

Effectiveness of ICT in Investment Policy Decision-making for Economic Entities

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ABSTRACT The purpose of the study is to investigate the effectiveness of using information and communication technologies (ICT) to optimize investment policy decision-making for economic entities. The research tasks include analyzing the potential of ICT in enhancing investment decisions, performing a SWOT analysis of Kazakhstan's agricultural sector, comparing ICT use in the agricultural sectors of the United States and Kazakhstan, and developing strategies for integrating ICT in Kazakhstan's agricultural sector. The technical problem is to develop and implement ICT solutions that enhance investment policy decision-making in dynamic environments. The mathematical methods used include statistical analysis, optimization techniques, and predictive modeling to evaluate the effectiveness of ICT and develop implementation strategies in the agricultural sector. The study found significant potential for using modern information and communication technologies to enhance the investment policy decision-making of economic entities. These technologies facilitate the optimization of operations in a dynamic environment, improving production, marketing, business activity, and ultimately boosting the investment appeal of the entity.

KEYWORDS software and hardware; data collection and dissemination; user rights and interests; investments in development; practical expediency; real benefits.

I. INTRODUCTION

INFORMATION and communication technologies are widely used in various fields of science, technology, and economy of modern Kazakhstan. The economic development of these areas takes place against the background of the development of stable market relations, with a significant transformation of the structures that have developed over the decades, and their reorientation towards self-sufficiency, risk, effective search for sales channels and expansion of supply opportunities. The process of attracting investments into the activities of economic entities in a dynamic mode is directly related to increasing the productivity and efficiency of their activities, which is clearly expressed in almost all sectors of the economy without exception [1]. For example, in the agricultural sector of the Republic of Kazakhstan, as one of the key sectors of the country's economy, from 2000 to 2017 there was a tendency to decrease the volume of production of various types of crop products, taking place against the background of a decrease in yields of almost all types of crops [2]. At the same time, crop production in Kazakhstan is developed at the expense of peasant and farm enterprises (39%), the share of agricultural enterprises (31%) and the farming population

(30%). About 61% of the total acreage is cultivated by agricultural enterprises, 38% by peasant farms and 1% by farmers [3], [4]. The problems of increasing the efficiency of processing agricultural areas and increasing yields are directly related to the issues of expanding the range of using information and communication technologies in agriculture. This will increase the efficiency of the enterprises of the agro-industrial complex of Kazakhstan and their investment attractiveness in general.

The purpose of the study is to investigate the effectiveness of using information and communication technologies (ICT) to optimize the investment policy decision-making process for economic entities. The tasks of the research include analyzing the potential of ICT in enhancing investment decisions, performing a SWOT analysis of the agricultural sector in Kazakhstan, comparing the use of ICT in the agricultural sectors of the United States and Kazakhstan, and developing strategies for the integration of ICT in Kazakhstan's agricultural sector. The technical problem is to develop and implement ICT solutions that enhance the decision-making process for investment policies in dynamic environments. The mathematical methods used in this study include statistical

analysis, optimization techniques, and predictive modeling to evaluate the effectiveness of ICT in investment decision-making processes and to develop strategies for their implementation in the agricultural sector.

II. RELATED WORK

G. Niyetalina et al. considered the issues of interconnection of energy production from fossil fuels of renewable and low-carbon resources within the framework of the Taylor rule, using the example of the Republic of Kazakhstan [5]. The researchers noted that after gaining independence, Kazakhstan went through a stage of restructuring in many economic sectors, and this process was aimed at integrating the country with foreign markets. The introduction of innovations in the production of energy from renewable sources has a reducing effect on inflation, which generally proves the absence of a causal relationship between the rate of inflation and the development of production processes [6]. The mechanisms of building a causal relationship were not considered. In turn, G. Lukhmanova et al. reviewed a wide range of issues of innovative development of the agricultural sector of the Republic of Kazakhstan [7]. Researchers noted that the country's agriculture was developing in an extensive direction, while achieving the effect of expanding production volumes by increasing the number of livestock, the amount of acreage, and an increase in the number of people employed in agricultural work. It was concluded that the modernization of the industry should take place considering the specifics of its functioning, which determined the prospects for the introduction of various information and communication technologies in agricultural production. The problems of technological difficulties inevitably arising during the modernization of agriculture were not considered in the paper. A. Zhagiparova et al. studied the realities of the current state of the financial market in Kazakhstan in the context of global instability [8]. It was noted that the financial market belongs to those segments of the economic system that are heavily regulated by state authorities. The use of information and communication technologies is of great importance for improving the efficiency of the functioning of the subjects of this market and the quality of decisions made in the course of their activities. The issues of interrelation of the results of the activities of economic entities in the context of the use of information and communication technologies for the control of financial activities by state authorities were not considered.

III. MATERIAL AND METHODS

The mathematical methods used in this study encompass statistical analysis, optimization techniques, and predictive modeling to assess the effectiveness of ICT in investment decision-making processes and to formulate strategies for their integration into the agricultural sector. In addition, a SWOT analysis of the agricultural sector of the Republic of Kazakhstan is performed. The theoretical basis consists of data from the analysis of the results of scientific research on a wide range of issues related to the use of information and communication technologies in the activities of enterprises in various economic sectors.

The mathematical methods employed in this study are crucial for evaluating the effectiveness of ICT in investment decision-making processes and for developing strategies for their implementation in the agricultural sector. Statistical analysis is used to process and interpret data related to the

performance and outcomes of ICT applications, providing insights into trends, correlations, and the overall impact of these technologies on investment decisions. Optimization techniques are applied to identify the most efficient and effective ways to allocate resources and manage investments, ensuring that the ICT solutions are utilized to their fullest potential. Predictive modeling is utilized to forecast future developments and outcomes based on current data and trends, allowing for the anticipation of potential challenges and opportunities in the implementation of ICT in the agricultural sector. These mathematical methods collectively contribute to a comprehensive understanding of how ICT can enhance investment policy decision-making and support the strategic development of the agricultural sector in Kazakhstan.

SWOT analysis of the state of the agricultural sector in the Republic of Kazakhstan provided data on the key problems and difficulties of the current state of agriculture in the Republic of Kazakhstan, and the possibilities of introducing information and communication technologies into this sector and the threats that may arise. The use of the modelling allowed obtaining a model of the influence of information and communication technologies on the process of making effective decisions on the investment policy of an economic entity in dynamic mode. The use of such a model helps to assess the relationship between various aspects of the use of ICT in economic activity, in particular, the importance of digital transformation processes, increasing the overall level of manufacturability of business processes, and their relationship with the growth of investment attractiveness of an economic entity and increasing the effectiveness of decisions taken in the field of its investment policy. This provides an insight into the role and place of modern information and communication technologies in the activities of an economic entity in general, without reference to a specific area of the economy, and the prospects of their use in the context of optimizing the investment policy of this economic entity.

IV. RESULTS

The role of information and communication technologies in making effective decisions on the investment policy of economic entities in dynamic modes can be traced by comparing the experience of managing the innovative development of the agro-industrial complex in the United States and Kazakhstan. In particular, the US economy has accumulated a significant amount of experience in solving problems through the use of innovative information and communication technologies. Companies in the agricultural sector of the country have developed such management methods and principles for launching innovative processes that best fit into the concepts of the activities of large economic structures [7].

At the present stage of economic development and technological progress, there is a significant increase in the role of small businesses in research and development in the agricultural sector related to the use of information and communication technologies. Small and medium-sized high-tech farms in America have the opportunity to purchase equipment that fully meets their current needs and systematically develop, increasing the level of their own technological security, while incurring the lowest possible costs [9]. The activation of small businesses in the field of innovation has determined the emergence of a new form of

investment financing for economic entities of this type – risk capital for innovative projects with a high degree of risk.

In the Republic of Kazakhstan, the share of farms in the structure of gross agricultural output has increased significantly in the last few years. Approximately 80% of the products produced in the agricultural sector are sold as raw materials without processing, while the finished products are characterized by weak competitiveness. Table 1 shows the data of the SWOT analysis of the agricultural sector in the Republic of Kazakhstan.

Table 1. SWOT analysis of the agricultural sector in the Republic of Kazakhstan

No.	Strength	Weakness
1	Kazakhstan is the ninth largest country in the world by territory	Low GDP (4.9%).
2	In terms of the area of agricultural land per capita, the Republic of Kazakhstan ranks second in the world.	Problems of trade development, including exports of finished products.
3	The country is one of the largest exporters of grain and flour.	Insufficient level of implementation of research and development work.
4	Large rural population (46% of the total population), a high percentage of employment (22% of the total number of working citizens).	Low level of safety in the field of veterinary medicine and food supply.
5	There is a significant demand for food products in the markets of the CIS and Asian countries.	Significant capital intensity.
6	Stable growth of the gross agricultural product.	Long payback period for agricultural products.
7	Significant prospects for the production and export of organic products.	Significant impact of climate change.
8		Low productivity.
9		Low profitability of agricultural producers.
No.	Opportunities	Threats
1	The possibility of increasing the volume of production of all types of agricultural products due to an increase in the population and problems of its food supply system.	Negative impact of climate change, sudden weather changes.
2	Creation of a system of effective state support for agricultural production cooperatives.	Spread of animal and plant diseases and environmental pollution.
3	Increased scope of supply and export volumes in advanced industries.	Increased competition in global markets for certain types of products due to accession to the World Trade Organization.
4		Risk of ineffective regulation of the industry by government agencies.

Source: compiled by the authors.

The introduction of modern information and communication technologies into the activities of enterprises in the agricultural sector of the Republic of Kazakhstan, and the development of information systems in the context of integration with the systems of government agencies and member states of the Eurasian Economic Union through the national gateway is necessary for the successful solution of the following tasks [7]:

- organizing the processes of granting subsidies and other government support measures;
- accounting of livestock sector products;
- accounting of crop production;

- tracking the turnover of fish and products of the fishing industry;
- monitoring and conservation of water resources, water management;
- registration of agricultural machinery, collaterals, issuance of driver’s licenses through the introduction of portal solutions;
- monitoring and accounting of forestry, prevention of forest fires;
- monitoring and accounting of land resources and their management;
- accounting, production, movement of agricultural products for enterprises of the agricultural sector, enterprises of processing industries, cooperatives, and other subjects of economic activity.

This will allow:

- create the necessary prerequisites for the export of agricultural products;
- increase the overall level of information saturation in the industry;
- increase the overall level of efficiency and transparency in the provision of public services;
- transfer public services to an electronic format;
- increase the investment attractiveness of economic entities.

Investing in the activities of economic entities in a dynamic mode can be carried out by both private investors and government agencies, as part of the implementation of public-private partnership programs. For this reason, the key parameters of the applied information and communication technologies, the requirements for their use, and the expected results from their practical application should be described in the technical specifications for the development of technologies of this kind and information systems used to improve the effectiveness of decisions taken in the field of investment policy of economic entities in dynamic mode.

Table 2 presents the key aspects of managing the implementation of innovative information and communication technologies and investment processes in the activities of economic entities in various regions of the Republic of Kazakhstan.

Table 2. Management of the processes of innovative technology introduction and distribution of investments in the regions of Kazakhstan

Indicator	System component
Theoretical and methodological aspects of the substantiation of the management strategy and its mechanisms	Consolidation of key areas of regional development in the social, economic and environmental spheres, and stimulation of scientific, educational and innovative mechanisms used in the activities of economic entities in a dynamic mode.
Economic and modelling software and applications used	Packages of complex analysis, computer modelling of the effectiveness of investment policy measures, methods of forecasting and strategic programming in the long term
Information base for modelling, situation analysis, and decision-making in the field of building investment policy of economic entities	Control of scientific and innovative potential of economic entities, patent databases
The program-target structure of an economic entity	Development of an interdepartmental directing scientific, educational and innovation center, problem study centers (laboratories), innovation and technical

	centers, and testing grounds for information and communication technologies used.
Ways to mobilize financial resources for the effective solution of scientific, innovative, and investment tasks	The issue of securities secured by intellectual property. Determination of depreciation and profit. Receiving orders from the state.
Subsystem for increasing motivation in the field of information and communication technologies implementation	Ways to develop motivation on the part of government agencies in a direct and indirect way.

Source: compiled by the authors.

The introduction of digital and information and communication technologies into the activities of an economic entity in general, and enterprises of the agro-industrial complex

in particular, is one of the strategic areas for the development of the economy of any state. Bio- and nanotechnology, the practical implementation of developments in the field of genetic engineering, the possibility of adapting manufactured agricultural products to the needs of certain categories of customers should be considered the main areas for increasing the competitiveness of the industry, and increasing the investment attractiveness of economic entities [10], [11]. Without actively expanding the range of implementation of digital innovative technologies, it is impossible to turn the agricultural sector of any state into a high-tech industry in a short period of time.

Figure 1 shows a scheme for the introduction of information and communication technologies in the activities of an economic entity in the agricultural sector in dynamic mode.

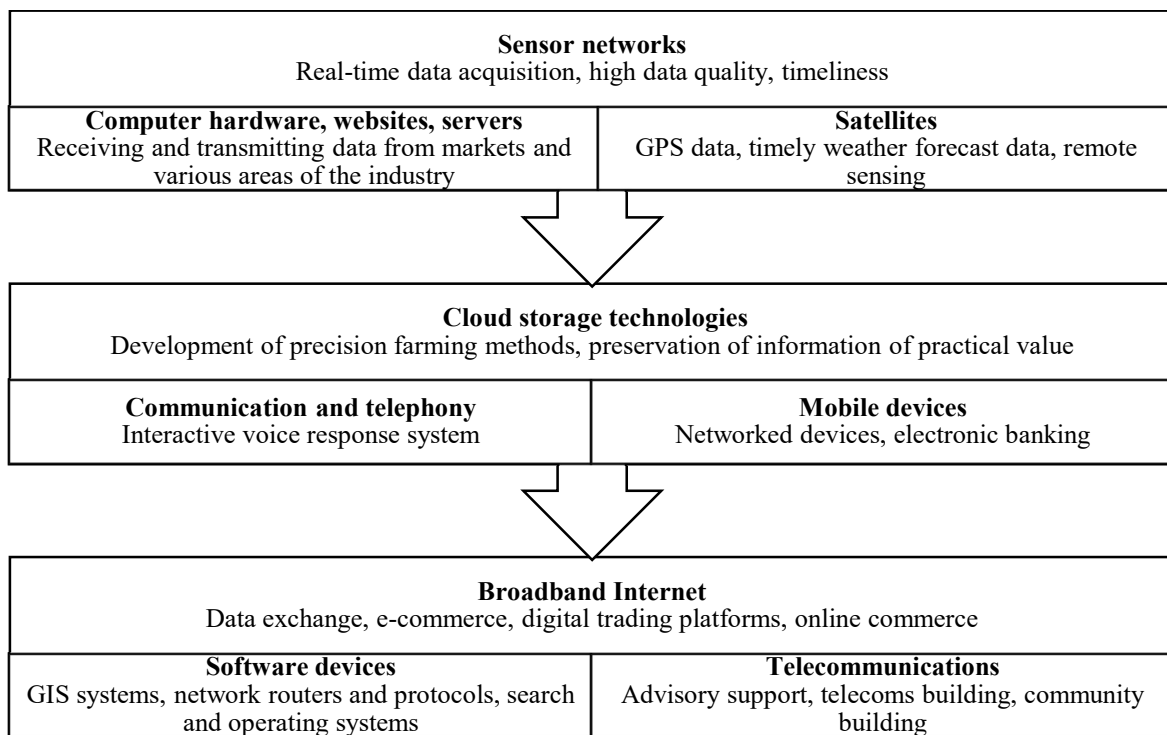


Figure 1. Information and communication technologies in the activity of an economic entity of the agricultural sector in a dynamic mode.

Source: compiled by the authors based on N. Boltianska et al. [12].

The introduction of information and communication technologies implies a harmonious way out of closed-loop technological solutions, which are characterized by strong polarization and narrow market segmentation. This leads to an increase in the sustainability of the agricultural sector through the redistribution of technologies, crops and livestock breeds, through a system that includes all subjects of the agro-industrial complex. There is no standard approach that would make this

vision practical and promote the effective use of information and communication technologies [13], [14].

Figure 2 shows a block diagram of the model of the information and communication technology influence on the process of making effective decisions on the investment policy of an economic entity in a dynamic mode. Within the framework of this model, the key areas of the ICT influence on the development of the processes of an entity activity operating in any economic sector of a single state are presented.

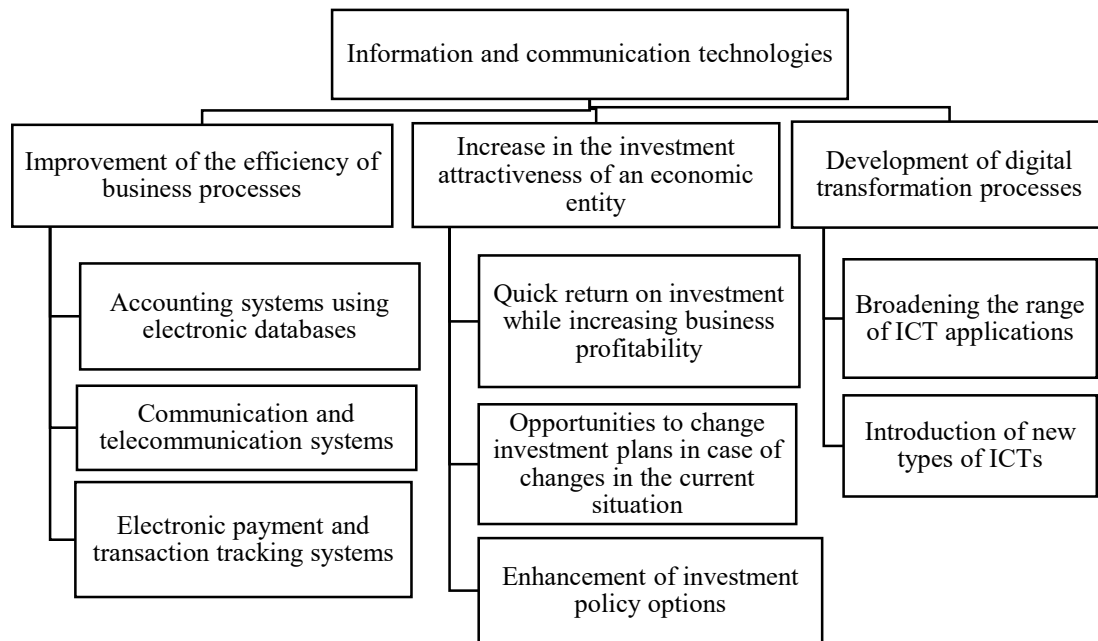


Figure 2. Block diagram of the model of the information and communication technology influence on the process of making effective decisions.

Source: compiled by the authors.

The presented model reflects the interrelation of the aspects of increasing the investment attractiveness of an economic entity with the issues of improving the efficiency of business processes of its activities, and its digital transformation. There is a clear correlation between the issues of increasing the level of technological efficiency of an economic entity in a dynamic mode and the effectiveness of decisions taken within the framework of its investment policy. The expansion of the possibilities of conducting an economic entity’s investment policy is directly related to the prospects for changing investment plans in case of sudden changes in the economic situation in which the entity is located at a given time [15], [16]. The growth of profitability of an economic entity in a dynamic mode is directly related to the use of modern information and communication technologies, allowing for the possibility of an early return of investment funds invested in this activity. The use of information and communication technologies in the context of the search for effective solutions to the investment policy of an economic entity in a dynamic mode is also associated with the development of digitalization processes. The introduction of new, innovative types of ICT, combined with the steady expansion of the range of their practical applications, ensure an effective search for additional options for conducting an economic entity’s investment policy, along with expanding existing opportunities.

Thus, the existence of an inextricable link between the processes of introducing information and communication technologies into the activities of an economic entity in a dynamic mode with the expansion of opportunities for making effective decisions on conducting its investment policy indicates the real prospects for the use of ICT in various sectors of the economy in Kazakhstan, including the agricultural sector.

V. DISCUSSION

The results obtained indicate the presence of a significant impact of the use of information and communication technologies on the processes of making effective decisions in the field of conducting investment policy of an economic entity in a dynamic mode. In particular, it ensures an increase in the overall level of information saturation in the field of activity of economic entities, quality control, production and sales volumes of finished products, and the translation of all documentation reflecting the activities of these enterprises into electronic format.

S. Abdoli and B. Bahramimianrood considered the issues of developing a target structure for evaluating the effectiveness of approaches to the development of information systems [17]. The researchers noted that the rapid growth rates of modern technologies had caused the emergence of complex information and communication technologies used by large companies to work in a dynamic mode. The development and application of information and communication technologies for making effective decisions in the field of investment policy of an economic entity in a dynamic mode includes specific social elements as stakeholders (for example, users and manufacturers) and requires the use of technological capabilities in a certain life cycle. The opinion expressed is fully confirmed by the results of this study, since they emphasize the role and importance of specific social elements in the effectiveness of the use of information and communication technologies in building the investment policy of an economic entity in a dynamic mode.

In turn, Z. Wang et al. examined the general principles of ecological transformation of the economy in the context of the use of natural resources and the application of innovations in the field of information and communication technologies for green growth [18]. It was suggested that the pursuit of sustainable green growth in the context of the use of

innovations in the field of information and communication technologies has become of primary importance today. The relationship between the use of modern information and communication technologies and the final effect achieved by increasing the efficiency of the final use of natural resources remains largely unexplored. The opinion of the researchers is controversial, since for a real assessment of the effectiveness of the use of information and communication technologies in the field of green growth, special quantitative studies are required.

Y. Wu et al. [19] reviewed a wide range of aspects of investment decision-making in Internet projects, through the use of a fuzzy interval synthetic model based on the Choquet fuzzy integral model. The researchers drew attention to the fact that the rapid development of the traditional energy system caused significant obstacles to coordination between different energy sources. According to researchers, the decision-making process in the field of investment policy of an economic entity in a dynamic mode should be studied in depth, considering the specifics of the use of information and communication technologies to solve all possible issues of investment and economic activity of this entity. The opinion of researchers corresponds to the findings, since the depth of studying the decision-making process in the field of investment policy of an economic entity in a dynamic mode determines the target orientation of the use of information and communication technologies in managing the activities of this entity.

S.S. Padhi et al. [20] considered the issues of the introduction of information and communication technologies to increase the competence of risk management of supply chains of economic entities in dynamic modes. The researchers draw attention to the fact that the introduction of ICT into the activities of enterprises whose activities do not involve exposure to risk factors contributes to the expansion of their capabilities and competence. The number of optimal investment decisions can significantly increase in the case of effective implementation of technologies of this kind in the activities of enterprises. These conclusions are confirmed by the results obtained, since they emphasize the direct relationship between the processes of introducing information and communication technologies into the activities of economic entities and the ultimate effectiveness of their investment policy.

For its part, Y. Xu et al. in study [21] considering a number of issues related to the assessment of investment risk for onshore and offshore wind energy based on the method of system dynamics, noted that the application of the method of multilevel system dynamics based on the analysis of investment risk contributes to improving the effectiveness of the investment policy of an economic entity in a dynamic mode. The improvement of applied technologies opens up additional opportunities in the field of investment attractiveness of economic entities and increasing the efficiency of their functioning. The opinion expressed coincides with the results of this study, since it reflects the relationship established by them between an increase in the level of investment attractiveness of economic entities and the volume of ICT implementation in their activities.

S. J. White et al. [22] conducted a joint study on improving the effectiveness of information and communication technologies in the field of education [22]. The researchers noted that the use of information and communication technologies in healthcare forms the basis of interaction between medical care providers and their consumers. Given the

significant role of ICT in this industry, many international agencies have developed measures to support educational programs in the health care system, involving the use of information and communication technologies in order to increase the investment attractiveness of healthcare facilities. The conclusions are confirmed by the results obtained in this study, since the competent use of information and communication technologies in various fields, including educational, increases the investment attractiveness of entities operating in this industry.

O.P. Aqboala et al. [23] examined a number of problematic aspects of the impact of information and communication technologies on stakeholder participation and sustainability of smart cities [23]. Researchers noted that the achievement of environmental sustainability of an economic entity in a dynamic mode is possible with the rational use of information and communication technologies in the management of these entities. There is a steady increase in the use of ICT in the management of economic entities, considering the specifics of making effective decisions within their investment policy. This opinion is fully confirmed by the results of this study, since the effective use of information and communication technologies, along with an increase in their use, significantly increases the investment attractiveness of economic entities and affects the effectiveness of decisions taken within the framework of their investment policy.

The topic of the influence of information and communication technologies on the stability of economic entities in a dynamic mode was raised by O.P. Agboala and M. Tunay [24]. The researchers suggested that information and communication technologies can be extremely important in terms of increasing the sustainability of both cities and individual economic facilities. It was noted that the use of innovative methods to ensure sustainable urban growth is inextricably linked with the use of information and communication technologies as a tool to ensure the effectiveness of investment policy decisions of an economic entity in a dynamic mode. The opinion of researchers is confirmed by the results of this study, however, the assessment of the effect of the use of ICT in each specific case requires a more detailed study, considering the specifics of a particular economic industry and the activity of the subject within its framework.

In turn, M. Brianti and L. Gáti reviewed a list of aspects of the use of information and communication technologies in assessing the overall productivity and economic activity of subjects in a dynamic mode [25]. According to researchers, the use of technologies of this kind has a positive effect on the cyclical nature of medium-term fluctuations in the activities of economic entities. It was concluded that the quality of using technologies of this kind directly affects the effectiveness of the investment policy of economic entities and any changes to the principles of using these technologies should be strictly regulated. The conclusions correspond to the results of this study, while the issues of assessing the quality of changes in the principles of using information and communication technologies require additional research in each specific case.

Thus, the discussion of the results obtained in this study, in the context of their comparison with other studies on the use of ICT in the development and implementation of effective solutions to the investment policy of an economic entity in a dynamic mode, indicates their compliance with the key parameters of scientific research.

VI. CONCLUSIONS

It is found in the study that the introduction of information and communication technologies into the activities of an economic entity in a dynamic mode objectively affects both its investment policy and the nature of all activities as a whole. Information and communication technologies expand the possibilities of economic entities and their rational use increases their investment attractiveness in the long term.

The introduction of information and communication technologies and digital transformation are integral elements of the changes taking place in the economies of all countries. In the economy of Kazakhstan, in which a significant share is accounted for by the agricultural sector, there is a steady trend towards the dynamic development of industries and this is largely achieved through the use of information and communication technologies. Economic entities receive ample opportunities to optimize all processes in their activities, which ultimately affects their investment attractiveness and opens up prospects for improving the effectiveness of their investment policy.

The introduction of modern information and communication technologies into the activities of economic entities in a dynamic mode allows achieving a high level of manufacturability of all work processes. The issues of production and marketing of finished products, data storage, ensuring stable communication, and the transmission of information in real time are solved at a higher technological level, which provides ample opportunities for optimizing the activities of an economic entity. This is clearly evident in the agricultural sector of Kazakhstan, where information and communication technologies are gaining an increasingly significant role and are actively used.

The novelty of the obtained results lies in the development of new models and methods that leverage ICT for investment decision-making in the agricultural sector. These models differ from existing analogues by incorporating advanced statistical analysis, optimization techniques, and predictive modeling specifically tailored to the dynamic conditions of Kazakhstan's agricultural sector. The advantages of these methods include improved resource allocation, enhanced forecasting accuracy, and greater investment efficiency. However, potential disadvantages may include the complexity of implementation and the need for significant initial investment in ICT infrastructure.

The prospects for further scientific research are determined by the steady expansion of the introduction of information and communication technologies in the activities of economic entities representing both the agricultural sector and other sectors of the economy. This implies the need to search for new opportunities to assess both the economic effect of the introduction of information and communication technologies and the expansion of opportunities for conducting investment policy of economic entities in a dynamic mode.

References

- [1] N. Reznik, A. Zahorodnia, "Impact of digitalization on society's innovative environment," *Economics and Business Management*, vol. 13, issue 1, 2022. [https://doi.org/10.31548/bioeconomy13\(1\).2022.39-48](https://doi.org/10.31548/bioeconomy13(1).2022.39-48).
- [2] K. Abdullayev, A. Aliyeva, K. Ibrahimova, S. Badalova, S. Hajizada, "Current trends in digital transformation and their impact on the national economy," *Scientific Bulletin of Mukachevo State University. Series "Economics"*, vol. 11, issue 1, pp. 9-18, 2024. <https://doi.org/10.52566/msu-econ1.2024.09>.
- [3] N. Boltianska, I. Manita, "Innovative development of technology for dairy cattle," *Scientific Newsletter TDATU*, vol. 10, issue 2, 2020. <https://doi.org/10.31388/2220-8674-2020-2-5>.
- [4] L. Piddubna, M. Gorobynskaya, "Digital transformation as a factor of changes in the organizational behaviour of international companies," *Development Management*, vol. 22, issue 4, pp. 25-36, 2023. <https://doi.org/10.57111/devt/4.2023.25>.
- [5] G. Niyetalina, E. Balapanova, A. Kuralbayev, G. Lukhmanova, A. Bolganbayev, "The relationship of energy generation from fossil fuels, low carbon resources, and renewable resources and inflation within the framework of Taylor's rule: The case of Kazakhstan," *International Journal of Energy Economics and Policy*, vol. 13, issue 4, pp. 9-15, 2023. <https://doi.org/10.32479/ijeep.14308>.
- [6] K. Mehta, S.P. Panda, "Sentiment analysis on e-commerce apparels using convolutional neural network," *International Journal of Computing*, vol. 21, issue 2, pp. 234-241, 2022. <https://doi.org/10.47839/ijc.21.2.2592>.
- [7] G. Lukhmanova, K. Baisholanova, N. Shiganbayeva, B. Abenov, A. Sambetbayeva, B. Sh. Gussenov, "Innovative development of the agricultural sector of the Republic of Kazakhstan," *Espacios*, vol. 40, issue 32, 2019. <https://www.revistaespacios.com/a19v40n32/a19v40n32p06.pdf>.
- [8] A. Zhagiparova, L. Sembieva, G. Samarkhan, "Current state of the banking system of Kazakhstan in the conditions of the crisis," *International Scientific and Practical Journal "Financial Space"*, vol. 41, issue 1, pp. 82-97, 2021.
- [9] N. Kurhan, O. Fartushniak, L. Bezkorovina, "Improvement of organization and automation of commercial enterprise electronic money accounting in conditions of economy digitalization," *Economics of Development*, vol. 22, issue 3, pp. 8-20, 2023. <https://doi.org/10.57111/econ/3.2023.08>.
- [10] D. Tkachyk, R. Kvietyni, "Asymmetric sentiment analysis of business news in historical data forecasting systems", *Information Technologies and Computer Engineering*, vol. 58, issue 3, pp. 65-75, 2023. <https://doi.org/10.31649/1999-9941-2023-58-3-65-75>.
- [11] M. Liepert, "A meta-analysis on private equity technology-driven value creation," *Scientific Bulletin of Mukachevo State University. Series "Economics"*, vol. 11, issue 1, pp. 29-39, 2024. <https://doi.org/10.52566/msu-econ1.2024.29>.
- [12] N. Boltianska, I. Manita, N. Serebyakova, "The use of information and communication technologies in the agricultural sector of Ukraine," *Bulletin of Tauride State Agrotechnological University*, vol. 9, issue 6, pp. 272-277, 2021. <https://doi.org/10.31388/2220-8674-2021-2-9>.
- [13] M. Gninigüé, K. O. Wonyra, A-F. Tchagnao, N. Bayale, "Participation of developing countries in global value chains: What role for information and communication technologies?" *Telecommunications Policy*, vol. 47, issue 3, article number 102508, 2023. <https://doi.org/10.1016/j.telpol.2023.102508>.
- [14] O.A. Matthew, R. Osabohien, O. O. Omosehin, N. Jawaid, T. Aderemi, O. Olanrewaju, P. N. Evans-Osabuohien, "Information and communication technology deployment and agricultural value chain nexus in Nigeria," *Heliyon*, vol. 9, issue 9, article number e19043, 2023. <https://doi.org/10.1016/j.heliyon.2023.e19043>.
- [15] F. Z. Fahmi, M. J. S. Mendrafa, "Rural transformation and the development of information and communication technologies: Evidence from Indonesia," *Technology in Society*, vol. 75, article number 102349, 2023. <https://doi.org/10.1016/j.techsoc.2023.102349>.
- [16] B. Van Voorhees, M. Gerges, G. Munaz, P. Kanabar, J. Tess, A. Holterman, M. H. Choi, K. Rasinski, R. Caskey, "Development of information and communication technology (ICT) for a coordinated healthcare program serving low income, chronically ill children," *Healthcare*, vol. 11, issue 4, article number 100720, 2023. <https://doi.org/10.1016/j.hjdsi.2023.100720>.
- [17] S. Abdoli, B. Bahramianrood, "A target-driven framework for assessing the effectiveness of product-service-system development approaches at System of Systems level," *Procedia CIRP*, vol. 119, pp. 229-234, 2023. <https://doi.org/10.1016/j.procir.2023.01.002>.
- [18] Z. Wang, Y. Huang, V. Ankrah, J. Dai, "Greening the knowledge-based economies: Harnessing natural resources and innovation in information and communication technologies for green growth," *Resources Policy*, vol. 86, article number 104181, 2023. <https://doi.org/10.1016/j.resourpol.2023.104181>.
- [19] Y. Wu, T. Zhang, L. Yi, "Regional energy internet project investment decision making framework through interval type-2 fuzzy number based Choquet integral fuzzy synthetic mode," *Applied Soft Computing*, vol. 111, article number 10771, 2021. <https://doi.org/10.1016/j.asoc.2021.107718>.
- [20] S. S. Padhi, S. Mukherjee, T. C. E. Cheng, "Optimal investment decision for Industry 4.0 under uncertainties of capability and competence

- building for managing supply chain risks,” *International Journal of Production Economics*, vol. 267, article number 109067, 2023. <https://doi.org/10.1016/j.ijpe.2023.109067>.
- [21] Y. Xu, R. Du, J. Pei, “The investment risk evaluation for onshore and offshore wind power based on system dynamics method,” *Sustainable Energy Technologies and Assessments*, vol. 58, article number 103328, 2023. <https://doi.org/10.1016/j.seta.2023.103328>.
- [22] S. J. White, B. Condon, P. Ditton-Phare, N. Dodd, J. Gilroy, D. Hersh, D. Kerr, K. Lambert, Z. E. McPherson, J. Mullan, S. Saad, M. Stubbe, M. Warren-James, K. R. Weir, C. Gilligan, “Enhancing effective healthcare communication in Australia and Aotearoa New Zealand: Considerations for research, teaching, policy, and practice,” *PEC Innovation*, vol. 3, article number 100221, 2023. <https://doi.org/10.1016/j.pecinn.2023.100221>.
- [23] O. P. Aqboala, F. M. Bashir, Y. A. Dodo, M. A. S. Mohamed, I. S. R. Alsadun, “The influence of information and communication technology (ICT) on stakeholders’ involvement and smart urban sustainability,” *Environmental Advances*, vol. 13, article number 100431, 2023. <https://doi.org/10.1016/j.envadv.2023.100431>.
- [24] O. P. Agboala, M. Tunay, “Urban resilience in the digital age: The influence of information-communication technology for sustainability,” *Journal of Cleaner Production*, vol. 428, article number 139304, 2023. <https://doi.org/10.1016/j.jclepro.2023.139304>.
- [25] M. Brianti, L. Gáti, “Information and communication technologies and medium-run fluctuations,” *Journal of Economic Dynamics and Control*, vol. 156, article number 104740, 2023. <https://doi.org/10.1016/j.jedc.2023.104740>.

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