https://doi.org/10.31489/2023L4/7-17

UDC 347.02

E.S. Kuandykova[1*], D.L. Baideldinov[1], T. Hoffmann[2]

[1] *Al-Farabi Kazakh National University, Almaty, Kazakhstan;*
[2]*The Institute of Law at Tallinn Technical University, Tallinn, Estonia*
(E-mail: elvirab8080@mail.ru, Daulet.Baideldinov@kaznu.kz, thomas.hoffmann@taltech.ee)

Problems of legal regulation of digital transformation of agriculture of the Republic of Kazakhstan

In the context of the best world practices the study is an overview of the legal regulation of the process of digital transformation of public administration of agriculture in the Republic of Kazakhstan. The hypotheses of this study are based on the analysis of the legal nature of the world practice of digital transformation of economic development and international cooperation of modern states. The research revealed that agriculture is a branch of the economy that is particularly in need of the introduction of information and communication technologies and, consequently, the improvement of legal regulation of the activities of public administration in the digital reality. The analysis of state programs and national projects of the Republic of Kazakhstan provides grounds for concluding that the digitalization of the Kazakh economy in agriculture is a priority. The dependence of the effectiveness of digital solutions in the agro-industrial complex on the level of public administration organization is substantiated: digitalization resources contribute to a more focused and result-oriented public policy through the use of legal monitoring capabilities. Digitalization is a rapidly growing trend in agriculture, when it does not just replace analog technologies traditionally used in practice, but develops new development options for effective solutions to problems in the industry, among which the introduction of legal mechanisms is of paramount importance. The study contains an analysis of the development of the legal foundations of digitalization in the industry, taking into account the problems at all levels of the process – from the issues of providing agricultural producers with an elementary level of Internet access to increasing the level of legal regulation of state management in the field of digitalization management.

Keywords: digitalization, agriculture, public administration, legal regulation, information and communication technologies, e-government, modernization.

Introduction

Sustainable development as the main condition for the creation by modern states of the “The future we want”, formulated in UN General Assembly resolution 66/288, should be based on the principles of democracy, the rule of law, state management at the level of international and national law. In the context of the recovery of national economies from the severe consequences of the coronavirus pandemic, digitalization is of paramount importance as a factor in the modernization of public administration. Information and communication technologies contribute to the effective exchange of information between government agencies and society online. The expansion of the structure of e-government has led to a trend of interaction between public authorities and society and has made it possible to use information technology to implement innovations in management. It is important to note that the use of digitalization significantly speeds up and improves the

*Corresponding author. E-mail: *elvirab8080@mail.ru*

quality of information exchange, ensures transparency and accountability of government operations, efficiency and effectiveness in the provision of a wide range of public services [1].

The Republic of Kazakhstan, among the 193 UN member states, is taking effective measures to achieve sustainable development goals and ranks 28th in the UN e-government development ranking [2]. However, it should also be noted that "the potential for development and improvement is quite high, and further social modernization envisages the adaptation of economic and social aspects to the requirements and standards of the modern world" [3].

Within the framework of this study, digitalization is considered as an important factor in the modernization of public administration in the field of agriculture in the Republic of Kazakhstan, an industry that is in particular urgent need for the implementation of information and communication technologies. The national project for the development of the agro-industrial complex of the Republic of Kazakhstan for 2021-2025 contains a number of activities for the implementation of digital solutions, such as bringing the material support of the Republican State Institution "Republican Methodological Center for Phytosanitary Diagnostics and Forecasts" of the State Inspection Committee in the agro-industrial complex of the Ministry of agriculture of the Republic of Kazakhstan material and technical means, laboratory equipment, uninterrupted high-speed access to the Internet, etc.; elaboration of the use of fintech and agrotech tools for digital solutions, creation of soil maps in electronic form, creation of geobotanical maps in electronic form, production of digital orthophoto maps, scanning of land cadastral files using the subsystem "Archive" of Automated Information System of the State Land Cadastre, creation of electronic maps of accounting quarters formed on the lands of cities and towns [4]. The sources substantiate: the digitalization of the Kazakh economy in agriculture will be carried out by optimizing production and logistics processes, improving the efficiency of the labor market, reducing resource consumption and production losses, increasing the efficiency of research work and is a prerequisite for the competitiveness of the industry [5].

The research is aimed at analyzing the legal regulation of digitalization in the field of agriculture of the Republic of Kazakhstan in the context of the world experience of agricultural development.

Materials and methods

The research is based on the materials of international and domestic practice of digitalization implementation in the management process in the field of agro-industrial complex. The national strategic program documents on the regulation of the digitalization process in the field of agriculture have been subjected to a detailed analysis. A review of the scientific literature and the news agenda revealed the regularities of the legal regulation of the implementation process and the results of the impact of digital technologies on agriculture on an international scale.

The scientific analysis of the sources was carried out using the methods of dialectical and formal logic, analysis, synthesis, as well as special methods of legal research: system-structural, formal-legal, comparative studies, socio-legal forecasting, legal modeling and others.

Results and discussion

The new digital reality presents a serious challenge to modern law. Digitalization as such requires an effective transformation of the model of regulatory regulation of public relations in all spheres of society, which is increasingly acquiring the contours of an information society. In this context, the effect of digital solutions in the agro-industrial complex, as world practice shows, is largely due to the level of organization of public administration. The global agriculture industry is facing today's challenges – food security threats, market shocks, climate change, and is forced to adapt to changing conditions, to support the transition to green energy and bioeconomy, to become climate neutral, and to prevent harmful environmental impacts. In this complex process, the application of digital technologies can provide critical innovative support for the successful transformation of agricultural systems in their specific spatial conditions and, moreover, contribute to learning in the decision-making process in agriculture [6]. Digitalization resources contribute to a more focused and result-oriented public policy due to the wider use of legal monitoring capabilities [7]. Decision support systems designed to collect and process data to substantiate decisions serve primarily to satisfy the requirements of all interested parties. Studies confirm that digital technological innovations contribute to a significant increase in the efficiency of the use of agro-industrial complex resources [8].

At the same time, the problems of digitalization in the field of agriculture also cause critical judgments among scientists, politicians and other interested actors in the digitalization process. There is a position justifying fears that digitalization in agriculture will exacerbate the process of negative impact on the environ-

ment [9]. As counter-arguments to the expansion of digitalization, assumptions are made about the reduction of industry jobs, the reduction of the managerial autonomy of entrepreneurial farmers [10], the increase in the load on the energy system due to the commissioning of numerous servers and other digital devices, and the increase in greenhouse gas emissions that can lead to secondary effects [11].

However, digitalization, as a rapidly growing trend in agriculture, is characterized by the use of accurate and data-driven technologies that facilitate real-time and site-specific decision-making [12]. Using a wide range of new technologies based on data, digital agriculture potentially increases the resilience of food systems, as evidenced by the high level of public policy and legislation in the EU countries, the experience of Germany is especially representative [13].

The legal paradigm associated with digital agriculture is constantly being transformed: the principles and provisions of state strategies are of key importance in determining the framework conditions for technological innovations and their implementation. We are talking about the financing of scientific research, the establishment of subsidies, and other regulators of the digitalization of the industry. Institutional, regulatory and socio-technical conditions for the development of digitalization depend on the level of development of each individual country. All countries adhere to the position of recognizing the importance of sustainability and reducing the impact of the agro-industrial sector on the environment. The American model of digitalization of agriculture is based on a strategy that adheres to the productive use of digital technologies without restrictions on the use of pesticides and fertilizers [14]. The policy of the European Commission "Farm to fork" F2F focuses on improving the efficiency of resource use by reducing the costs of agrochemicals [15]. In connection with the use of such directly opposite strategies, the question of the need for research and, based on them, to assess and predict how future trends in the agri-food industry may affect the effectiveness of digitalization is being actualized.

The F2F strategy uses the potential of digitalization to more efficiently use agricultural resources, climate and environmental data. Digitalization provides an opportunity to bring transparency to agricultural policy information, from financing, subsidies, to information about agricultural production, with a focus on providing consumers with healthy food. This strategy highlights the link between the development of a sustainable food system and the promotion of a healthier diet for the population of the European Union and provides quality information about this type of diet. This achieves the level of SDG3 as part of the UN SDG – good health and well-being for the European population in the range of problems associated with overeating, obesity and chronic diseases. Enhanced monitoring technologies are useful for assessing compliance and developing evidence-based national policies [16].

The key factors for the success of digitalization are the continuous increase in the availability of high-speed broadband Internet in rural areas and an effective monitoring system, and these factors are the basis of a digital strategy. Indicative in this context is the experience of Germany, strategy of which in the agricultural sector is based on 7 main digitalization measures: 1) quality control for evaluating digital applications is provided by an independent body, 2) measures to improve soil health through innovative digital technologies, 3) the development of digital technologies adapted for small and medium-sized farms, 4) creation and development of a regulatory framework for digitalization, 5) implementation of real-time GPS in all rural areas and provide access to data for farmers, 6) creation of experimental sites, 7) development of preliminary conditions for establishing the independence of farmers [17].

The function of law is to implement the goals of sustainable development and to establish clear rules. International experience dictates that when implementing and developing digitalization of various sectors of the economy, it is necessary to ensure compliance with the basic principles of the General Data Protection Regulation (GDPR). This is necessary for the organization of communications – data exchange is carried out at the level of legal norms of the named regulation. In this regard there are also technological implications for monitoring. The progressive experience of Germany and other European countries focuses on ensuring "farm data sovereignty" [18].

The digital agricultural policy does not just replace analog technologies traditionally used in practice. Transforming, it offers new policy options in the form of new developments to effectively solve problems in the industry. A wide range of digital technologies can be used at different stages of the agricultural policy cycle – when setting the agenda, formulating problems, forming, implementing and evaluating public policy [19]. According to the analysis, currently agricultural policy in Europe uses tools covering the entire range of policy options from providing information to regulation and economic incentives. Digitalization planning is important, the benefits of digital agricultural policy can be realized through training and capacity building of the entire industry, the key factors are research, innovation and experiments.

The Republic of Kazakhstan, which occupies the 28th position in the UN ranking on the development of e-government, is actively investing in the digital sector of the economy, including agriculture [20]. For Kazakhstan, as for any other country, "developing IT is a huge challenge that requires the state and business to take drastic measures in the context of innovative industrialization" [21; 246].

In the context of the problem of modernizing public administration, the recommendations formulated at the meeting of the Parties of the Convention about access to information, public participation in decision-making and access to justice in environmental matters by the Economic Commission for Europe Representative of UNEP are of great importance. An assessment of the potential for transforming public administration in the context of new digital technologies gives reason to conclude that they provide a real opportunity to solve complex problems in various sectors of the economy. Among them, the tasks of paramount importance are improving data management to make it less fragmented and unstructured, and their quality less volatile; expanding cooperation between the public and private sectors to transform data into knowledge that can influence economic incentives and behavior — in this regard, access to product information may be important; solving the issues of the digital divide and improving digital literacy, carrying out the process of digital transformation by state bodies providing public services. True in this context is the statement that "these problems are inherent in our reality, must be solved in due measure, which once again underlines the relevance and relevance of the transformation of public administration in the age of new information technologies" [22].

The potential of digital technologies will be effectively realized with the active cooperation of all factors of the agro-industrial complex. It is necessary to emphasize the role of the state in the creation and development of the digital landscape both at the legislative level and at the level of scientific research. Research proves that the development, implementation and evaluation of digital technologies will attract new investments to the industry, increase labor productivity, generally strengthen the competitiveness of agricultural products and significantly increase the effect of digitization [23; 22].

The first program document in accordance with the state planning system in Kazakhstan was the State program "Digital Kazakhstan", which included the following measures: the implementation of a traceability system for agricultural products; the implementation of elements of "precision farming" in a number of farms, including the use of meteorological stations; the implementation of electronic commerce in agriculture [24]. The Digital Kazakhstan program was preceded by the state program for accelerated industrial and innovative development. Since 2005, the "electronic government" has been consistently formed, elements of the innovation ecosystem are being implemented, and the basic level of digital literacy of the population and internet access are expanding. In Kazakhstan, with a certain degree of success, an attempt was made to implement the state program "Information Kazakhstan-2020" adopted in 2013. The main result of this project was that the information infrastructure became more accessible to a wider range of users, including workers in the agricultural sector [25]. The next policy document is the message of the President "The Third Modernization of Kazakhstan: Global Competitiveness" (2017), which focuses on the fact that "it is important to ensure the development of communications, universal access to fiber-optic infrastructure. The development of the digital industry will provide an impetus to all other industries" [26]. The fourth industrial revolution, called Industry 4.0, is a key factor in the development of digitalization in the field of industry, of which the agro-industrial complex is an integral part.

The Law of the Republic of Kazakhstan "On Informatization" dated November 24, 2015 No. 418-V defines the objectives of state regulation of public relations in the field of informatization as the formation and development of information and communication infrastructure, the creation of conditions for the development of domestic value in the production of goods, works and services in the field of information and communication technologies for information support of social and economic development and competitiveness of the Republic of Kazakhstan (Article 3). In accordance with Article 61, state support for the development of the information and communication technologies industry is provided by authorized state bodies, the National Institute for Development in the field of Information and Communication Technologies and other national development institutions in order to stimulate the development of the information and communication technologies industry in the Republic of Kazakhstan.

The basic prerequisites for the legal regulation of digitalization have been created, but a significant gap is the lack of methodological approaches to the development of regulatory requirements. This circumstance is the reason for the lack of effectiveness of legal mechanisms. Therefore, the agro-industrial complex has remained an industry with unrealized growth potential for many years.

This is exactly the area in which the existing potential for the development of digitalization has not been realized [27].

In terms of the implementation of automated systems in the agro-industrial complex of the country The Ministry of Agriculture of the Republic of Kazakhstan, considered the implementation of the state program "Digital Kazakhstan" as one of the most important strategic tasks. In the context of implementing the strategy for the long-term development of the agricultural sector, the strategy of the Ministry of Agriculture of the Republic of Kazakhstan, there was developed a specialized program E-AIC. A feature of this program is that digitalization is focused on the farmer and the simplification of his activities, on business processes for the provision of public services for the agricultural sector. The departmental project of the Ministry of Agriculture of the Republic of Kazakhstan contained the main message – the use of integrated digital agricultural solutions connected to the E-APK digital platform [28; 51].

On October 12, 2021, there was approved the National Project "Technological breakthrough through digitalization, science and innovation", presented a new format of events: automation and digitalization of the process of providing state support measures in the agro-industrial complex; amendments to the legislation on subsidizing communication services for agricultural producers, as well as at manufacturing enterprises; subsidizing communication services in agricultural fields and industrial facilities. The national project has set ambitious strategic goals: 33 (68.9) place by 2025 in the IMD Digital Competitiveness Ranking, 70 place by 2025 in the Global Competitiveness Index of the World Economic Forum "Innovation Potential", "Productivity Growth" in the industry "Information and communications" up to 34.4% of the level of 2019 by 2025, "Investments in fixed assets" in the industry "Information and Communications" up to 137.9% of real growth compared to the level of 2019 by 2025 [29].

The Resolution of the Government of the Republic of Kazakhstan "On approval of the Concept of Development of the agro–industrial complex of the Republic of Kazakhstan for 2021-2030" dated December 30, 2021 No. 960 states that the share of agricultural producers competently using digitalization products represents only a small part of the total number of agrarians in the country. This circumstance is the reason for slowing down the productivity process and reducing costs. At the same time, passivity in the use of digital tools is explained by objective reasons: the weakness and instability of mobile communications, the lack of a unified digital ecosystem of agriculture, and others.

Thus, practice has shown that in the field of digitalization of agriculture, as well as the economy as a whole, constructive modernization of existing digital resources and mechanisms for their practical application is necessary. The Concept of digital transformation, development of the information and communication technologies industry for 2023-2029, approved by the Decree of the Government of the Republic of Kazakhstan dated March 28, 2023 No. 269, is aimed at solving these tasks. The analysis of the content part of the Concept confirms the ambitiousness of this strategic document of the state: by 2029, it is planned to comprehensively effectively develop the innovative potential of the republic at a qualitatively new level. The bar of planned achievements is very high: by 2029, a significant increase in the volume of innovative products and labor productivity growth in the Information and Communications industry is expected, reaching at least 30th place in the IMD Digital Competitiveness Rating; reaching at least 15th place in the UN e-Government Rating; reaching at least 15th place in the Global Cybersecurity Index.

It is important not to repeat the practice of failures of previous state programs, the planned goals and indicators must be provided with adequate resources, supported by systematic legal monitoring and state control over compliance with legislation.

The national project, in contrast to the long-term and practically uncontrolled state programs of previous years, is aimed at achieving specific goals, and already in the first year of the Ministry of Agriculture's work on the implementation of the project showed certain results. First of all, attention was paid to the training of personnel in the agricultural sector – specialized agricultural and IT universities developed and implemented joint innovative educational programs in which there are digitalization skills. Measures have been launched to introduce state support for agricultural producers to purchase digital equipment and solutions, including the provision of subsidies to ensure communication at all levels of agro-industrial facilities. As for the provision of public services, their share in electronic format increased by 34%, the work on planning the modification of public services in the field of crop production, veterinary medicine and agricultural machinery has begun, the work on automation and optimization of public services is being activated (at least 95% of public services). Modern challenges make it necessary to improve the quality of public services. At the same time, for all actors in the agro-industrial sector, the factor of increasing transparency at all stages of the provision of public services becomes the most important. The primary task of the program for introducing digi-

talization into the agricultural process is to improve the regulatory legal framework that regulates parallel processes – educational, providing state support, updating industry databases and others [29].

The implementation of the tasks set is faced with problems of a different nature, starting with the issues of providing agricultural producers with an elementary level of access to the Internet and ending with the weakness of state management in the field of digitalization management. The objective reasons that complicate the process of implementing information technologies are due to many factors. First of all, it should be stated that the regions of the country are in unequal conditions due to the large territorial extent of Kazakhstan as a state that occupies the 9th place in the world in terms of area. We are talking about agro-climatic conditions, the degree of proximity to markets, the availability of infrastructure, the relativity of favorable and unfavorable conditions for agricultural production, and the differentiation of agricultural producers.

To create a digital landscape, it is of paramount importance to solve the problem of low-quality, and complete absence of internet in some remote rural areas. No less problematic are the factors of corruption, lack of transparency and related problems of acquiring land rights, using the possibility of obtaining state support measures for rural producers and others. Increasing the efficiency of public service delivery processes, implementing of digitalization projects, increasing the scope and efficiency of the use of information technologies are defined as the main tasks of the Department of Public services development and AIC digitalization. A specialized structural unit is endowed with the appropriate resources to solve the set strategic tasks.

The thesis that digitalization in the modern period is the most promising scenario for agriculture is supported at international forums. In Kazakhstan, in June 2023, with the participation of more than 50 agricultural companies, there was held the II International Forum on the digitalization of agriculture, which gained popularity among farmers after the I International Forum in 2021. The forum cultivated the idea that the latest developments, artificial intelligence and automation provide an opportunity to unlock the agricultural potential of the land much more widely, preserving its wealth and fertility for future generations, and improving the state of the agricultural business and industry [30]. We believe that such a valuable thesis is addressed primarily to the state that manages agriculture and is called upon to implement measures of state support for the development of digitalization.

Valuable in the context of the implementation of the advanced experience of developed countries in digitalization is the international cooperation of states and regional associations. The Department of the agro-industrial policy of the Eurasian economic commission emphasizes the importance of the implementation by the state of a set of incentive and regulatory measures, the interconnectedness of which will determine the implementation of digital technologies in the agro-industrial complex. The EEC Council for agro-industrial Policy proposed a set of digital transformation measures within the framework of the integration association: to develop information systems to provide agricultural producers with state support measures (subsidies, electronic data exchange, etc.); to develop tools to support the development of digital solutions; to provide support in increasing digital literacy among the rural population; to expand the coverage of the internet network in rural areas; to develop a system of personnel training; to increase the level of technical equipment of scientific research, etc. [31]. In this context, the sources correctly summarize that "the creation of an optimal digital ecosystem, that is, a market, is impossible without the development of a large-scale network of digital platforms and sub-platforms in all areas of activity in the agricultural sector" [32].

In the context of regional cooperation, the digital space of the countries of the Central Asia Regional Economic Cooperation Program (CAREC) is important for the development of digitalization as an interconnected digital ecosystem which will allow the development of new digital products and services, to accelerate digital transformation and to support a freer flow of data throughout the region. It should be borne in mind that the CAREC countries, as part of the digital strategy until 2030, perceived the acceleration vector of digital transformation for regional competitiveness and inclusive growth. The modernization of the state management of the agro-industrial complex in each country depends on the digital transformation of the government, which is a key element in creating a digital space of regional integration associations as a network of connected smart cities and villages. The factor of choosing digital agriculture as a priority for digital transformation in the region is quite explainable for the CAREC countries: a significant part of the population of all 10 member countries lives in rural areas [33].

Conclusion

As the analysis of the digital transformation of the state management of the agricultural industry on a global and national scale has shown, modern states use digital technologies and data to improve the way they

implement agroecological policy. Best practices demonstrate advances in data collection technologies, adoption of precision farming techniques, advances in data processing, artificial intelligence and computing power, advances in encryption and data protection technologies, and data exchange. Innovation creates a base of opportunities for solving strategic issues of public administration in the field of agriculture – to overcome information gaps and asymmetries, reduce transaction costs, and improve stakeholder interaction. The effectiveness of the use of digital technologies in agriculture depends on a number of factors, starting with the problem of providing access to basic connectivity infrastructure (broadband, telecommunications services, etc.), a set of services for collecting and analyzing data, the regulatory framework (interoperability rules, quality standards data, norms and regulations on data ownership and privacy, skills, common modeling structures, digital platforms, cloud storage and development, etc.). Thus, an effective data infrastructure for agriculture is being created, due to active measures of state support of an organizational, financial and supportive nature. The implementation of the principles of the digital economy makes it possible to create and develop an institutional environment that meets the modern realities of technology and improves the efficiency of the agro-industrial complex.

In the modern period it is important for the Republic of Kazakhstan to maintain a favorable regulatory environment for the development of digital agriculture, to ensure the information and economic security of agricultural producers, to strengthen the digital base for the provision of public services, to provide training for digital agriculture, to implement digital technologies in industries related to agriculture, to develop the concept of an agro-enterprise of digital business and the mechanism for its implementation, to increase the coefficient of international cooperation within the framework of regional integration associations.

As the analysis of the regulatory framework for digitalization in the field of agriculture has shown, the current legislation in the information sphere lags behind objective public relations, since the regulatory framework for the implementation of planned and ongoing digitalization measures has not been created at the proper level. It seems that the primary task is to legislate a system of principles on the basis of which adequate development of regulatory requirements is possible.

It is necessary to ensure access of agricultural producers not only to information on the market in the field of agriculture, but also to real resources of debt and trade financing. Taking into account the level of corruption in the agricultural sector in the regulatory legal acts regulating the mechanisms of state support, it is necessary to tighten the rules of responsibility for violating the established procedure for using the unified national platform for providing information services to agricultural producers, and the unified state subsidy system on a free basis. In this context, the existing regulatory framework regulating public relations in the field of digitalization of agriculture needs to be supplemented with regulatory requirements to improve the efficiency of providing information services for agricultural producers. The most urgent issues in the modern period are the issues of improving the legal regulation of monitoring the traceability of agricultural products, taxation, preferential lending, leasing programs, insurance, subsidies and other measures of state support. The effectiveness of digital transformation largely depends on the level of ensuring compliance of all digitalization processes with the requirements of regulatory legal acts.

This article was funded by the Committee of Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan (Grant №. BR21882302 "Kazakhstan's society in the context of digital transformation: prospects and risks").

References

1 E-Government. — [Electronic resource]. — Access mode: https://publicadministration.un.org/egovkb/en-us/Overview.

2 UN E-Government Survey. — [Electronic resource]. — 2022. — Access mode: https://publicadministration.un.org/egovkb/en-us/Overview.

3 Цифровизация для устойчивого развития и обеспечения социального благополучия общества. — [Электронный ресурс]. — Режим доступа: https://www.undp.org/ru/kazakhstan/stories/cifrovizaciya-dlya-ustoychivogo-razvitiya-i-obespecheniya-socialnogo-blagopoluchiya-obschestva.

4 Постановление Правительства Республики Казахстан от 12 октября 2021 года № 732. Об утверждении национального проекта по развитию агропромышленного комплекса Республики Казахстан на 2021–2025 годы. — [Электронный ресурс]. — Режим доступа: https://adilet.zan.kz/rus/docs/P2100000732.

5 Даулиева Г.Р. Цифровые системы в сельском хозяйстве Республики Казахстан: вектор успеха / Г.Р. Даулиева, А.А. Ережепова, С.С. Бакытжан // Проблемы агрорынка. — 2022. — № 2. — С. 56–63. — [Электронный ресурс]. — Режим доступа: https://doi.org/10.46666/2022-2.2708-9991.05 //https://www.jpra-kazniiapk.kz/jour/article/view/837/517.

6 Ingram J. What are the implications of digitalization for agricultural knowledge? / J. Ingram, D. Maye // Front. Sustain. Food Syst. — 2020. — 4. — P. 66, 10.3389/fsufs.2020.00066.

7 Robert Finger. Precision Farming at the Nexus of Agricultural Production and the Environment / Finger Robert, M. Scott Swinton, El Nadja Benni, Walter Achim // Annual Review of Resource Economics. — 2019. — 11:1. — 313-335.

8 Fountas S. Farm management information systems: current situation and future perspectives / S. Fountas, G. Carli, C.G. Sørensen, Z. Tsiropoulos, C. Cavalaris, A. Vatsanidou, B. Liakos, M. Canavari, J. Wiebensohn, B. Tisserye // Comput. Electron. Agric. — 2015. — 115. — P. 40-50, 10.1016/j.compag.2015.05.011.

9 Basso B. Digital agriculture to design sustainable agricultural systems / B. Basso, J. Antle // Nat. Sustain. — 2020. — 3. — P. 254-256, 10.1038/s41893-020-0510-0.

10 Lajoie-O'Malley A. The future(s) of digital agriculture and sustainable food systems: an analysis of high-level policy documents / A. Lajoie-O'Malley, K. Bronson, S. van der Burg, L. Klerkx // Ecosyst. Serv. — 2020. — 45. — Article 101183, 10.1016/j.ecoser.2020.101183.

11 Henman P. Improving public services using artificial intelligence: possibilities, pitfalls, governance / P. Henman // Asia Pac J Public Adm. — 2020. — 42 (4). — P. 209–221. DOI: 10.1080/23276665.2020.1816188.

12 Leroux C. Reflecting on the carbon footprint of digital technologies in the AgTech and Precision Agriculture sectors [Electronic resource] / C. Leroux. — 2020. — Access mode: https://www.aspexit.com/en/reflecting-on-the-carbon-footprint-of-digital....

13 Wolfert S. Big data in smart farming–a review / S. Wolfert, L. Ge, C. Verdouw, M. Bogaardt // Agric Syst. — 2017. — 153. — P. 69–80. DOI: 10.1016/j.agsy.2017.01.023.

14 MacPherson J. Future agricultural systems and the role of digitalization for achieving sustainability goals / J. MacPherson, A. Voglhuber-Slavinsky, M. Olbrisch, P. Schöbel, E. Dönitz, I. Mouratiadou, K. Helming // A review. Agron Sustain Dev. — 2022. — 42(4). — 70. DOI: 10.1007/s13593-022-00792-6. Epub 2022 Jul 6. PMID: 35818482; PMCID: PMC9258761.

15 United States Department of Agriculture (USDA). U.S. Agriculture Innovation Research Strategy. — [Electronic resource] — 2020. — Access mode: https://www.usda.gov/sites/default/files/documents/AIS.508-01.06.2021.pdf.

16 European Commission F2F strategy: for a fair, healthy and environmentally-friendly food system. — [Electronic resource]. — 2020a. — Access mode: https://ec.europa.eu/food/farm2fork_en.

17 Ehlers M. Agricultural policy in the era of digitalization [Electronic resource] / M. Ehlers, R. Huber, R. Finger // Food Policy. —2021. — 100:102019. Access mode: https://doi.org/10.1016/j.foodpol.2020.102019.

18 Bundesministerium für Ernährung und Landwirtschaft (BMEL). — [Electronic resource]. Discussion Paper 2035 Arable Farming Strategy. — 2019. — Access mode: https://www.bmel.de/SharedDocs/Downloads/EN/Publications/ackerbaustrategie-en.html.

19 Härtel I. Künstliche Intelligenz in der nachhaltigen Landwirtschaft — Datenrechte und Haftungsregime [Electronic resource] / I. Härtel // Nat Recht. — 2020a. — 42 (7). — 439–453. — Access mode: https://doi.org/10.1007/s10357-020-3704-3.

20 OECD, 2019 Digital Opportunities for Better Agricultural Policies OECD Publishing, Paris. — [Electronic resource]. — 2019. Access mode: https://www.oecd.org/publications/digital-opportunities-for-better-agricultural-policies-571a0812-en.htm

21 Цифровизация экономики регионов Казахстана: понятия, перспективы и механизмы реализации / под ред. акад. НАН РК, проф., д-ра экон. наук А.А. Сатыбалдина. — Алматы: Институт экономики КН МОН РК, 2021. — 292 с.

22 Yerkinbayeva L. Digitalization of Environmental Information in the Republic of Kazakhstan: Issues of Legal Regulation / L. Yerkinbayeva, D. Nurmukhankyzy, B. Kalymbek, A. Ozenbayeva, Z. Kalymbekova // Journal of Environmental Management And Tourism. — 2022. — 13(1). — 115-127. DOI:10.14505/jemt.v13.1(57).10.

23 Бейсекова П.Д. Цифровизация как инструмент управления агробизнесом Казахстана / П.Д. Бейсекова, Г.К. Джолдасбаева, Л.Т. Печеная // Конкурентные стратегии в развитии экономики, управления и права в зеркале компаративистики: Материалы Междунар. науч.-практ. конф., Москва, 28–29 ноября 2019 года / под общ. ред. Ф.Л. Шарова. — М.: Междунар. ин-т экон. и права, 2020. — С. 22–27.

24 Об утверждении Государственной программы «Цифровой Казахстан» Постановление Правительства Республики Казахстан от 12 декабря 2017 г. № 827. Утратило силу Постановлением Правительства Республики Казахстан от 17 мая 2022 г. № 311. — [Электронный ресурс]. — Режим доступа: https://adilet.zan.kz/rus/docs/P1700000827.

25 О Государственной программе «Информационный Казахстан–2020» и внесении дополнения в Указ Президента Республики Казахстан от 19 марта 2010 г. № 957 «Об утверждении Перечня государственных программ». Указ Президента Республики Казахстан от 8 января 2013 г. № 464. Утратил силу Указом Президента Республики Казахстан от 5 мая 2018 г. № 681. — [Электронный ресурс]. — Режим доступа: https://adilet.zan.kz/rus/docs/U1300000464.

26 Третья модернизация Казахстана: глобальная конкурентоспособность. Послание Президента Республики Казахстан от 31 января 2017 г. — [Электронный ресурс]. — Режим доступа: https://adilet.zan.kz/rus/docs/K1700002017.

27 Новые возможности развития в условиях Четвертой промышленной революции. Послание Президента Республики Казахстан народу Казахстана от 10 января 2018 г. — [Электронный ресурс]. — Режим доступа: https://www.akorda.kz/ru/addresses/addresses_of_president/poslanie-prezidenta-respubliki-kazahstan-n-nazarbaeva-narodu-kazahstana-10-yanvarya-2018-g

28 Жумашева С.Т. Цифровизация как основа инновационного потенциала аграрного производства Казахстана / С.Т. Жумашева, А. Муханова, Ж.Б. Смагулова // Проблемы агрорынка. — 2020. — № 2. — С. 45–52.

29 Об утверждении национального проекта «Технологический рывок за счет цифровизации, науки и инноваций». Постановление Правительства Республики Казахстан от 12 октября 2021 г. № 727. — [Электронный ресурс]. — Режим доступа: https://adilet.zan.kz/rus/docs/P2100000727.

30 Почему цифровизация — самый перспективный сценарий сельского хозяйства будущего. — [Электронный ресурс]. — Режим доступа: https://informburo.kz/special/pocemu-cifrovizaciya-samyi-perspektivnyi-scenarii-selskogo-xozyaistva-budushhego.

31 Международный опыт развития цифровизации в АПК: государственная поддержка, регулирование, практика. — [Электронный ресурс]. — Режим доступа: https://eec.eaeunion.org/upload/medialibrary/d62/Mezhdunarodnyy-opyt-razvitiya-tsifrovizatsii-v-APK-gosudarstvennaya-podderzhka_-regulirovanie.pdf.

32 Тлембаев Е. Роль цифровой экономики для агропромышленного комплекса / Е. Тлембаев // Қазақстан Республикасы Тәуелсіздігінің 30–жылдығына арналған «Сейфуллин оқулары — 17: «Қазіргі аграрлық ғылым: цифрлық трансформация» атты Халықаралық ғылыми–тәжірибелік конференция материалдары = Материалы Междунар. науч.-теор. конф. «Сейфуллинские чтения — 17: ”Современная аграрная наука: цифровая трансформация”», посвящ. 30-летию Независимости Республики Казахстан». — 2021. — Т. 1. Ч. 3. — С. 216–218. — [Электронный ресурс]. — Режим доступа: https://kazatu.edu.kz/webroot/js/kcfinder/upload/files/%D0%BD%D0%B0%D1%83%D0%BA%D0%B0/%D0%A1%D0%A7-17/%D0%A2%D0%BB%D0%B5%D0%BC%D0%B1%D0%B0%D0%B5%D0%B2%20%D0%95..pdf.

33 Цифровая стратегия ЦАРЭС до 2030 года. — [Электронный ресурс]. — Режим доступа: https://www.carecprogram.org/uploads/MC-2021-Docs-2-CAREC-Digital-Strategy-2030-20211711-RU.pdf.

Э.С. Куандыкова, Д.Л. Байдельдинов, Т. Хоффманн

Қазақстан Республикасындағы ауылшаруашылығын цифрлық трансмормациялауды құқықтық реттеудің мәселелері

Зерттеуде Қазақстан Республикасындағы ауыл шаруашылығын мемлекеттік басқаруды цифрлық трансформациялау үдерісін ең үздік әлемдік тәжірибе контексінде құқықтық реттеуге шолу жасалған. Бұл зерттеудің гипотезалары қазіргі мемлекеттердің экономикалық дамуы мен халықаралық ынтымақтастығын цифрлық түрлендірудің әлемдік тәжірибесінің құқықтық табиғатын талдауға негізделген. Зерттеу барысында ауыл шаруашылығы әсіресе ақпараттық-коммуникациялық технологияларды енгізуге, демек цифрлық нақтылық жағдайында мемлекеттік басқару органдарының қызметін құқықтық реттеуді жетілдіруге аса мұқтаж экономика саласы болып табылатыны анықталды. Қазақстан Республикасының мемлекеттік бағдарламалары мен ұлттық жобалары мен заңнамасын талдау ауыл шаруашылығындағы қазақстандық экономиканы цифрландырудың басымдығы туралы қорытынды жасауға негіз болады. Аграрлық сектордағы цифрлық шешімдер тиімділігінің мемлекеттік басқаруды ұйымдастыру деңгейіне тәуелділігі дәлелденді: цифрландыру ресурстары құқықтық мониторинг мүмкіндіктерін пайдалану арқылы неғұрлым мақсатты және нәтижеге бағытталған мемлекеттік саясатқа ықпал етеді. Цифрландыру — ауыл шаруашылығындағы қарқынды дамып келе жатқан үрдіс, ол тәжірибеде дәстүрлі түрде қолданылатын аналогтық технологияларды жай ғана алмастырып қоймай, саладағы мәселелерді тиімді шешу үшін дамудың жаңа нұсқаларын әзірлейді, оның ішінде құқықтық тетіктерді енгізу бірінші кезектегі маңызды мәселе. Зерттеу ауыл шаруашылығы тауарын өндірушілерді интернетке қолжетімділіктің қарапайым деңгейімен қамтамасыз ету мәселелерінен бастап цифрландыруды басқару саласындағы мемлекеттік басқаруды құқықтық реттеу деңгейін арттыруға дейінгі үдерістің барлық деңгейлеріндегі мәселелерді ескере отырып, саладағы цифрландырудың құқықтық негіздерін дамытуды талдауды қамтиды.

Кілт сөздер: цифрландыру, ауыл шаруашылығы, мемлекеттік басқару, құқықтық реттеу, ақпараттық-коммуникациялық технологиялар, электронды үкімет, жаңғырту.

Э.С. Куандыкова, Д.Л. Байдельдинов, Т. Хоффманн

Проблемы правового регулирования цифровой трансформации сельского хозяйства Республики Казахстан

Исследование представляет собой обзор правового регулирования процесса цифровой трансформации государственного управления сельским хозяйством в Республике Казахстан в контексте лучших мировых практик. Гипотезы данного исследования основаны на анализе правовой природы мировой практики цифровой трансформации экономического развития и международного сотрудничества современных государств. В ходе исследований выявлено, что сельское хозяйство представляет собой отрасль экономики, особенно остро нуждающуюся во внедрении информационно-коммуникационных

технологий и, следовательно, в совершенствовании правового регулирования деятельности органов государственного управления в условиях цифровой реальности. Анализ государственных программ и национальных проектов Республики Казахстан представляет основания для вывода о приоритетности цифровизации казахстанской экономики в сельском хозяйстве. Обоснована зависимость эффективности цифровых решений в агропромышленном комплексе от уровня организации государственного управления: ресурсы цифровизации способствуют более целенаправленной и ориентированной на результат государственной политике благодаря использованию возможностей правового мониторинга. Цифровизация являет собой быстрорастущую тенденцию в сельском хозяйстве, когда таковая не просто заменяет аналоговые технологии, традиционно используемые на практике, а вырабатывает новые варианты разработок для эффективного решения проблем в отрасли, среди которых первостепенное значение имеет внедрение правовых механизмов. Исследование содержит анализ развития правовых основ цифровизации в отрасли с учетом проблем на всех уровнях процесса — от вопросов обеспечения сельхозтоваропроизводителей элементарным уровнем доступа к Интернету до повышения уровня правового регулирования государственного менеджмента в области управления цифровизацией.

Ключевые слова: цифровизация, сельское хозяйство, государственное управление, правовое регулирование, информационно-коммуникационные технологии, электронное правительство, модернизация.

References

1 E-Government. *www.un.org*. Retrieved from https://publicadministration.un.org/egovkb/en-us/Overview.

2 (2022). UN E-Government urvey. Retrieved from https://publicadministration.un.org/egovkb/en-us/Overview.

3 Tsifrovizatsia dlia ustoichivogo razvitia i obespechenia sotsialnogo blagopoluchia obshchestva [Digitalization for sustainable development and ensuring the social well-being of society]. *www.undp.org.kz.* Retrieved from https://www.undp.org/ru/kazakhstan/stories/cifrovizaciya-dlya-ustoychivogo-razvitiya-i-obespecheniya-socialnogo-blagopoluchiya-obschestva [in Russian].

4 Postanovlenie Pravitelstva Respubliki Kazakhstan ot 12 oktiabria 2021 goda № 732 «Ob utverzhdenii natsionalnogo proekta po razvitiu agropromyshlennogo kompleksa Respubliki Kazakhstan na 2021–2025 gody» [Resolution of the Government of the Republic of Kazakhstan dated October 12, 2021 No. 732. On the approval of the national project for the development of the agro-industrial complex of the Republic of Kazakhstan for 2021-2025]. Retrieved from https://adilet.zan.kz/rus/docs/P2100000732 [in Russian].

5 Daulieva, G.R., Erezhepova, A.A. & Bakytzhan, S.S. (2022). Tsifrovye sistemy v selskom khoziastve Respubliki Kazakhstan: vektor uspekha [Digital systems in agriculture of the Republic of Kazakhstan: vector of success]. *Problemy agrorynka — Problems of the agricultural market /* https://doi.org/10.46666/2022-2.2708-9991.05. Retrieved from //https://www.jpra-kazniiapk.kz/jour/article/view/837/517 [in Russian].

6 Ingram, J., & Maye, D. (2020). What are the implications of digitalization for agricultural knowledge? *Front. Sustain. Food Syst.*, 4, 66, 10.3389/fsufs.2020.00066.

7 Robert, Finger, Swinton, M. Scott, Benni, El Nadja, & Achim, Walter. (2019). Precision Farming at the Nexus of Agricultural Production and the Environment. *Annual Review of Resource Economics*, 11:1, 313-335.

8 Fountas, S., Carli, G., Sørensen, C.G., Tsiropoulos, Z., Cavalaris, C., Vatsanidou, A., Liakos, B., Canavari, M., Wiebensohn, J., & Tisserye B. (2015). Farm management information systems: current situation and future perspectives. *Comput. Electron. Agric.*, 115, 40-50, 10.1016/j.compag.2015.05.011.

9 Basso, B. & Antle, J. (2020). Digital agriculture to design sustainable agricultural systems. *Nat. Sustain., 3,* 254-256, 10.1038/s41893-020-0510-0.

10 Lajoie-O'Malley, A., Bronson, K., S. van der Burg, & Klerkx, L. (2020). The future(s) of digital agriculture and sustainable food systems: an analysis of high-level policy documents. *Ecosyst. Serv.*, 45, Article 101183, 10.1016/j.ecoser.2020.101183.

11 Henman, P. (2020). Improving public services using artificial intelligence: possibilities, pitfalls, governance. *Asia Pac J Public Adm., 42*(4), 209–221. DOI: 10.1080/23276665.2020.1816188.

12 Leroux, C. (2020). Reflecting on the carbon footprint of digital technologies in the AgTech and Precision Agriculture sectors. Retrieved from https://www.aspexit.com/en/reflecting-on-the-carbon-footprint-of-digital....

13 Wolfert, S., Ge, L., Verdouw, C., & Bogaardt, M. (2017). Big data in smart farming–a review. *Agric Syst.*, 153, 69–80. DOI: 10.1016/j.agsy.2017.01.023.

14 MacPherson, J., Voglhuber-Slavinsky, A., Olbrisch, M., Schöbel, P., Dönitz, E., Mouratiadou, I., & Helming, K. (2022). Future agricultural systems and the role of digitalization for achieving sustainability goals. *A review. Agron Sustain Dev., 42*(4), 70. DOI: 10.1007/s13593-022-00792-6. Epub 2022 Jul 6. PMID: 35818482; PMCID: PMC9258761.

15 United States Department of Agriculture (USDA) (2020). U.S. Agriculture Innovation Research Strategy. Retrieved from https://www.usda.gov/sites/default/files/documents/AIS.508-01.06.2021.pdf.

16 European Commission (2020a). F2F strategy: for a fair, healthy and environmentally-friendly food system. *www.ec.europa.eu*. Retrieved from https://ec.europa.eu/food/farm2fork_en.

17 Ehlers, M., Huber, R., & Finger, R. (2021). Agricultural policy in the era of digitalization. *Food Policy*, 100:102019. *www.doi.org.* Retrieved from https://doi.org/10.1016/j.foodpol.2020.102019.

18 Bundesministerium für Ernährung und Landwirtschaft (BMEL) (2019). Discussion Paper 2035 Arable Farming Strategy. *www.bmel.de.* Retrieved from https://www.bmel.de/SharedDocs/Downloads/EN/Publications/ackerbaustrategie-en.html.

19 Härtel, I. (2020a). Künstliche Intelligenz in der nachhaltigen Landwirtschaft — Datenrechte und Haftungsregime. *Nat Recht 42*(7), 439–453. *www. doi.org*. Retrieved from https://doi.org/10.1007/s10357-020-3704-3.

20 (2019). OECD, 2019 Digital Opportunities for Better Agricultural Policies OECD Publishing, Paris. Retrieved from https://www.oecd.org/publications/digital-opportunities-for-better-agricultural-policies-571a0812-en.htm.

21 Satybaldina, A.A. (Ed.). (2021). Tsifrovizasiia ekonomiki regionov Kazakhstana: poniatiia, perspektivy i meshanizmy realizatsii [Digitalization of the economy of Kazakhstan's regions: concepts, prospects and implementation mechanisms]. Almaty: Institut ekonomiki KN MON RK [in Russian].

22 Yerkinbayeva, L., Nurmukhankyzy, D., Kalymbek, B., Ozenbayeva, A., & Kalymbekova, Z. (2022). Digitalization of Environmental Information in the Republic of Kazakhstan: Issues of Legal Regulation. *Journal Of Environmental Management And Tourism, 13*(1), 115-127. DOI:10.14505/jemt. v13.1(57).10.

23 Beisekova, P.D., Dzholdasbaeva, G.K., & Peshenayia, L.T. (2020). Tsifrovizasiia kak instrument upravleniia agrobiznesom Kazakhstana [Digitalization as an agribusiness management tool in Kazakhstan]. *Konkyrentnye strategii v razvitii ekonomiki, upravleniia i prava v zerkale komparativistiki. Materialy Mezhdunarodnoi nauchno-prakticheskoi konferentsii — Competitive strategies in the development of economics, management and law in the mirror of comparative studies. Materials of the international scientific and practical conference, Moscow, 28–29 November 2019.* F.L. Sharova (Ed.). Moscow: Mezhdunarodnyi institut ekonomiki i prava, 22–27 [in Russian].

24 Ob utverzhdenii Gosudarstvennoi programmy "Tsifrovoi Kazakhstan" Postanovlenie Pravitelstva Respubliki Kazakhstan ot 12 dekabriia 2017 goda N 827. Utratilo silu Postanovleniem Pravitelstva Respubliki Kazakhstan ot 17 maia 2022 goda N 311 [On the approval of the State Program "Digital Kazakhstan" Resolution of the Government of the Republic of Kazakhstan dated December 12, 2017 No. 827. Became invalid by the Decree of the Government of the Republic of Kazakhstan dated May 17, 2022 No. 311]. *base adilet.zan.kz*. Retrieved from https://adilet.zan.kz/rus/docs/P1700000827 [in Russian].

25 O Gosydarstvennoi programme "Informatsionnyi Kazakhstan–2020" i vnesenii dopolneniia v Ukaz Presidenta Respubliki Kazakhstan ot 19 marta 2010 goda N 957 "Ob utverzhdenii Perechnia gosudarstvennykh programm". Ukaz Presidenta Respubliki Kazakhstan ot 8 yanvaria 2013 goda N 464. Utratil silu Ukazom Presidenta Respubliki Kazakhstan ot 5 maia 2018 goda N 681 [About the State program "Informational Kazakhstan – 2020" and amendments to the Decree of the President of the Republic of Kazakhstan dated March 19, 2010 No. 957 "On approval of the List of state programs". Decree of the President of the Republic of Kazakhstan dated January 8, 2013 No. 464. Became invalid by Decree of the President of the Republic of Kazakhstan dated May 5, 2018 No. 681]. *base adilet.zan.kz*. Retrieved from https://adilet.zan.kz/rus/docs/U1300000464 [in Russian].

26 Tretia modernizatsia Kazakhstana: globalnaia konkurentosposobnost Poslanie Prezidenta Respubliki Kazakhstan ot 31 yanvaria 2017 goda [The third modernization of Kazakhstan: global competitiveness. Message of the President of the Republic of Kazakhstan dated January 31, 2017]. *base adilet.zan.kz*. Retrieved from https://adilet.zan.kz/rus/docs/K1700002017 [in Russian].

27 Novye vozmozhnosti razvitia v usloviiakh Chetvertoi promyshlennoi revolutsii Poslanie Prezidenta Respubliki Kazakhstan narodu Kazakhstana. 10 yanvaria 2018 goda [New development opportunities in the conditions of the Fourth Industrial Revolution Message of the President of the Republic of Kazakhstan to the People of Kazakhstan. January 10, 2018]. *www.akorda.kz*. Retrieved from https://www.akorda.kz/ru/addresses/addresses_of_president/poslanie-prezidenta-respubliki-kazahstan-n-nazarbaeva-narodu-kazahstana-10-yanvarya-2018-g [in Russian].

28 Zhumasheva, S.T., Mukhanova, A., & Smagulova, J.B. (2020). Tsifrovizatsia kak osnova innovatsionnogo potentsiala agrarnogo proizvodstva Kazakhstana [Digitalization as the basis of the innovative potential of agricultural production in Kazakhstan]. *Problemy agrorynka* — Problems of the agricultural market, 2, 22–45 [in Russian].

29 Ob utverzhdenii natsionalnogo proekta "Tekhnologicheskii ryvok za schet tsifrovizatsii, nauki o innovatsii". Postanovlenie Pravitelstva Respubliki Kazakhstan ot 12 oktiabria 2021 goda N 727 [On the approval of the national project "Technological Breakthrough through digitalization, science and innovation". Resolution of the Government of the Republic of Kazakhstan dated October 12, 2021 No. 727]" *base adilet.zan.kz*. Retrieved from https://adilet.zan.kz/rus/docs/P2100000727 [in Russian].

30 Pochemu tsifrovizatsiia — samyi perspektivnyi stsenarii selskogo khoziaistva budushchego [Why digitalization is the most promising scenario for agriculture of the future]. *www. informburo.kz.* Retrieved from https://informburo.kz/special/pocemu-cifrovizaciya-samyi-perspektivnyi-scenarii-selskogo-xozyaistva-budushhego [in Russian].

31 Mezhdunarodnyi opyt razvitiia tsifrovizatsii v APK: gosudarstvennaia podderzhka, regulirovanie, praktika [International experience in the development of digitalization in agriculture: state support, regulation, practice]. *www. eec.eaeunion.org*. Retrieved from https://eec.eaeunion.org/upload/medialibrary/d62/Mezhdunarodnyy-opyt-razvitiya-tsifrovizatsii-v-APK-gosudarstvennaya-podderzhka_-regulirovanie.pdf [in Russian].

32 Tlembaeyev, E. (2021). Rol tsifrovoi ekomomiki dlia agropromyshlennogo kompleksa [The role of the digital economy for the agro-industrial complex]. *Qazaqstan Respublikasy Tauelsizdiginin 30 gyldygyna arnalgan «Seiffullin oqylary–17: Qasirgi agrarlyq gylym: tsifrlyq transformasiia» atty Khalyqaralyq gylymi-tagiribelyk konferentsiia materialdary = Materialy Mezhdunarodnoi nauchno-teoreticheskoi konferentsii «Seiffullinskie chtenya–17: Sovremennaia agrarnaia nauka: tsifrovaia transformatsia», posviashennoi 30-letiiu Nezavisimosti Respubliki Kazakhstan — Materials of the international scientific and theoretical conference "Seifullin Readings–17: Modern agricultural science: digital transformation", dedicated to the 30th anniversary of Independence of the Republic of Kazakhstan, Vol. 1,* Part 3, pp. 216-218. Retrieved from https://kazatu.edu.kz/webroot/js/kcfinder/upload/files/%D0%BD%D0%B0%D1%83%D0%BA%D0%B0/%D0%A1%D0%A7-17/%D0%A2%D0%BB%D0%B5%D0%BC%D0%B1%D0%B0%D0%B5%D0%B2%20%D0%95.pdf [in Russian].

33 Tsifrovaia strategiia SAREC do 2030 goda [Digital Strategy of CAREC until 2030]. *www.carecprogram.org*. Retrieved from https://www.carecprogram.org/uploads/MC-2021-Docs-2-CAREC-Digital-Strategy-2030-20211711-RU.pdf [in Russian].