Digital economy development in the agro-industrial complex of the Russian Federation

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Abstract. In 2017, the digital revolution entered a crucial phase. Digital transformation is one of the main drivers of global economic growth. Today, Russia has a unique chance to realize its potential in the digital revolution and take its rightful place among its leaders. The paper describes the current level of digitalization on the example of agribusiness enterprises, and indicates the development path for the coming years. The forecast of the expected effect of digitalization implementation is given, as well as the need for modernization is explained. The problems that will allow agricultural producers to solve the transition to the figure are described. On the other hand, digitalization, like any change, carries risks for both companies and citizens. The paper considers the most likely of them.

1. Introduction

Digital agriculture is a set of economic activities (including financial security) on the cultivation, production, processing and storage of agricultural products, raw materials and food, as well as to provide services in these areas based on the application of science and technology (innovative technologies, platform solutions, automation and robotization of production processes and management procedures) to ensure a qualitative transformation of the productive forces of agricultural sphere, optimization of inter-industry and institutional relations, multiple growth of labor productivity with significant cost reduction, quality improvement and reduction of the cost of agricultural products, ensuring labor safety and achieving environmental safety of agricultural production [1].

Digitalization of agricultural production determines the development of the economic potential of rural areas and provides for rational land use and conservation of land, compliance with environmental standards of agricultural production [2]. The introduction of digital and other end-to-end technologies should be considered as a key element of increasing labor productivity in the economy. [3]In the Russian Federation, the opportunities for modernizing the agro-industrial sector are huge. Increasing the volume of agricultural production, which must be obtained by increasing the yield of vegetable crops (4), the development of export potential turn agriculture into an advanced branch of the economy and determine the return of Russia’s status as a leading player in the global food market. This need is also caused by the growing population of our planet, which, according to UN forecasts, will grow from current 7.7 billion to 9.8 billion people by 2050 [5].

The state position on the need to transition to digital economy has already been established and is generally supported by the government program “Digital economy of the Russian Federation” [6]. In April 2018, the Council for the Digital Economy Development was established under the Federation Council of the Federal Assembly of the Russian Federation [7].
2. Materials and methods
In the process of work, the methods of economic science are used: general scientific (dialectical, analysis and synthesis, comparison and analogy); special (system, comparative analysis, statistical-economic, economic-mathematical).

Official state statistics; normative legal acts of Federal and regional levels; data of the Ministry of Agriculture of the Russian Federation; reference materials of specialized publications on the subject under study; materials received from participants in the market of protected soil vegetables, their own research; Internet data (industry portals, sites of producers of protected soil products, articles and reviews) were the information base of the study.

3. Results
Currently, the transition to the digital economy (platform, gig-economy, IT-economy) is actively developing all over the world. In terms of digitalization of private companies, Russia still lags behind the leading countries. It is important for Russia to build up the potential of its own ICT industry, which will reduce critical dependence on imports and increase exports of digital technologies. The private sector does not take advantage of the active adoption of digital technologies by consumers, and does not invest much in using technological advances, improving productivity, and creating new products and services.

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According to Rosstat, in 2017, the level of investment in digitalization of the agro-industrial complex amounted to 3.6 billion rubles, or 0.5% of all ICT investments in all sectors of the economy, which is the lowest among the sectors of the economy [1].

| Table 1. Contribution of the digital economy to the GDP of countries, % [1]. |
|----------------------|-------------------|-------------------|
| Country              | Before digitalization | After digitalization |
| Great Britain        | 8.3                | 12.4              |
| China                | 5.5                | 6.9               |
| India                | 4.1                | 5.6               |
| Japan                | 4.7                | 5.6               |
| USA                  | 4.7                | 5.4               |
| Germany              | 3.0                | 4.0               |
| Austria              | 3.4                | 3.7               |
| France               | 2.9                | 3.4               |
| Russia               | 1.9                | 2.8               |
| South Africa         | 1.9                | 2.5               |
| Brazil               | 2.2                | 2.4               |

With the emergence of “big data” analytics, cloud technology, advanced and cheap sensors and mobile broadband, the development of artificial intelligence and the Internet of things, increasing distribution of service robotics objects in the last decade, in the last decade, conditions have developed for the formation of a new production system in the agricultural sector, based on automation of decision-making and minimizing human interference in production processes. For example, unmanned aerial vehicles can be used for many purposes, including soil analysis, seed planting, crop monitoring and processing, crop forecasting and harvesting. In Russia, the average speed of Internet access is quite high – 12 Mbit/s, which together with the available data transfer rates [8] makes this type of
communication available. According to experts, the introduction of technologies based on the Internet of things on average increases the efficiency of agricultural production by 20-30%, depending on the type of activity and the technologies of used culture and agricultural machinery [9]. This will be achieved, including by speeding up and reducing the cost of the production process, creating a base of reliable contractors, building optimal logistics chains for the movement of raw materials and finished products, while eliminating unnecessary intermediary links – all these are proven measures aimed at minimizing costs [10].

Today we come to understand that without the use of information technologies in the field, livestock farm, transport, transporting raw materials for processing and production, in the warehouse of finished products and in trade, it is impossible to ensure effective production and delivery of quality products to the consumer.

Now the program helps determine the best time to plant seeds, apply fertilizers, moisten or harvest, calculate the loading time of cargo delivery to the buyer, monitor the temperature in the storage and transportation area to avoid spoilage and deliver fresh and good products [11].

Super and hypermarkets account for 64% of the total market turnover in the Russian Federation. In Russia, the leading retail chains are X5 Retail group, Magnit, and Auchan, which provide 15% of the total turnover with food products. Today, there is a high probability that the market for food sales, including the Russian market, may be divided among a small number of major players, among which Russian companies will be in the minority. The development of domestic e-commerce platforms will help to change this situation. To stimulate domestic demand and consumption, it is necessary to develop various retail channels, that is, the development of multi-format retail trade, including the development of online trade, which involves increasing transparency and traceability of the commodity flow. Digital trade, which is part of the concept of digitalization, will eliminate falsification from the shelves, ensure confirmation of quality that meets international and national standards, and achieve a fair price for all participants (retail chains, manufacturers, consumers) [11, 12]. Now the latter problem is particularly relevant: at the end of 2018, the share of Russians who buy products with discounts reached 50.6%, and some retail chains have already thought about limiting their promotional activity [13].

As a result of the introduction of digital technologies in agriculture, a significant multiplier effect is expected not only in the agricultural sector, but also in the economy as a whole [14]. According to the McKinsey Global Institute, the Internet of things alone will bring in between $4 and $11 trillion annually to the global economy by 2025 [15].

Digitalization of agriculture will increase the volume of production; improve the quality and safety of food products. Blockchain technology will allow tracking the entire history of each product, and smart contracts will make it easier for small and medium-sized agricultural producers to enter the international market.

Unfortunately, at present, the process of digitalization continues to develop mainly at large enterprises in the industry. According to the level of information technology penetration in agriculture Russia ranks 45th place in the world [16]. Small businesses are still poorly informed about the possibilities of IT-technologies, although the situation has started to improve over the past few years. Even smaller businesses are limited in the means to acquire and apply new technologies. Also, in general, it is worth noting a significant spread of enterprises in the agro-industrial sector, even large ones, by the level of IT maturity. Obviously, this situation will continue for several years.

This is due to the high cost of modern technologies. Despite the high efficiency of precision farming AgroIoT, etc., the price factor is a serious limitation for their distribution both in the SMB segment and in the corporate segment. Moreover, such technologies require a sufficient number of trained personnel, which becomes another deterrent. IT-technologies themselves do not change much, being only a tool. Changing the business and technological processes of the enterprise is what can give real benefits and savings. Therefore, large projects in the industry involve significant time and resources spent on business engineering. This should be taken into account by companies that are engaged in large-scale implementation [17].
On the other hand, companies that are at the forefront of the digital revolution not only get significant benefits, but also carry increased risks. In the United States, during 1993-2013, those sectors of the economy where there was the most noticeable positive dynamics of profitability were also characterized by the active use of digital technologies. However, within these industries, the profitability indicators of leaders and outsiders differed by 2-4 times. In other words, the “winner-takes-all” principle works in the most digitally developed sectors of the economy. The introduction of digital technologies leads to tougher competition, creating threats for existing market leaders from new waves of innovation. Now this is happening before our eyes — after the introduction of digitalization, the order of providing banking services has changed, the markets for taxis, short-term rental of transport (from scooters to commercial) and housing have changed. The number of rental options available through the website of Airbnb, which was founded in 2008, have already exceeded the total number of rooms offered by the world’s three largest hotel chains, which have been operating for many decades. As digital companies take a leading position in a single market, they increasingly seek to develop related areas, which often become the main ones. This should be taken into account by agricultural producers in the medium and long-term planning.

Vegetable producers bear additional risks due to the conditions of use of modern agricultural machines. All data required for analyzing the state of fields is stored in the cloud (on the servers of the machine manufacturer). Although the data is not associated with specific agricultural producers, it is processed in a generalized form. In the future, their analysis can be monetized, including at the expense of agricultural producers. It is also worth paying attention to large companies, mainly related to the IT sphere, that diversify their business and enter markets that are not related to their main activities.

The frequency of new opportunities and threats, as well as the speed of their penetration into markets, continue to increase. Every year, new technologies enter our lives faster, and companies have less time to implement them. As a result, the usual structure of industries is changing: the share of innovative companies in many sectors has already reached 10-20% and will grow rapidly in the coming years. In the total profit of the top 500 American corporations in 1997, the share of technology companies accounted for about 9%, in 2017 - 17% already. Such changes occur everywhere, so that the use of a full range of innovative levers becomes a prerequisite for leadership and a guarantee of sustainable competitive advantage.

There are also risks for citizens. From 1990 to 2014, the capitalization of the three largest companies increased by 30 times, while the number of employees decreased by 10 times [18]. Experts in digital technology and economy agree that automation will significantly affect the labor market in the coming decades. According to estimates of the McKinsey Global Institute, up to 50% of the world’s work processes will be automated by 2036. This will result in significant staff release, a reduction in the number of jobs requiring average qualifications, and an increase in the difference in pay levels. Digital companies show the greatest growth in wages, but their share in the overall structure of the economy is small in terms of the number of jobs. Robots are replacing workers on conveyors, and information systems are beginning to perform operations that were previously the responsibility of accountants, secretaries, and other office professionals. Developed countries have been already discussing actively what measures should be taken in this regard: to conduct mass retraining, establish a guaranteed basic income, or introduce a tax on robots proposed by Bill Gates. In some countries, certain measures of this nature have already been implemented as an experiment.

Some agribusiness enterprises have been already undergoing significant changes in the structure of employees. On modern farms, automatic systems milk and weigh cows, which significantly reduce the number of employees, and in the fields robotic tractors perform the necessary operations without the presence of a person.

However, digital technologies also have a positive impact on the labor market. For example, digital platforms create new employment opportunities. They help to develop additional skills and improve abilities, especially for people who previously did not have such opportunities due to social or geographical restrictions. Due to the development of Internet platforms, the mobility of employees
increases. Digital technologies allow residents of remote localities to get high-quality education, improve their skills and find a job, without limiting the opportunities that exist locally. There are new professions and well-paying jobs related to the digitalization. According to the forecasts of the United Nations and the Federal State Statistics Service, the number of working-age population in Russia will decline in the next two decades [19]. Automation will help mitigate the negative effects of this phenomenon. In such circumstances, “digital” personnel is a strategic asset. Its lack inevitably leads to a slowdown in the growth rate of both the digital economy and the country’s economy as a whole.

During the implementation of the national program “Digital economy of the Russian Federation”, it is planned to solve the tasks of training all categories of personnel for the digital economy at all levels of education. Over five years, 143 billion rubles will be allocated for these events. It is planned that from 2019 to 2024, at least 120 thousand people will be accepted to higher education programs in the field of information technology, 10 million people will be trained online in digital literacy programs, and 1 million people will be admitted to the state system of personal digital certificates.

For example, ventilation, light mode, vaccination, and feed feeding have already been automated at some enterprises, in particular at the “Sakhovat broiler” poultry farm in Uzbekistan. Commercial Director of the company Timur Khadzhimuratovich Gasiyev at the conference “IT in the service of the agro-industrial complex of Russia”, held on June 10-11, 2019 in Moscow, expressed confidence in the possibility of remote farm management from a tablet.

Digitalization is transforming the social paradigm of people’s lives. It opens up unprecedented opportunities for obtaining new knowledge, expanding horizons, developing new professions and improving skills. Geographical horizons of opportunities are expanding. Due to more comfortable cities, efficient public institutions and affordable public services, the conditions of everyday life of citizens are improving. States that are committed to innovation and research attract qualified personnel as a magnet – a key resource of digital economies. It should be noted that the country’s GDP grew by 7% from 2011 to 2015, and the volume of the digital economy increased by 59% over the same period – by 1.2 trillion rubles in 2015 prices [20]. Thus, over these five years, the digital economy accounted for 24% of total GDP growth.

4. Summary
Digitalization of the economy can significantly increase the competitiveness of any industry in a short period of time. In the near future, the competitiveness of companies will be determined by the level of their digitalization. In the pre-digital era, savings on scale were achieved by building large production complexes. The deployment of such facilities requires significant time and resources and carries significant incremental costs. As for digital companies, the combination of low incremental costs with easy scalability of IT platforms allows the most successful of them to reach previously impossible scales in record time.

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