

**O.V. Misnik, G.Zh. Yesenova, M.T. Zholamanova**

*L.N. Gumilyov Eurasian National University, Nur-Sultan, Kazakhstan  
(E-mail: olesiyomis@mail.ru, pavlodarsemey@mail.ru, makpalzh@mail.ru)*

### **Digital Trends for small and medium-sized enterprises in agriculture of Kazakhstan**

**Abstract.** The article discusses the main provisions and stages of the implementation of the state program «Digital Kazakhstan» in the agricultural sector. A review of the main directions of the program development is carried out; the key tools for its implementation intended for small and medium-sized enterprises are marked in agriculture of the Republic of Kazakhstan. The directions of automation of public services aimed at increasing the availability of state support measures for agricultural producers, as well as the direction for developing a system of interaction of IT-business with agricultural entities are considered, which provides for the use of precision farming and establishment of smart farms. The analysis of the involvement of small and medium-sized enterprises is carried out in the digitalization process by using the «Digital platform for business». In addition, data on the digitization of the agricultural land are analyzed in Kazakhstan in the context of regions and intended use.

**Keywords:** digitalization, agriculture, small and medium-sized enterprises, precision farming, smart farm.

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**Introduction.** One of the priority areas outlined in the Message to the people of Kazakhstan New Development Opportunities under the Fourth Industrial Revolution is to increase labor productivity in the agricultural sector through the use of smart technologies. This is due to the fact that digitalization will not only reduce production costs, but also improve its quality and competitiveness through the efficient use of resources. As part of this area, in 2017 the digitalization program of the agro-industrial complex, aimed at facilitating the farmers activities and work starting from the beginning of the production up to the marketing of the products, was adopted. The main participants in this state program are not only large farms, but also small and medium-sized enterprises, which make up a significant part of agricultural producers.

When writing an article, we set a **goal** to conduct a study of the main directions of development of digital technologies for small and medium-sized enterprises in the agricultural sector.

**The tasks of the study** were determined as the following: to consider the main directions of the state program of E-AIC; to analyze digitalization tools; to identify problems of their implementation.

**Research Methods.** The research information base was made up of the state program documents of the Ministry of Agriculture of the Republic of Kazakhstan, statistics of the “Digital Platform for Business website, ranking.kz rating agency, as well as the works of domestic and foreign scientists published in periodicals.

Various research methods comprising analysis, synthesis and generalization, as well as abstraction-logical in identifying problems associated with the development of digitalization in agriculture of the Republic of Kazakhstan were used in the scientific research.

**Main part.** The information Kazakhstan state program adopted in 2013 has become one of the main steps towards creating the conditions for the transition to the information society and the transformation of the country’s economy into digital. The program provided for the implementation of such areas as improving public administration, creating institutions of the Open and Mobile Government, increasing the availability of information infrastructure for corporate entities and citizens of the state.

The next stage of the transition to digitalization was the state program Digital Kazakhstan,

which determined five vectors of development of the digital industry, one of which is the development of economic sector, including agriculture [1]. At the same time, the program indicates that “Kazakhstan occupies the 50th line out of 85 states in the rating compiled by The Boston Consulting Group according to the level of digitalization of the economy [2]. This trend shows the need to use digitization in order to reduce the risks of losses of agricultural producers due to adverse climatic conditions, increase of crop yields and livestock production, the effective organization of field work, etc.

World experience in the use of digital technologies in the agricultural sector by countries such as the European Union, China, Singapore, Malaysia and South Korea shows that the introduction of IT technologies allows agricultural producers to reduce costs by up to 20% or less using innovative software that includes an array of data received from the equipment, sensors, drones, satellite and other external applications. Available mobile and online applications with downloaded data on the lands under the agriculture, allow farmers to receive the most accurate recommendations on land use, taking into account the analysis of the influence of various factors. In addition, new technologies make it possible to trace the entire path of product promotion from the field to the consumer, which guarantees the quality of the product. [3]

Currently, in Kazakhstan, the digitalization process in the agro-industrial complex is carried out in two main areas: within the framework of automation of public services and the creation of a system for the interaction of IT business with agribusiness entities. The main task of the state in implementing the first is related to the increase of the availability of the state support measures for SMEs by optimizing and automating them according to the One-Stop-Shop-Service principle, which will lead to a reduction in the timing of the provision of public services and the efficient distribution of financial resources among agricultural producers. In addition, to simplify the process of making management decisions and to automate cash accounting, personnel management, accounting of the movement of goods and services, a single Digital Platform for Business has been developed, whose users are currently 173,799 entities (Table 1).

Table 1

**The number of registered users of the Digital Platform for Business portal on  
December 1, 2019**

The name of the region	Legal entities		Individual entrepreneurs		Individual persons	
	Quantity, units	Specific weight, %	Quantity, units	Specific weight, %	Quantity, units	Specific weight, %
Akmola region	2294	10,7	3199	4,4	2055	2,6
Aktobe region	2218	10,4	2427	3,3	1388	1,7
Almaty region	1184	5,5	21491	29,5	15803	19,9
Atyrau region	118	0,6	1972	2,7	374	0,5
East Kazakhstan region	1098	5,1	10146	13,9	4621	5,8
Zhambyl region	665	3,1	11625	16,0	2517	3,2

West Kazakhstan region	438	2,0	3799	5,2	1751	2,2
Karaganda region	896	4,2	4320	5,9	3717	4,7
Kostanai region	1645	7,7	4350	6,0	862	1,1
Kyzylorda region	1918	9,0	689	0,9	1021	1,3
Mangistau region	221	1,0	734	1,0	496	0,6
Pavlodar region	838	3,9	2427	3,3	1258	1,6
North Kazakhstan region	2148	10,0	2149	3,0	932	1,2
South Kazakhstan region	4515	21,1	3260	4,5	42376	53,2
Almaty	512	2,4	82	0,1	177	0,22
G. Nur-Sultan	552	2,6	43	0,06	161	0,20
Shymkent	132	0,6	76	0,1	102	0,13
Total	21392	100,0	72789	100,0	79611	100,0
Note-compiled by the authors according to the site qoldau.kz						

As the table shows, the main users of the information platform are individuals and entrepreneurs, who account for more than 88.0% of all users. At the same time, the leaders in the use of the platform are East Kazakhstan and Zhambyl regions.

The introduction of the Open Digital Platform will enable the digitization of the work and activities of over 300 thousand entrepreneurs by 2022 and reduce the cost of providing services for non-financial business support. [4]

In addition, according to the experts, the digitization of business in Kazakhstan will lead to the following results:

a) it is predicted that the cumulative effect of the implementation of digitalization projects will amount to 30% of GDP growth since 2025. The program has significant potential for value added activity and reducing costs in the economy, which will allow achieving a country's GDP growth rate of 4.55% per year since 2025;

b) it is assumed that 200 thousand new jobs will be created due to the relevant processes during the period 2018 - 2022;

c) according to the preliminary estimates, by the year 2025 the direct effect of the «Digital Kazakhstan» state program will have allowed getting an added value of 1.7-2.2 trillion tenge, thus ensuring a return on investment of 4.8-6.4 times by 2025 to total investment including private investment;

d) it is expected that Digital Kazakhstan will not only introduce technologies such as Bigdata, Blockchain, Internet of Things" in the framework of the state projects, but also create favorable conditions for their use by the market. A greenhouse environment is also created for the

development of the sphere of IT start-ups by creating ultramodern AstanaHub based on the EXPO infrastructure;

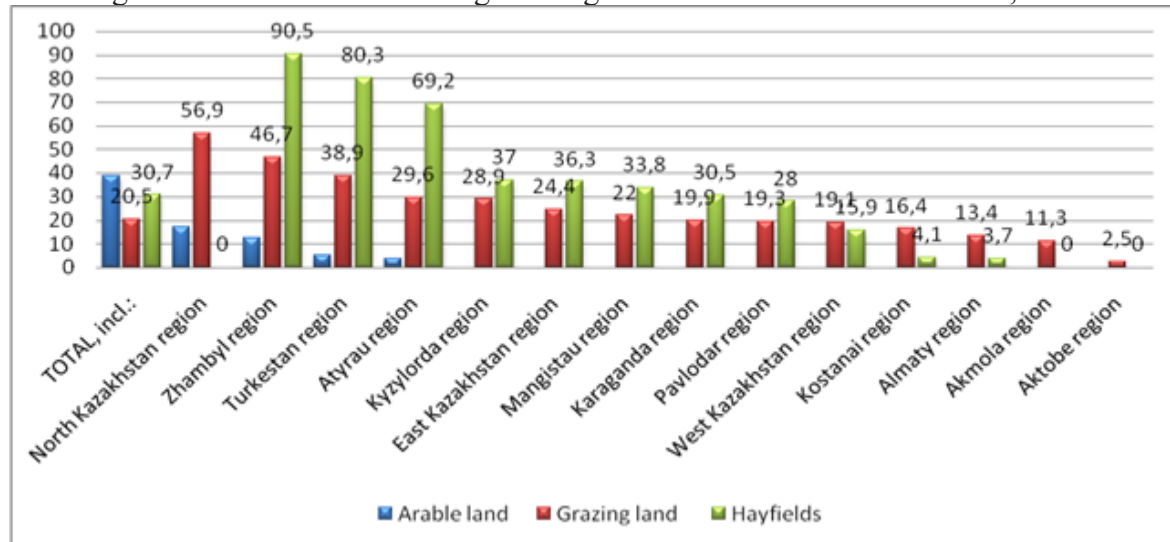
e) it is noted that «through the progressive development of the digital ecosystem, it is possible to improve the quality of life of the population and the competitiveness of the economy of Kazakhstan.» Total expenses for the implementation of this program will amount to 384.2 billion tenge. [5]

As part of the implementation of the second direction, the introduction of precision farming elements and the creation of 20 digital farms and 4000 farms with an advanced level of dairy and meat production are envisaged.

The introduction of precision farming will increase the yields and labor productivity in the sector due to real-time information on the state and condition of sowings, moisture, nutrients, nitrogen, potassium, phosphorus, pests, and rainfall forecast. [2] In this case, the introduction of precision farming involves the use of tools such as electronic arable land maps, weather station data, and the creation and establishment of digital and advanced farms.

Currently, in Kazakhstan, 79.3% of all grazing lands, 69.2% of hayfields and 61.4% of arable lands were digitized for the application of precision farming, [6] (Figure 1).

Figure 1 - Indicators of non-digitized agricultural land as of 01.12. 2019, %



Note - compiled by the authors according to the site qoldau.kz

As can be seen from Figure 1, the largest share of non-digitized lands falls on the Zhambyl and Turkestan regions. So, in the Zhambyl region 12.4% of arable land, 46.7% of pastures and 90.5% of hayfields still remain non-digitized. This suggests that the digitalization process is proceeding at a rather slow pace there. As for the Aktoobe region, it should be noted that the process of land digitization is almost complete, with the exception of 2.5% of pasture lands.

The creation and establishment of Smart farms in Kazakhstan provides for robotization of a number of production processes that will increase the level of production, the quality of the products produced and reduce the risks of farmer losses. It is possible to ensure a constant increase in animal productivity by the way of developing farms with automated control systems, the parameters of which vary depending on the microclimate and the condition of animals on farm. In order to implement this direction effectively, all farms are divided into three levels:

Level I «Digital Farm», i.e. farmers with necessary infrastructure and ready to begin digitalization of production;

Level II Advanced includes farmers with a high level of technical facilities and introducing

high-tech equipment;

Level III Basic consists of farmers with a low level of equipment. For each group of farmers specific digital support tools are provided, which will allow to bring farmers to a qualitatively new stage of development.

The study allows concluding that in Kazakhstan the digitalization of the agricultural sector is being considered both at the government level and the industry as a whole. The “Information Kazakhstan” state program has been adopted, the institute of Open and Mobile Government has been developed, and the Digital Kazakhstan state program has been accepted and is being implemented.

A “One-Stop-Shop-Service” has been introduced to the entities of SMEs in order to distribute efficiently financial resources among agricultural producers and reduce the time for the provision of public services and their automation.

A single Digital platform for business has been developed to make it possible for IT business to interact with agribusiness entities, to simplify the process of making management decisions and to automate cash accounting, personnel management, accounting of the movement of goods and services, which will also allow digitization of the work and activities of over 300 thousand entrepreneurs and reduce costs of providing services for non-financial business support.

The concept of precision (coordinate) farming involving the use of electronic maps for arable lands, the creation and establishment of digital and advanced farms has been introduced, and 79.3% of all pasture lands, 69.2% of hayfields and 61.4% of arable lands have already been digitized. Smart farms are being created and established in Kazakhstan.

Thus, the process of digitalization of agriculture in Kazakhstan is an effective tool for the development of the agricultural sector and will primarily improve the quality and timeliness of the provision of public services to agricultural producers in the form of small and medium-sized enterprises, increase the competitiveness of farm and livestock products, and reduce the risk of losses associated with natural and climatic conditions, as well as properly organize and expand business by introducing computer-based technologies.

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**О.В. Мисник, Г.Ж. Есенова, М.Т. Жоламанова**

*Евразийский национальный университет им.Л.Н.Гумилева, Нур-Султан, Казахстан*

### **Тренды цифровых технологий для малого и среднего бизнеса в сельском хозяйстве Казахстана**

**Аннотация.** В статье рассмотрены основные положения и этапы реализации государственной программы «Цифровой Казахстан» в отрасли сельского хозяйства. Проведен обзор основных направлений развития программы, выделены ключевые инструменты ее реализации для малого и среднего бизнеса в сельском хозяйстве Республики Казахстан. Рассмотрены направления автоматизации процессов государственных услуг, направленных на повышение доступности мер государственной поддержки сельхозтоваропроизводителей, а также направление по созданию системы взаимодействия IT-бизнеса с субъектами АПК, в рамках которого предусмотрены использование точного земледелия и создание «умных ферм». Проведен анализ вовлечения малого и среднего бизнеса в процесс цифровизации путем использования «Цифровой платформы для бизнеса». Кроме того, проанализированы данные по оцифровке сельскохозяйственных угодий в Казахстане в разрезе регионов и целевого использования.

**Ключевые слова:** цифровизация, сельское хозяйство, малый и средний бизнес, точное земледелие, «умная ферма».

**О.В. Мисник, Г.Ж. Есенова, М.Т. Жоламанова**

*Л.Н. Гумилев атындағы Еуразия ұлттық университеті, Нұр-Сұлтан, Қазақстан*

### **Қазақстанның ауыл шаруашылығы шағын және орта бизнесіне арналған сандық технологиялар трендтері**

**Аңдатпа.** Мақалада ауыл шаруашылығы саласындағы «Цифрлық Қазақстан» мемлекеттік бағдарламасын жүзеге асырудың негізгі ережелері мен кезеңдері қарастырылған. Бағдарламаны дамытудың негізгі бағыттарына шолу жүргізілді, Қазақстан Республикасының ауыл шаруашылығындағы шағын және орта бизнес үшін оны іске асырудың негізгі құралдары бөлінді. Ауыл шаруашылығы тауарын өндірушілерді мемлекеттік қолдау шараларының қолжетімділігін арттыруға бағытталған мемлекеттік қызмет процестерін автоматтандыру бағыттары, сондай-ақ, IT-Бизнестің АӨК субъектілерімен өзара іс-қимыл жүйесін құру бойынша бағыттар қаралды, оның шеңберінде нақты егіншілікті пайдалану және «ақылды фермалар» құру қарастырылған. «Бизнеске арналған цифрлық платформаны» пайдалану жолымен цифрландыру процесіне шағын және орта бизнесті тартуға талдау жүргізілді. Бұдан басқа, Қазақстанда өнімдер бөлінісінде және мақсатты пайдалану бойынша ауыл шаруашылығы алқаптарын цифрлау жөніндегі деректер талданды.

**Түйін сөздер:** цифрландыру, ауыл шаруашылығы, шағын және орта бизнес, нақты егіншілік, «ақылды ферма».

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**Сведения об авторах:**

**Misnik O.V.** – 1<sup>st</sup> year PhD student of the specialty «Finance and Business», L.N. Gumilyov Eurasian National University, Kazhymukan Munaitpasov street 11, Nur-Sultan, Kazakhstan.

**Yesenova G.Zh.** – PhD, Associate Professor, Head of the Department of Finance, L.N. Gumilyov Eurasian National University, Kazhymukan Munaitpasov street 11, Cabinet 1516, Nur-Sultan, Kazakhstan.

**Zholamanova M.T.** - PhD, Associate Professor, Acting Professors of the Department «Finance» of the L.N. Gumilyov Eurasian National University, Kazhymukan Munaitpasov street 11, Cabinet 1514, Nur-Sultan, Kazakhstan.

**Мисник О.В.** – «Қаржы және бизнес» мамандығының Ph.D. докторанты, Л.Н. Гумилев атындағы Еуразия ұлттық университеті, Нұр-Сұлтан, Қазақстан.

**Есенова Г. Ж.** – Л.Н. Гумилев атындағы Еуразия ұлттық университетінің доценті, э.ғ.к, Нұр-Сұлтан, Қазақстан.

**Жоламанова М. Т.** – Л.Н. Гумилев атындағы Еуразия ұлттық университетінің доценті, э.ғ.к, Нұр-Сұлтан, Қазақстан.