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DIGITALIZATION OF RURAL AREAS IN SAMARA REGION: OPPORTUNITIES AND CONSTRAINTS

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Abstract

Currently, the existing economy is being upgraded to a digital one, innovative technologies are being developed. They are dominated by artificial intelligence, widespread automation, and ecosystems based on digital platforms. The development of both mobile and wired broadband networks has a huge positive impact on all sectors of the economy, including agriculture. At the same time, the implementation of digital technologies is mainly concentrated in IT companies, industry, the financial and retail sectors, insurance and social networks. The level of digitalization reaches 70-80% in those sectors. The use of digital technologies increases the efficiency of all existing production, thereby stimulating innovation and significantly reducing costs. Currently, there is a general positive trend of digitalization of rural areas, but it often does not reach the required level. At the same time, the main constraint factor is the specifics of agricultural production and rural development. This article provides an overview of the prospects for rural development through the introduction of digital technologies. Foreign and domestic experience of digitalization in the agro-industrial complex is analyzed. Recommendations and proposals for the introduction of digital technologies in the economy of rural areas have been developed. This study sheds new light on the need to develop a long-term program for digitalization of rural territories of the Russian Federation.

1. Introduction

A growing world population implies an increase in demand for agricultural products. By 2025, according to UN forecasts, food production will need to be increased by 70%. Constant demand will be attributed to the growth of the general welfare and population. By 2050, the demand for grain crops will reach about 3 billion tons. Annual grain production will need to be increased by almost a billion tons (2.1 billion tons today), and meat production by more than 200 million tons to reach 470 million tons in 2050, 72% (58% today). The agro-industrial complex will be able to increase its productivity to the desired level only by using the latest scientific achievements and applying the most advanced technologies. Developed countries are successfully modernizing their economies, rapidly developing innovative technologies that are dominated by the use of artificial intelligence, widespread automation and digital platforms. Currently, up to 25% of the global economy is a digital one, which is necessary for the effective joint functioning of the state, business and the population.

Digitalization is an important condition for adapting rural areas to modern realities. The gradual digitalization of rural production will allow diversifying into new innovative areas of the real economy and opening up local regional producers of products and services both at the national and global level. Moreover, digitalization can help reduce the outflow of population to large urban agglomerations from rural areas and make rural areas more attractive for young people to live and work in (Rivza et al., 2019). Global socio-economic trends are crucial for the employment and life standard in rural areas, which largely depend on the state of the market and the cost of production, and, accordingly, on the competitiveness of goods and services created. At the same time, the main digitalization of the real sector of the economy occurs in large urban agglomerations, while in rural areas stand far behind. Almost all settlements in rural areas no longer have problems with connecting to communication services, but there is a need to increase the capacity of these communication channels and intensive integration of digital technologies in agricultural production.

The fundamental documents are the "Strategy for the development of the information society in the Russian Federation for 2017-2030" and the "Digital economy of the Russian Federation" program (2017). Now almost all sectors of the real economy are actively digitized, which is necessary to increase the profitability of all industries, including agriculture. According to the approach to digital transformation of agriculture through the introduction of digital technologies and platform solutions to ensure a technological breakthrough in the agro-industrial complex and achieve productivity growth in "digital" agricultural enterprises there are some vital tasks that need to be implemented. They are described in the departmental project "Digital agriculture".

2. Problem Statement

Under constant changes in consumer demand and high competition in the market of agricultural products, only joint systematic digitalization of rural territories and the entire country's agriculture can support agricultural sector. As noted above, ubiquitous digitalization is a new trend in the global economy that has replaced computerization. Russia has made significant progress in many areas of digitalization in recent years. The problem of digitalization of rural areas is not a new direction in scientific research, but most often it is about the introduction of digital technologies. In this paper this issue is considered in an

economic and statistical way, so the review of the relevant scientific literature was conducted. The existing research can be classified by territorial, industrial, and technological aspects. The industrial aspect of rural digitalization is represented by a wide range of scientific works of domestic and foreign scientists. The research on digitalization of healthcare (Rusanovsky & Bylina, 2019), education (Wang et al., 2019), tourism, state and municipal services (Blinova & Bylina, 2019) can be mentioned in this list. In their works, the authors actively used methods of cluster and correlation-regression analysis, population surveys, and typological groupings.

A number of studies were devoted to the issues of computerization and digitalization of individual territories (both regions and countries). For example, the regional level is represented by research on the prospects for the development of information and communication technologies in Samara region (Tokarev & Persteneva, 2010) and the Republic of Bashkortostan (Akhmetov & Galikeev, 2019). The experience of implementing the state program "Digital Kazakhstan" and the associated reduction of farmers' costs and increased harvest are described in the work (Kasenova & Zhomartova, 2020). The relationship between the investment climate and the formation of the digital agricultural sector of the economy in Latvia is studied in (Rivza et al., 2019).

In the economic and technological aspect, the work on the implementation of the Ural Cognitive Agro international agricultural robotization program in Russia (Pavlov et al., 2019) is of special interest. The authors consider the directions of development of IT technologies in the agro-industrial sector and analyze the dynamics of investment in the relevant sector of the economy.

Digital technologies that are rapidly spreading to rural areas in different countries are not only bringing about positive changes related to increasing production productivity and improving the quality of life. There are constraints along the way. Different opportunities to access the new benefits of the digital age differentiate both rural residents and agricultural enterprises, provoking spatial marginalization (Rotz et al., 2019). The digital divide caused by the territorial remoteness of rural settlements is compounded by socio-demographic factors such as educational level and employment status (Park, 2017). The reviewed research covers various aspects of life in rural areas. This research focuses on their development in the context of the digital economy.

3. Research Questions

According to the Ministry of agriculture the level of digitalization in the agricultural sector of Russia is only about 10 %, with annual growth limited to 2-3 %. Russia was among 15 countries in terms of digitalization of agriculture taking a leading position in the world in terms of the area of fertile land, as of the end of 2019. Solutions for precision farming were used only in 3 % of agricultural enterprises in Russia, while in the United States this figure reached 60 %, and 80 % in the European Union. In the context of Russian regions, the situation in the field of digitalization of the agro-industrial complex also varies greatly (Akhmetov & Galikeev, 2019). In this regard, this paper reports on a study of the digitalization issues (programs) of rural territories in Russia, and traces the processes and phenomena that arise during the digitalization of rural territories. Thus, the research studies the processes and phenomena that occur during the digitalization of rural areas. The prospects for the development of rural areas through the introduction of digital technologies have not been sufficiently studied, not to mention foreign and domestic experience

of digitalization in the agro-industrial complex. For evaluation, it is proposed to use statistical tools as the most appropriate ones for answering the research questions.

4. Purpose of the Study

The purpose of this study is to statistically study the level of digitalization of rural areas in the Russian Federation. To achieve this goal, a list of fundamental documents for the digital transformation of the Russian economy has been compiled. Different aspects of digitalization of rural areas have been considered. Statistics has been collected and grouped for further processing. The classification of factors by territorial, industrial and technological aspects has been carried out. The directions of rural development in the context of the digital economy are defined. The main constraints to the introduction of digital technologies in the agricultural sector of the economy were identified.

5. Research Methods

The study was conducted using general scientific and statistical methods and approaches. General scientific methods include analysis and synthesis. Using the synthesis, the general features of rural development in the Russian Federation were determined. In the framework of the institutional approach, the analysis of digitalization of the agricultural sector was carried out. The historical method was used to justify the irreversibility of the ongoing digitalization processes that form the basis of the post-industrial stage of society's development. To analyze the dynamics statistical methods were used. Statistical methods made it possible to group the data.

6. Findings

Information and communication technologies in agriculture can be observed only for financial cooperation as program products before the era of ubiquitous digitization of the production. Now digitalization is aimed at solving specific tasks such as precision farming, economical irrigation systems, smart farms, etc. At the same time, their quality of implementation does not yet pass into the required quantity. Another important trend is the creation of a single ecosystem for smooth operation of all necessary databases with software. Digitalization of agricultural production significantly simplifies the planning of work performed and largely prevents undesirable factors caused by various disasters. Additionally, the use of digital smart solutions allows tracking all aspects of a long production and technological cycle in the agro-industrial complex almost simultaneously. However, many modern world achievements of "smart" agriculture due to their high cost are now available only to large companies, i.e. state unitary agricultural enterprises and private agricultural holdings. The majority of private substantial agricultural businesses and peasant farms do not use new digital technologies at all. At the end of 2019, there were 102.9 thousand organizations in the Russian Federation, that is 11% less than in 2018 (Table 1).

Table 1. Number of organization according to their economic activity (to the end of the year; thousands)

Years	2017	2018	2019
agriculture, forestry, hunting, fishery and fish farming	129,4	115,4	102,9

Source: authors.

Over the period from 2000 to 2019, the share of agricultural products in actual prices for agricultural organizations increased from 45.2 to 58.2%. The growth was 13 percentage points. The transition of households in the peasant farms and the consequent reduction in the share of production in households was from 51.6 to 28.2 or 23 percentage points. Peasant farms, including individual entrepreneurs, have undergone significant changes in the structure of production from 3.2 to 13.6 (Table 2).

Table 2. Structure of agricultural production by type of enterprise (%)

Years	2000	2010	2017	2018	2019
Enterprises of all types including:	100	100	100	100	100
agricultural organizations	45,2	44,8	55,2	56,5	58,2
households	51,6	48,0	32,4	31,0	28,2
peasant farms	3,2	7,2	12,4	12,5	13,6

Source: authors.

A large number of small agricultural producers, which have a fairly low level of digitalization and economic opportunities to use modern technologies, causes their low productivity and, as a result, low competitiveness. Only the comprehensive application of digital technologies in rural areas, both for large agricultural producers and especially for small ones, will gradually overcome the emerging inequality and improve the population welfare level. The modern program for the development of digital government and super services for citizens allows gradually introducing electronic document management in rural areas, building new business models for the production and sale of manufactured products, and improving the well-being of the rural population by increasing labor productivity. For the purposes of this study, the concepts of "digital agricultural enterprise", "digital personal subsidiary farm", "digital peasant (farmer) farm", "digital cooperative", "digital agricultural holding" are distinguished. Figure 1 shows the main directions of development for the digital economy in rural areas, with regard to various organizational and legal forms of agricultural production.
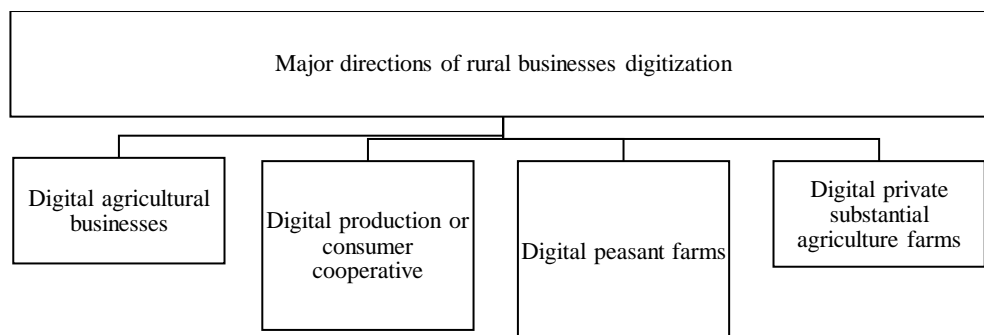

Figure 1. Major directions of rural businesses digitization

The basis of the economy of rural territories is now represented by private substantial agricultural farms but not large agricultural enterprises. According to the RF Ministry of Agriculture, they produce an average of about 30-35% of gross agricultural output, and for some types of agricultural products (potatoes, vegetables, fruits and berries), their share reaches 65-70 %. At the same time, the lack of well-established cooperative relations between private substantial agricultural farms does not yet allow many of them to reach a fundamentally higher level in the production, processing and marketing of agricultural products. Solving urgent socio-economic problems in rural areas largely determines the need for rapid implementation of digital solutions. Digitalization allows reducing the use of low-skilled labor and increasing the automation of production with the forced emergence of new high-tech jobs in rural areas. A significant part of labor relations and entire employment segments are moving to the virtual environment. Digitalization requires the formation of new competencies in the labor market, and the emergence of new jobs and professions. For large-scale digitalization of rural areas in Russia, modern information and communication technologies and people who can effectively implement them are vital. Reduction of non-production components of costs in the final cost of products goes in line with simultaneous integration of producers and sellers, and reduction of the cost of agricultural products without deterioration of their quality.

Taking all the above mentioned into account, the digitalization of the rural economy will ensure:

- the emergence of new online and offline platforms for the sale of agricultural products;

- increasing of living standards in rural areas;

- creating new jobs and interaction mechanisms;

- creating clear mechanisms of interaction between all market participants;

- reduction of the production costs and, that results in its competitiveness growth in the domestic and international markets.

7. Conclusion

In order for digitalization to have a tangible positive effect on the socio-economic development of rural areas, it is necessary to adopt and distribute the cloud applications, Internet of things, big data management services, rural communications, and integrated IT solutions based on unified platforms. The widespread development of both mobile and wired broadband networks can have a huge positive impact not only on all high-tech sectors of the economy, but also on agriculture. At the same time, not only specialists should be able to use the results of digitalization, but also ordinary citizens should have the skills to work with digital information. They must have the skills to work with digital information. Information barriers that prevent small farmers from accessing the market will gradually be overcome. In the long run, digitalization will contribute to improving the quality of life of the population in rural areas by increasing the efficiency of agro-industrial production, using the latest technologies, equipment, modern methods of production, processing, storage, sale, delivery of goods and services, improving rural social infrastructure, including education, medicine, and culture. Obviously, the acceleration of digital transformations in the agro-industrial complex, the formation of the digital agricultural sector of the economy largely depends on the favorable investment climate in the country. State support for the introduction of digital technologies in

rural areas, as well as active educational work, will improve the efficiency of agricultural production and the quality the rural life standards.

References

Akhmetov, V. Y., & Galikeev, R. N. (2019). Prospects for socio-economic development of rural areas in the context of digitalization of the economy. *Bulletin of Eurasian Science, 6,* 8.

Blinova, T. V., & Bylina, S. G. (2019). Development of digital services for the rural population of Russia. *Agribusiness: Economics, Management, 4,* 49-56.

Decree of the President of the Russian Federation No. 203 of 09.05.2017 "On the strategy for the development of the information society in the Russian Federation for 2017-2030"). http://kremlin.ru/acts/bank/41919

Kasenova, K. M., & Zhomartova, G. S. (2020). On digitalization of the agricultural economy of Kazakhstan. In I. A. Kolmogorov (Ed.), *Problems of Financial Management in the Digital Economy. Proceedings of the III International Scientific and Practical Conference of Students and Undergraduates Dedicated to the 55th Anniversary of the Altai Branch of the Financial University* (pp. 303-307). Kolmogorov.

Park, S. (2017). Digital inequalities in rural Australia: A double jeopardy of remoteness and social exclusion. *Journal of Rural Studies, 54,* 399-407.

Passport of the national program "Digital economy of the Russian Federation" (2020). http://static.government.ru/media/files/urKHm0gTPPnzJlaKw3M5cNLo6gczMkPF.pdf

Pavlov, A., Batova, V., & Popov, V. (2019). Introduction of digital technologies in the agro-industrial complex as a tool for ensuring sustainable development of rural areas. In I. Vylegzhanina (Ed.), *Proceedings of the 1st International Scientific Conference Modern Management Trends and the Digital Economy: From Regional Development to Global Economic Growth, Advances in Economics, Business and Management Research, 81* (pp. 340-344). Atlantis Press.

Rivza, B., Vasilevska, D., & Rivza, P. (2019). Impact of digital innovation on development of agriculture in Latvia. In L. Malinovska, V. Osadcuks (Eds.), *Proceedings of the 18TH International Scientific Conference Engineering for Rural Development* (pp. 682-687). Latvia University of Life Sciences and Technologies.

Rotz, S., Gravely, E., Mosby, I., Duncan, E., Finnis, E., Horgan, M., LeBlanc, J., Martin, R., …, & Fraser, E. (2019). Automated pastures and the digital divide: How agricultural technologies are shaping labour and rural communities. *Journal of Rural Studies, 68,* 112-122.

Rusanovsky, V. A., & Bylina S. G. (2019). Problems of digitalization of rural healthcare in Russia in the context of regional differentiation. *Economic Security and Quality, 2*(35), 27-33.

Tokarev, Y. A., & Persteneva, N. P. (2010). Dynamics of the informatization level of the economy in Samara region. In V. I. Koshkin (Ed.), *Scientific Research* (pp. 136-144). Samara Institute-Higher School of Privatization and Entrepreneurship.

Wang, J., Tigelaar, D. E. H., & Admiraal, W. (2019). Connecting rural schools to quality education: Rural teachers' use of digital educational resources. *Computers in Human Behavior, 101,* 68-76.