DIGITAL AGRICULTURE AS A DRIVER OF INNOVATIVE DEVELOPMENT OF AIC

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SUMMARY

The relevance of this article is due to the fact that new drivers for the development of agriculture in Russia are needed in the country's agro-industrial complex. Certain successes have been achieved in the industry in recent years, at the same time competition in food markets is increasing, economic sanctions and restrictions in promoting Russian products to foreign markets continue. In the agricultural sector there is a low level of labor productivity and a high dependence on technology imports. The possibilities of modernization of the agro-industrial complex are enormous, there are real needs for innovation. The introduction of information technologies in the framework of the Digital Agriculture project proposed by the Ministry of Agriculture of the Russian Federation can contribute to solving these issues.

KEYWORDS

Agriculture, innovation, modernization, digital economy, land relations, smart field, smart farm, information technology

Agricultural innovation is a continuous process in which new or existing products, technologies, and processes are used to improve efficiency, productivity, and competitiveness in the agricultural sector. Thus, innovation makes a significant contribution to food security, economic and social development of the Russian Federation.

The Decree of the President of Russia "On the national goals and strategic objectives of the development of the Russian Federation for the period up to 2024" of May 7, 2018 set the task of transforming priority sectors of the economy and the social sphere, including agriculture, through the introduction of digital technologies and platform solutions.

Figure 1 shows that Russia is seriously lagging behind the growth rates of the digital economy in most G20 countries.

Fig. 1. Growth in the share of the digital economy in GDP (materials of the analytical center of the Ministry of Agriculture of Russia)

Страна	2010	2016
Великобритания	8,3%	12,4%
Южная Корея	7,3%	8,0%
Китай	5,5%	6,9%
Индия	4,1%	5,6%
Япония	4,7%	5,6%
США	4,7%	5,4%
Мексика	2,5%	4,2%
Германия	3,0%	4,0%
Саудовская Аравия	2,2%	3,8%
Австралия	3,4%	3,7%
Канада	3,0%	3,6%
Италия	2,1%	3,5%
Франция	2,9%	3,4%
Аргентина	2,0%	3,3%
Россия	1,9%	2,8%
ЮАР	1,9%	2,5%
Бразилия	2,2%	2,4%
Турция	1,6%	2,3%
Индонезия	1,3%	1,5%

The Ministry of Agriculture of Russia submitted to the Government a departmental project "Digital Agriculture". It is planned that due to the implementation of this project, significant qualitative changes will take place in the agro-industrial complex.

Objective of the project: digital transformation of agriculture through the introduction of digital technologies and platform solutions to ensure a technological breakthrough in the agricultural sector and the achievement of productivity growth in the "digital" agricultural enterprises by 2 times by 2024.

In turn, analysts at McKinsey predict that by 2025, the digitization of the entire Russian economy may increase the country's GDP from 4.1 to 8.9 trillion rubles. Digital economy in the country could reach 8-10% of GDP.

The new generation of information and communication technologies (ICT) consists of big data, robotics, electronic systems M2M (machine to machine), the Internet of Things (IoT), artificial intelligence (AI), blockchain and cloud computing. The role of ICT in agriculture is particularly important: it is a regulatory and public base; financial services and agricultural insurance; new opportunities in the development of small agribusiness; food safety and food quality control; access to new knowledge and innovations; links between academic science, education and participants of the agricultural market. One of the most important digital solutions is sustainable agriculture with wide access to high-tech methods of agricultural production, plant protection, animal health and soil fertility conservation.

Innovation in agriculture covers all aspects of the production cycle throughout the value chain. As an example, Figure 2 analyzes the losses in the production of grain crops.

Fig.2. Diagram of the life cycle of products of the AIC (data McKinsey & Company)

It should be noted that just new technologies do not solve all the problems of agriculture. Effective digitalization requires professional staff, which in turn will require higher education institutions to train new information technology specialists and expand the competencies of graduates of traditional agricultural specialties: agronomists, machine operators, veterinarians, and livestock breeders.

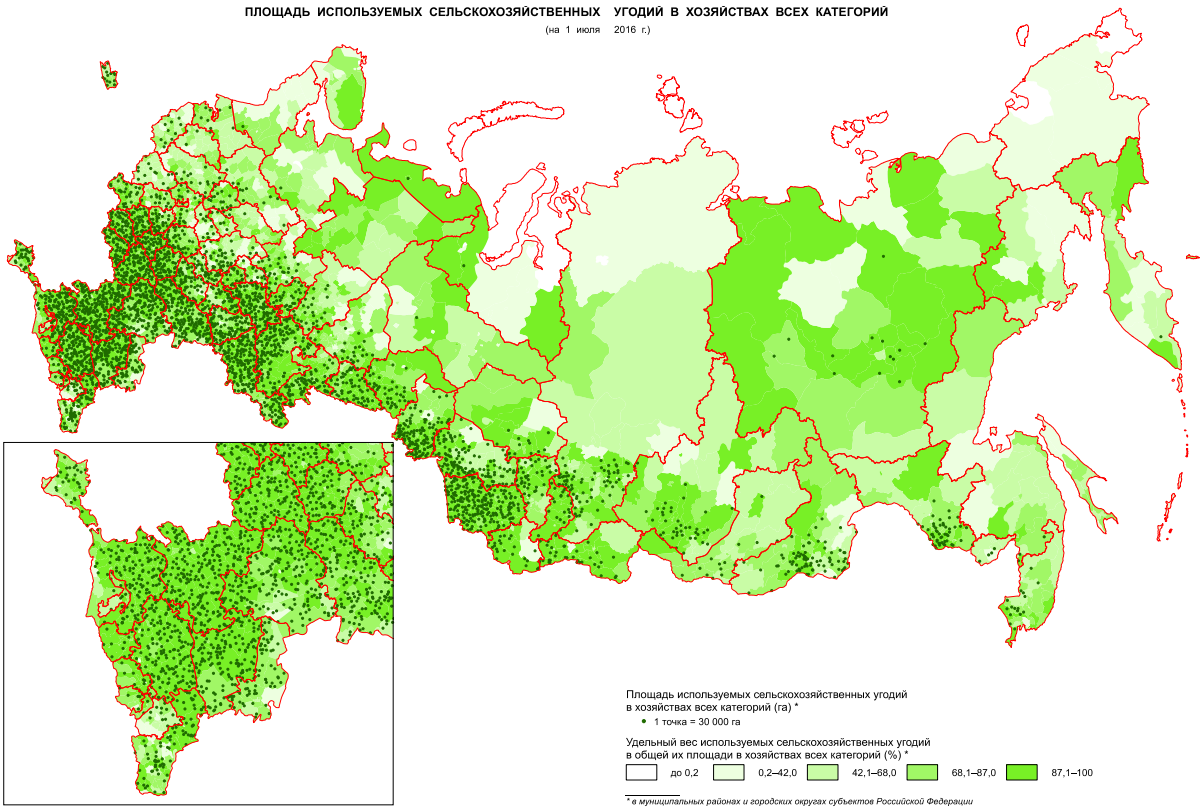
The Ministry of Agriculture of Russia proposes to develop three key digital platforms that are planned to be actively developed and implemented in the agricultural sector. First, the "Smart Farm" is a robotic agricultural facility for breeding animals of meat and dairy breeds, which does not require the constant physical presence of the operator, breeder or veterinarian. "Smart Farm" independently analyzes the economic efficiency of production, the situation in the consumer market, the income level of the population and other socio-economic indicators. For this, the platform uses artificial intelligence, Internet of things, big data, neural networks. Secondly, the "Smart Greenhouse" is an autonomous, robotic agricultural facility for receiving crop production, which minimizes the participation of the operator, agronomist and engineer. The platform analyzes the economic component taking into account the costs and consumer demand, controls environmental regulations and sanitary requirements, uses IT-technologies, takes into account assessments of various hybrids and plant varieties, analyzes the quality of soils. The introduction of new technologies will provide an opportunity to increase crop production in greenhouses, increase the efficiency of using substrates and fertilizers, significantly reduce energy consumption and production costs and improve the nutritional value of vegetables.

Thirdly, "Smart field" or "Effective hectare". This is a highly intelligent platform that continuously analyzes all information about the current state of agrobiocenosis, quickly makes management decisions and autonomously implements them with automated technical tools. The "smart field" can analyze soil and climatic conditions, independently makes the choice of crops depending on the goals: increasing the production volume or increasing profitability, changes the plant nutritional regime if necessary, carries out constant phytosanitary and maintenance work.

Now the market of digital technologies in the agro-industrial complex is already more than 360 billion rubles. According to experts, this market should grow 3-5 times in the next 10-15 years and this will allow the agricultural business to reduce production costs by 23%. It is very important that the average savings in total costs for land management with the use of GPS navigation technology is 11-14%; savings with a differentiated, balanced fertilizer application - 8-12%.

New technologies significantly clarify the situation with the state of the land and land use. At the Department of Economic Theory and Management of the State University a number of scientific studies were conducted on the topic: “Creating Public Information Systems for Land Management”. Research materials have shown that, despite the impressive legal framework for agricultural land, there is a persistence of problems in creating organizational and economic mechanisms for regulating land relations in agriculture of the Russian Federation. To obtain relevant and reliable information on the state of fertility of land used for agriculture, it is necessary to conduct a qualitative assessment, inventory and certification of land, further development of state accounting of soil fertility indicators (monitoring), including through improving the legislative regulation of the state function. A general land inventory is needed, which has not been conducted in Russia for many years. Information of Rosstat on the area of agricultural land used in the census in Figure 3.

Fig.3. Area of agricultural land used (materials of Rosstat)



The Ministry of Agriculture of Russia, within the framework of the implementation of the departmental project “Digital Agriculture” and, using big data technologies, proposes to create global information systems: The Central Information and Analytical System of Agriculture (CIAS CX) is an information bank integrated with the information systems of the Ministry of Agriculture of Russia, Rosstat, the Federal Customs

Service, RosHydromet, with analysis functions for operational monitoring of the state and development of AIC facilities. The Unified Federal Information System for Agricultural Lands (UFIS AL) is a system filled with up-to-date and reliable information about agricultural lands, including information on the location, condition and actual use of each land plot in the regions of Russia, on agricultural crops and on the state of agricultural vegetation in real of time.

Global digital networks and “smart fields and farms”, the latest achievements of genetics and breeding, molecular biology and biotechnology - all this is being actively introduced into agriculture, becoming not just a new technological base of agricultural production, but also the driver of the entire agricultural complex of Russia.

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