting their data as a participant in the road freight transportation market, companies have the opportunity to receive the required number of offers from both operators of forwarding services and the contractors themselves (DELLA, n.d.)

A similar Internet product of a domestic company to provide an opportunity for vehicle owners who want to constantly have a sufficient number of orders for cargo transportation in Kazakhstan, and for cargo owners who want to reduce logistics costs, the FA-FA website will be equally useful. Having a variety of offers for transportation from customers, the site also provides for the selection of vehicles of the required carrying capacity and different characteristics, such as refrigerators, long vehicles, car carriers and other vehicles for transporting specific goods. The resource allows companies that send goods to save up to 50-70% on cargo transportation in Kazakhstan (FA-FA, n.d.).

The next Internet product and IT solution in the field of transport and logistics services for road freight transportation are provided in the form of the InDrive mobile application, which gives mobility and efficiency for use. According to the page on the official website of this platform, there are also additional services for both road freight transportation and passenger transportation in intracity and intercity traffic (InDrive, n.d.).

The digital ecosystem of products like Yandex is a multinational corporation that invests in Internet search, cloud computing and advertising technologies and is also active in the transportation of both passengers and small cargo. In the field of transport and other services, the information service is actively provided by the legal entity Yandex.Taxi LLC, under the trade name Yandex Go (Taxi.Yandex, n.d.).

In the market of transport and logistics services and, in particular, road freight transportation, in addition to direct orders to participating companies, searches are carried out through Internet systems. Numerous requests for road transport on the Internet are carried out through the search portals Google and Yandex. According to google analytics, the number of trend queries over the past 90 days in Kazakhstan, by keywords, "freight transportation" and "truck" is shown in the figure (Fig. 2).

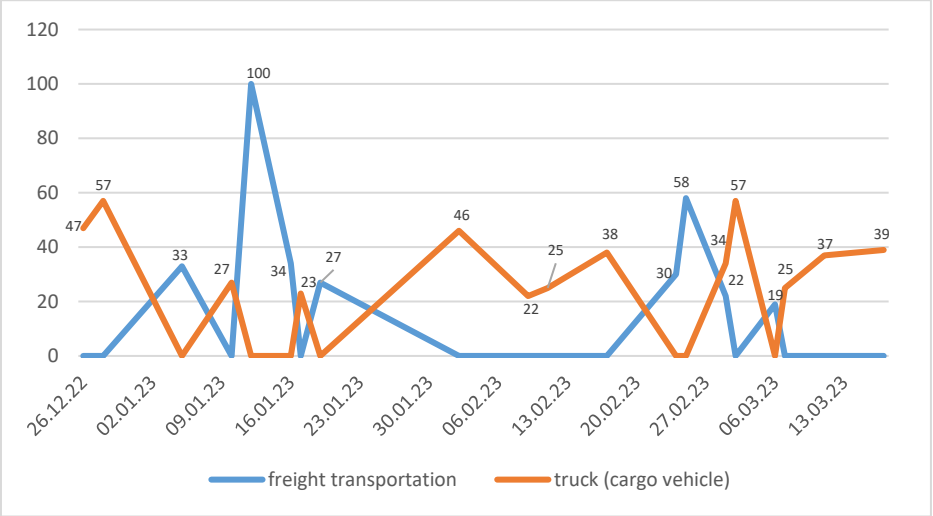

Fig.2. Dynamics of requests for keywords, “freight transportation” and “truck” for the period from 12/26/2022. to 13.03.2023 according to google analytics in Kazakhstan

(The chart was compiled by the authors according to Google Analytics data)

According to Figure 2, it can be seen that requests through the google search platform from potential customers are characterized by different dynamics. For a period of 90 calendar days, 12 of them have requests of a different number, and especially it can be noted that before the New Year, as well as after a long weekend at the beginning of the year there was high activity in search.

The activity of search queries in the domestic market and the Internet platform is also noted on the Yandex portal, where participants in the freight transportation market also carry out their requests for the keywords “freight transportation” and “trucks” (Fig. 3.)

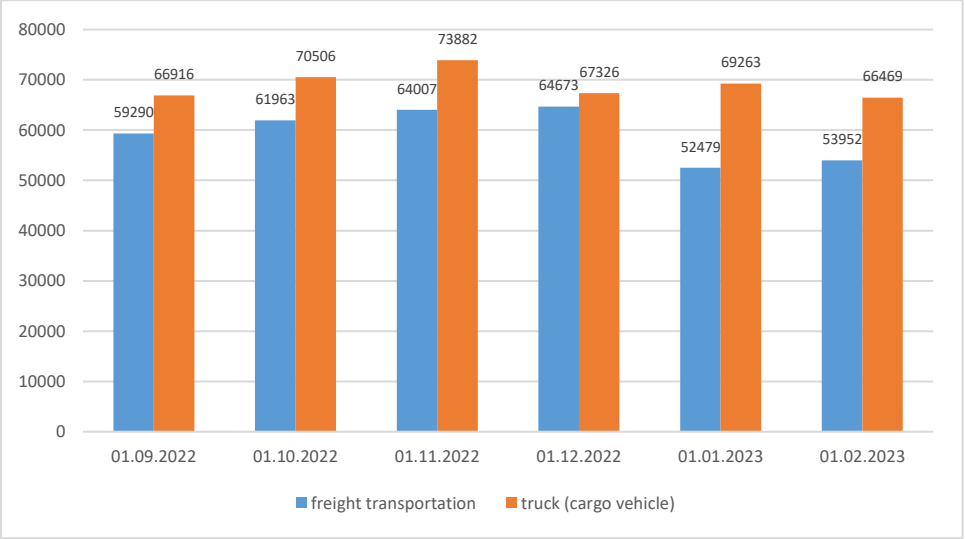

Fig.3. Dynamics of requests for the period from September to the month of 2022 to February 2023 according to Yandex analytics

(The diagram was compiled by the author according to Yandex analytics data)

According to the figure, it can be noted that most of the search queries of those interested in freight transportation are observed on the Yandex platform. The demand dynamics were also affected by the long weekend at the beginning of the year, and then there is an increase in the dynamics for the following months.

Research on secondary data of search query metrics showed evidence of the need to use marketing digital technologies in the field of transport and logistics services, in particular freight and road transport. According to the analysis of Internet platforms on the use of digital technologies in Internet marketing, it is necessary to note the weak promotion of specialized platforms in road freight transportation for the search for the keyword "road freight transportation" (Table 1).

Table 1

Comparative analysis of the use of digital marketing technologies in IT projects for road freight transportation

Key digital marketing activities	**IT products in the form of high-tech projects**			
	Della	**Fa-Fa**	**InDrive**	**Yandex Go**
Search engine optimization (SEO)	There is a website, but poor SEO promotion	There is a website, but poor SEO promotion	There is a website, but poor SEO promotion	There is a website, but

				poor SEO promotion
Search engine marketing (SEM)	No event to increase website traffic	No event to increase website traffic	Outdoor ads with the app name	Outdoor ads with the app name
Content marketing, User-generated content (UGS)	Available as text only at the bottom of the site	Available as text only on the main page of the site	Available both on the website and outdoor advertising	Available both on the website and outdoor advertising
Social media marketing (SMM)	No	No	Rare	Available, youtube, Instagram, TikTok, etc.
Content creation automation	No	No	Upon completion of the service, an assessment is provided	Upon completion of the service, an assessment and a report on the service are provided by e-mail.
E-commerce marketing	No	No	It is considered in the mobile app	Available, the possibility of charging from a bank card
Direct mailings	No	No	Rare emails	Calling on the cooperation of the company and sending e-mails
Advertising other IT products of the population	No	No	Available on other internet platforms	Available in other digital ecosystems
Note: the table was compiled by the authors based on the analysis of Internet product sites (DELLA, n.d.; FA-FA, n.d.; InDrive, n.d.; YandexGo, n.d.)				

Analyzing the use of high-tech IT projects for road freight transportation, and the use of modern digital marketing technologies in transport, it should be noted that, first of all, all Internet platforms are used in the form of a website and a mobile application. The main digital marketing activities such as SEO, SMM, SEM, UGS, contextual advertising, and others are not actively used. An analysis of the situation with low activity in the application of the main marketing promotion of the main Internet portals for road freight transport shows that there is a lot of demand for SEO queries, but the promotion of IT projects such as Della and fa-fa is very low. Promotion through other major digital marketing activities has the potential to renew the life cycle of Internet platforms, as well as the application of innovative

capabilities, which would once again increase the project's high-tech significance.

As a result of the analysis of the data presented, it can be concluded that Internet products that specialize only in road freight transportation are at the stage of decline in the project life cycle and it is necessary to focus on marketing activities and supplement digital ecosystems as their counterparts. The described trends are of current importance, and at this stage in the development of digitalization of transport logistics at the international level, it is very necessary to use the opportunities for developing domestic products. Working on the proposed IT products with additions and updates towards ecosystems in the coming years, it is highly likely that they will retain their influence on the development of the road freight transportation segment and the entire market of transport and logistics services in the country.

5 Conclusion

The results of comparisons, research and analysis, applied according to the methodology of trends in the development of the market of transport and logistics services, show that there are ample development opportunities and the market trend will be the formation of connected end-to-end processes of logistics ecosystems built based on digital technologies and promotion by marketing technologies. All internal functions within the provision of transport and logistics services will be integrated using a common data network, from procurement to production, logistics, marketing and sales management (PWC, n.d.).

Moreover, the gradual development to integrate digital workflow and digital ecosystem in new or renewed high-tech projects in the field of road freight transport, which is an important part of transport and logistics services in the supply chain, will lead to the transparency of the entire supply line. Such a future development will give market participants access to information online and allow them to make optimal and informed decisions that require prompt responses.

In the coming years, the recovery of the global economy from the 2020 recession, the growth of pent-up demand, the rapid development of e-commerce and express delivery segments, as well as the development of domestic consumer demand will also contribute to the further growth of the global transport and logistics services market (Tels Global, 2022).

In the context of the intensive development of digitalization in all areas and taking into account the constantly changing environmental conditions, the players of the domestic road freight transportation market must constantly improve their product offering by introducing high-tech solutions and innovative products, as well as the timely application of digital marketing campaigns, as they promptly provide information to users. It is also important

for companies with Internet products to focus on the development of human resources in the field of IT specialization and marketing, including staff development. When implementing solutions for the renewal of the life cycles of existing projects during the implementation and renovation of projects, it is possible to attract external experts in the field of intelligent technologies and high-tech project management, who can work effectively in cross-functional teams. The success factor in the current situation is based on the development of interaction with external partners across the region, state, and international transport and logistics ecosystems to enhance integration and an innovative component that increases organizational flexibility, quality of services and responsiveness.

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Estimating the demand for railway freight transportation in Kazakhstan: a case study

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Abstract

Accurate demand forecasting is essential for effective resource planning in organizations. In railway freight transportation, many factors can influence future volume and turnover, and traditional expert methods may no longer meet the requirements of the time. This article compares the accuracy of demand forecasts made using two different methods with the actual results. The theoretical research methods used are autoregressive integrated moving average (ARIMA) and expert methods. The results are compared using percentage mean absolute error (MAPE) and mean absolute error (MAE). The study found that time series analysis using ARIMA can significantly improve the accuracy of demand forecasts for railway freight transportation in Kazakhstan. The comparison of the results shows great promise for the use of time series analysis in improving demand forecasting quality. The implementation of time series analysis techniques can benefit the largest enterprises in Kazakhstan, including those in the transportation industry. By improving the efficiency of demand forecasting, organizations can better plan their operations, resulting in improved resource allocation and overall business success. Thus, this study suggests that time series analysis should be integrated into the practice of enterprises to improve their demand forecasting capabilities.

Keywords. demand forecasting, railway freight transportation, regression analysis, quality assessment of forecasts.

JEL codes: R41

1 Introduction

Demand estimates are crucial for effective planning and decision-making in any organization, providing key input for various departments such as marketing, production, distribution, and finance, to support short-to-long term forecasts (Punia, Shankar, 2022). Despite the complexity and execution of forecasting processes across different businesses, the main purpose remains the same: to obtain a fairly accurate estimation of future demand for a product or service based on historical data and the current state of the

environment, including political, social, and economic factors, to plan and organize businesses accordingly (Merkuryeva et al., 2019).

In the case of transport companies, forecasting future demand for transport services is critical for success and provides basic input for planning and control of functional areas such as transport operations planning, marketing, and finance (Milenković et al., 2018). One such company is Joint Stock Company “National Company “Kazakhstan Temir Zholy” (KTZ), a transport and logistics holding engaged in rail transportation, with its main sources of income coming from income generated by freight and passenger transportation. KTZ's corporate portfolio includes 44 organizations, and its main subsidiaries and structural organizations operate in the segments "Main railway network services", "Rail freight transportation", "Passenger rail transportation," and "Freight cars operations." The length of railway lines (unfolded length) is more than 21 thousand km, the fleet of freight cars is about 46 thousand units, the fleet of passenger cars is more than 2 thousand units, and the fleet of locomotives is more than 1.8 thousand units. The company is the country's largest employer (over 112,000 employees).

In 2021, the cargo turnover amounted to 233 billion t-km, exceeding the level of 2020 by 0.7%. Income from freight traffic increased by 11.5% compared to the fact of 2020, mainly due to an increase in freight turnover by 0.7%; changes in the exchange rate (Swiss franc) for the calculation of income from transit traffic; increase in income from changes in the average level of tariff increases, etc. The share of income from freight traffic is 89% of the total income of the KTZ.

The demand for railway transportation services is primarily assessed based on the volume of cargo transportation in tons multiplied by the distance transported in kilometers, known as freight turnover. The tariff freight turnover, which takes into account the shortest distance between the points of loading and unloading, is used to calculate demand and becomes the basis for calculating future revenues from freight traffic.

To generate accurate forecasts, a variety of forecasting methods have been developed based on two well-known approaches: qualitative and quantitative. Qualitative methods, such as Executive opinions, Delphi technique, Sales force polling, and Customer services, generate forecasts based on judgments or opinions, while quantitative techniques rely on historical data forecasts (e.g., Naive method, Trend Analysis, Time Series Analysis, Holt’s and Winter’s models) or associative forecasts that identify causal relationships between variables using Simple, Multiple or Symbolic regression. Mixed or combined models enable the integration of both approaches (Borucka et al., 2021).

2 Literature review

Numerous research centers have conducted studies on constructing models to describe demand for rail services. For instance, Milenković et al. (2018) utilized the SARIMA model to predict monthly passenger flows on Serbian railways, while Roos et al. (2017) developed a dynamic Bayesian network-based approach to forecast short-term passenger flows on the Parisian urban rail network. Zhang et al. (2019) utilized a LSTM (Long short-term memory) network to analyze the transport performance of the urban rail transit network in Beijing, while Tang et al. (2017) combined a backpropagation neural network and the glow-worm swarm optimization algorithm to analyze passenger traffic. Namiot et al. (2018) described methods of forecasting passenger traffic in Moscow based on network topology analysis. However, most of these studies are limited to the analysis of cities, where increasing demand for rail transport is due to urban sprawl and deteriorating road transport conditions, such as congestion, traffic jams, and increased vehicle emissions leading to smog.

Fewer models have been developed to assess the functioning of larger national rail networks, such as those in Sweden and India (Andersson et al. 2017; Prakaulya et al. 2017). Furthermore, Markovits-Somogyi (2011) reviewed the application of data envelopment analysis (DEA) in the transport sector, investigating the inputs and outputs used in 69 DEA models reported in the literature. Although DEA is a tool for evaluating the performance of decision-making units, it is sensitive to measurement errors and noise in data.

Most research in this area focuses on a specific mathematical model without considering alternative solutions, leading to a low effectiveness of proposed methods of analysis. However, Banerjee et al. (2020) propose various models to forecast demand in the regular passenger transport industry and compare them to choose the best one.

Demand analyses and forecasts are crucial for developing transport policies, but demand data are not always available due to a lack of appropriate mathematical models for generating forecasts. Thus, it is essential to analyze railway systems in various countries to select appropriate methods for forecasting transport performance. The objective of this study is to identify parameters of a mathematical model of rail cargo transport performance based on historical data to make reliable forecasts of future demand. In this paper, we investigate the national (Kazakhstan) railway system, propose several models dedicated to this type of empirical data, establish selection criteria, identify the best model, and assess its accuracy and effectiveness.

3 Methodology

The planning of demand for cargo transportation by rail at KTZ currently relies heavily on the expertise of an individual in cargo transportation marketing who uses MS Excel and MS Access to make

forecasts. The Marketing and Tariff Policy Department (hereinafter, MTPD) is responsible for demand forecasting and uses expert estimates and extrapolation to make their predictions. However, extrapolation has significant drawbacks as it does not consider changes in the external environment and the impact of external factors on the forecast. This method relies heavily on the judgment and experience of the MTPD expert, which can be time-consuming and may result in a deterioration in the quality of forecasts.

The MTPD expert spends most of their time on routine operations, such as downloading data from KTZ systems, uploading to personal computers, generating summary tables, preparing data, generating reports, graphs, tables, preparing paper questionnaires for shippers, and manually processing survey results. They use Microsoft Excel and Microsoft Access to process large data arrays, but their capabilities for processing large data arrays are severely limited, which can lead to simplifications and averaging, and thus, a deterioration in the quality of forecasts.

To improve the process of demand forecasting, KTZ needs to automate the process using modern software to analyze data and solve problems. This would allow the expert to spend more time on analysis rather than compilation of statistics. Special software products such as SAP HANA (High-Performance Analytic Appliance) and IBS SPSS (Statistical Package for the Social Sciences) can be used to analyze data and solve problems due to the high performance of database management systems and built-in libraries of algorithms, which would save time on mechanical tasks. KTZ has decided to conduct a pilot study or experiment on the planning and forecasting of future traffic and freight turnover using specialized software that processes and analyzes large volumes of data and compares the quality of the forecast made by the software with the forecast made by the MTPD experts using the methodology described in the methods section of this article.

The experiment consisted of multiple stages. Initially, data from KTZ systems on the volume and turnover of freight railway transportation were collected for each nomenclature of goods UTSNG (unified tariff and statistical nomenclature of goods) and 13 aggregated nomenclatures of goods, as well as for all types of communication. This data was analyzed and forecasted using a specialized program.

Next, macroeconomic indicators that could potentially correlate with the historical volumes of transportation or cargo turnover were collected and loaded into the program. The program was designed to assess the degree of correlation between the data on volume and turnover over a five-year period with macro indicators, and to determine the presence or absence of correlation between them.

A model was created and tested using 2012-2016 test data, and then it generated a monthly forecast for 2017. This forecast was compared with the 2017 results and with the forecast made by MTPD experts in 2016 for 2017, separately for each aggregated nomenclature of cargo and for each type of communication.

Finally, the quality of the forecast was assessed using the MAPE or MAE method. The MAPE/MAE indicator was derived for both the manual forecast made by MTPD experts and for the forecast made by specialized software by comparing the forecast with the actual value of the time series. MAE was used if the actual value of the indicator was zero.

$$MAPE = \frac{1}{N}\sum_{t=1}^{N}\frac{|Z(t)-X(t)|}{Z(t)} * 100\% \quad (1)$$

$$MAE = \frac{1}{N}\sum_{t=1}^{N}|Z(t) - X(t)| \quad (2)$$

SPSS, a specialized software for data analysis and forecasting, was selected due to its top ranking in the Gartner 2017 Data Science platform category. With numerous statistical and mathematical forecasting methods available in SPSS, the challenge was to determine the most effective approach. Consequently, three techniques - ARIMA model, neural net model, and autofitting - were utilized, and the best model was ultimately chosen.

In the design study, two models were utilized: a neural network and ARIMA. The neural network is a simplified model of the nervous system in living organisms, which uses interconnected processing elements to represent neurons. The network is trained by presenting it with records and adjusting the weights until it can accurately predict outcomes. After training, the neural network can be used to predict outcomes for new observations. On the other hand, ARIMA is used to create autoregressive integrated moving average models for time series simulations. It is capable of modeling trend and seasonal components, and can include predictor variables in the model. By setting the order of autoregressive, differential, and moving average components, as well as their seasonal equivalents, the ARIMA model can be fine-tuned. However, determining optimal values for these components can be time-consuming and require extensive trial and error.

The experiment involved analyzing five years of monthly historical data on traffic volume and freight turnover for 13 aggregated cargo categories using SPSS. The data included information on the Unified Tariff and Statistical Nomenclature of Goods (UTSNG) cargo code, as well as the country of consignor and consignee. Additionally, macro indicators from various countries with trade relations with Kazakhstan, such as production

volume, export/import volume, prices, and exchange rates, were loaded into the system in a monthly format for the same period as the historical data.

The correlation between the macro indicators and historical data was analyzed using special tools in SPSS, and the impact of predictors on historical data was estimated. The model was trained on the training sample and tested on the test data of 2012-2016. Using three different methods (ARIMA, neural net, and auto selection), a forecast was created by month for 2017 for all 13 cargo nomenclatures by traffic volume and cargo turnover. The best forecast generated by SPSS (ARIMA) was compared with the actual data for 2017 and the MTPD forecast generated by the old method described in the introduction section of the article.

4 Results and Discussion

The main results of the research work and the experiment in graphical form are presented below.

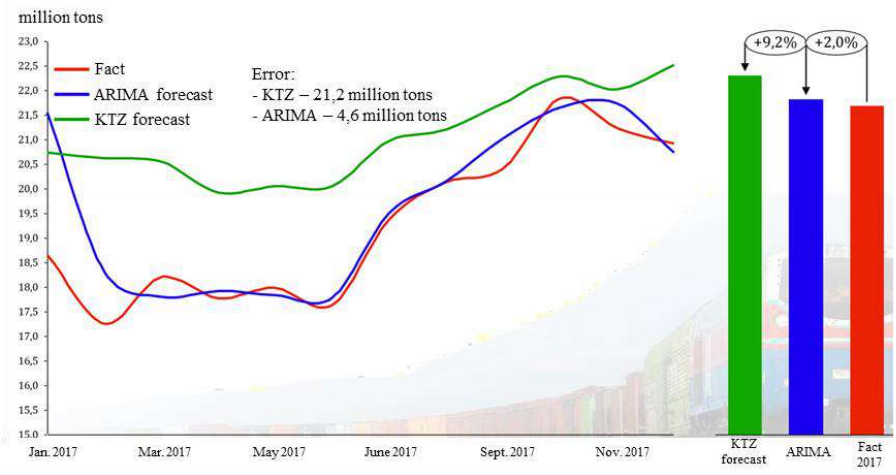

Figure 1: Cumulative traffic forecast for all nomenclature and message types compared to the 2017 fact and MTPD KTZ forecast.

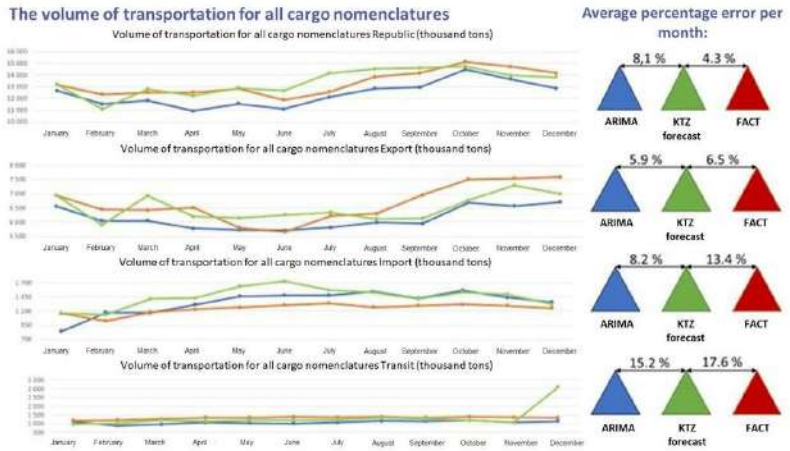

Figure 2. Thousand tones traffic forecast compared to 2017 actual: where ARIMA forecast is the forecast made by IBM SPSS Modeler by applying the ARIMA model to the forecast; FACT is actual data for 2017; KTZ forecast is a forecast made by MTPD experts in 2016 for 2017 using an expert method

Figure 2 shows that the MAPE score of the forecast made using ARIMA is better for all types of traffic except domestic traffic. In Import, especially in the second half of 2017, the blue line and the green line almost coincide, that is, the forecast turned out to be almost equal to the fact, while the red line, symbolizing the forecast made manually by MTPD experts, lies much lower than the fact. In general, it can be seen that MTPD experts somewhat overestimated the forecasts for transportation within the country and in exports, while imports were underestimated. In transit, everything is relatively "stable", even seasonal fluctuations are not felt, but in December there is an "anomalous" jump in traffic volumes.

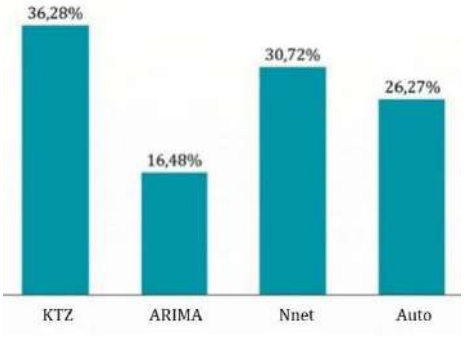

Figure 3. The indicator of the average monthly error per month for all types of cargo, all types of forecasts (volume and cargo turnover), all types of messages when using various forecasting methods

Figure 3 shows that the ARIMA predictive model gives much better results compared to even the neural network model. However, the neural network model (Nnet in Figure 4) requires more “fine” tuning, and has the potential for improvement.

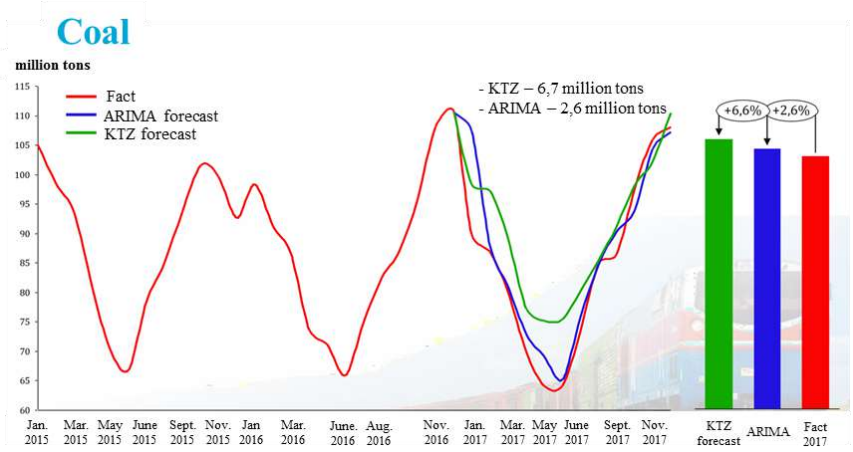

Figure 4: Comparison of fact with MTPD experts' forecast and SPSS simulation result (ARIMA model) on the total coal transportation volume in all modes of communication.

The ARIMA model provided a more accurate forecast for coal traffic, which is the main freight transported by KTZ. This is due to the high correlation between traffic volumes and macro indicators, as well as the seasonality of coal traffic. IBM SPSS Modeler's "predictor screening" feature can help identify the most important predictors for accurate forecasting. By using data on the correlation between specific predictors and traffic volume, along with forecasts from leading agencies, the quality and accuracy of the forecast can be greatly improved. By utilizing data that demonstrates a correlation between particular predictors and traffic and cargo turnover volume, which includes predictions from global and national agencies, it is feasible to enhance the precision and quality of the forecast considerably. For the purpose of this study, 260 indicators were collected from diverse sources of data (such as national statistical agencies of Kazakhstan's trading partners, global statistical agencies like Bloomberg, BMI Research, Reuters, and others). To perform an accurate correlation analysis, macro indicators with the right format and frequency, which matched the historical traffic data period and frequency (monthly data), were acquired. This resulted in more than 15,000 values for all predictors or a monthly data set for a five-year period (60 values) being loaded into the IBM SPSS interface for each predictor. Through a specific tool, IBM SPSS automatically detected the

existence of a correlation and the degree of influence of predictors on traffic volume or cargo turnover and compiled a list of up to 5-7 predictors that have the best correlation with the predicted indicators. This allowed for a focus on seeking predictions for specific macro indicators, saving valuable research time.

Using the methods and models described above has several advantages for KTZ's planning system. Firstly, it reduces the time for making forecasts and plans from 3 months to a maximum of 3-5 days, saving more than 1,000 man-days or 8,000 man-hours of work. Secondly, it allows for the development of many more forecasting scenarios, considering various scenarios of economic sectors' development. Thirdly, it presents an opportunity to reduce the average monthly error in forecasts from 36% to a potentially ambitious 10% or less. This will enable more accurate forecasting of KTZ's freight revenues and variable costs, which are dependent on freight performance. Fourthly, it enables more accurate calculation of the volume of demand and timing of purchases and deliveries of diesel fuel and electricity. Finally, combining the advantages of automation and MTPD experts' knowledge can result in significant progress in the speed and quality of demand forecasts and overall business planning at KTZ.

Here are the main areas for improvement when using a forecasting system with the aforementioned models and methods (ARIMA):

1. IBM SPSS forecasting results were found to be inferior to KTZ forecast results in some cases due to inadequate data for forecasting certain goods and message types, such as low volumes of crude oil transportation in import and transit. The accuracy of the forecast in any system for data analysis and forecasting depends on the availability and quality of data. In cases where historical data is insufficient, the "expert" forecasting method may be the only alternative.
2. Although the system can generate automatic forecasts, corrections by an expert may still be necessary. Only an expert can fully comprehend the forecast, evaluate its reasonableness and compare it with insider information that they may have from the largest shippers in the industry. Any changes made by an expert to the "automatic" forecast in the system must be documented and saved for future system training.
3. The study only utilized 260 predictors, which may not be sufficient for accurate forecasting. The quality of the forecast can be influenced by the number of predictors used, and a larger number of predictors can potentially improve the accuracy of the forecast. However, the quantity and frequency of macro- and microeconomic indicators by sectors of the economy in the Republic of Kazakhstan are quite limited, which is a natural limitation of the system.

4. Maintenance and updates are required for any data analysis and forecasting system to receive and upload new traffic data and predictors, which can be time-consuming and financially demanding. The benefits of using the system should outweigh the costs of maintaining it.

5 Conclusion

The aim of the study was to evaluate the accuracy of two forecasts for freight transportation in comparison to actual data for Kazakhstan Temir Zholy (KTZ). The study used historical data from 2012 to 2016, and macroeconomic indicators from Kazakhstan and its trading partners, which were loaded into IBM SPSS Modeler for analysis and forecasting. The forecasts generated by SPSS were compared to both the actual data for 2017 and the forecast data created by MTPD experts in 2016 for 2017, for all types of cargo and services in terms of tonnes of traffic and tonne-kilometres of freight turnover. The study found that modern mathematical and statistical models, such as SPSS, produced comparable results to those created by MTPD experts, especially for those goods and types of communication with complete, uninterrupted data and with historical transportation volume over the previous five years.

The study's conclusions suggest that modern mathematical and statistical models should be implemented in Kazakhstan's largest enterprises, including the transport industry. The experiment demonstrated that using these methods in practice for data analysis and forecasting can save up to 8,000 man-hours of work for MTPD experts, allowing them to concentrate on analysis rather than manual data processing. The experiment used real data, and the results were presented to KTZ management, leading to the launch of the "Integrated Planning System" project. The study's methodology, results, and recommendations were implemented in practice at KTZ.

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