Digital Agriculture: "Internet of Things"

Ustinovich Elena Stepanovna[1]*, Boldyreva Tatyana Petrovna[2], Imomov Shavkat Jaxonovich[3], Nuritov Ikrom Razhabovich[4] and Imomova Nodira Shavkatovna[5]

[1]Doctor of Political Science, Associate Professor; Head of the Department of Economics, Management and Humanities, Kursk State Agricultural Academy named after I.I. Ivanova. Russia

[2]Associate Professor of the Department of Economics, Management and Humanities, Kursk State Agricultural Academy named after I.I. Ivanova, 70 Karl Marx, Kursk, 305004, Russia

[3]Bukhara Institute of Natural Resources Management of "Tashkent Institute of irrigation and agriculture mechanization engineers" the National Research University, Republic of Uzbekistan 32 Kori Gazli street, Boxor city 200100, Uzbekistan

[4]Associate Professor of the Department of Tractors and Cars Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, 39 Kori Niyoziy street, Tashkent city 100000, Uzbekistan

[5]Assistent Automation and control of technology process Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, 39 Kori Niyoziy street, Tashkent city 100000, Uzbekistan

*Corresponding Author: Ustinovich Elena Stepanovna, Doctor of Political Science, Associate Professor; Head of the Department of Economics, Management and Humanities, Kursk State Agricultural Academy named after I.I. Ivanova. Russia.

Abstract

The modern state policy of the Russian Federation in the field of information technology is gradually covering the sectors of the economy. Digitalization has become a trend, first, in the economic sphere and sectors of the economy. Since 2017, the state program "Digital Economy" has been implemented in Russia. One of the promising areas of application of information and digital technologies in Russian agriculture and the implementation of the state program is the "Internet of Things".

Keywords: Government policy; information technology; digital technologies; digitalization of the economy; agriculture; "Internet of Things"

Introduction

The role of agriculture will undoubtedly increase in the coming decades. The growing population of the planet will lead to the problem of growing demand for food. It will be possible to solve it by increasing the productivity of agricultural production.

The use of technological innovation is not uncommon in agricultural production. Manual labor prevailed until the end of the industrial revolution, and in the 19th century, elevators, mineral fertilizers and tractors appeared. The further development of scientific and technological progress was facilitated by the fact that already at the end of the twentieth century; agricultural producers used the data of agricultural satellites to obtain the necessary information.

The purpose of this article is to assess the benefits of using the "Internet of Things" technology and the level of use of this technology in Russian agriculture.

Analysis of the literature on the topic

This article uses the current scientific publications of Russian scientists of the last few years on topical issues of digitalization in Russian and foreign countries.

Note that digitalization, the development of the digital economy, the digitalization of agriculture in recent years have become trends not only in economic development, but also in scientific research.

I.B. Manzhosova [1, 2] studied conceptual and methodological aspects of the "digital economy". Many scientific researchers [3, 5, 6, 8-15] and others have devoted their scientific works to the digitalization of agriculture in Russia and in foreign countries.

L.K. Chekueva and R. Kh. Tashmatov considered the problems and advantages of using modern information and digital technologies in agriculture.

However, it should be noted that the practical problems and the rapid spread of digitalization in the field of agricultural production require further scientific research.

Research Methodology

The article uses data from official documents reflecting the state of the state policy on the development of the digital economy, conceptual and methodological justifications and the main directions of digitalization. Analyzed the scientific results contained in the scientific articles of economists and political scientists. The main research method used in this article is interdisciplinary political and economic analysis.

Analysis and Results

The beginning of the XXI century was marked by the emergence of the Concept of the "Internet of Things". Publications appeared in the world media about the future technological revolution, which has a huge impact on the life of humankind.

IoT technologies are used in various sectors of the economy and agriculture. The study of opportunities and prospects, the use of "Internet of Things" technologies in agriculture of our country is especially important now.

Unfortunately, agriculture is seen as a subsidized industry. However, the use of the most modern technologies has a chance to completely change it, significantly increasing efficiency and turn it into a high-tech and highly productive sector of the economy. This circumstance has become the reason for the need to study the current state of affairs regarding the application of the "Internet of Things" technologies in agriculture, both at the present stage and in the future.

The Internet of Things (IoT) is an environment where objects, animals or people are equipped with unique identifiers that are capable of transmitting data over the Internet without human-to-human or human-computer interaction. This concept became popular in 1999 with the Auto-ID Center at MIT.

More than 13.4 billion devices were connected to the Internet as part of the "Internet of Things" in 2015. It is estimated that by 2022 their number will increase by 185% to 38.5 billion devices.

Almost every sphere of modern life of society uses the possibilities of the "Internet of Things"; the future of the service sector is also inextricably linked with it.

In our country, at the government level, there is still no program or concept for using the capabilities of the "Internet of things", despite the adoption in 2017 of the digital economy program [2]. Only the resolution "On measures for the development of the digital economy in the Republic of Uzbekistan" was adopted [four].

The State Program of the Russian Federation "Digital Economy", the departmental project of the Ministry of Agriculture of the Russian Federation "Digitalization of Agriculture" provides for the use of the following digital technologies (see Table 1):

Technologies	Opportunities	Obstacles
Big data	There is an ongoing need for big data in agriculture, and this end-to-end technology will be widely used in the digital big data platform, and this end-to-end	Ownership of Big Data
Augmented reality block chain	In agriculture, block chain technology is used to implement distributed databases for transactions in the sale and lease of land plots and to solve other problems.	Cybersecurity, lack of legal regulatory framework
Smart farm	In agriculture, they are used to control the accuracy of fertilization, predict adverse natural events, and improve the quality of growing products and more open interaction between farmers and consumers.	High cost of technology implementation, lack of necessary knowledge among farmers
Quantum technology	These technologies are in the process of formation	Lack of specially trained personnel
Internet of Things (IoT)	IoT is already used in the agro-industrial complex, and this technology is increasingly being used	Cybersecurity, lack of legal framework, standards
Robotics	In agriculture, machine systems and robots will soon replace workers in many specialties.	Difficulties in maintenance and repair of robots, lack of specialists
Wireless communications	These technologies are especially important for agriculture, since its infrastructure and production facilities are geographically remote.	Uneven wireless coverage in rural areas
Virtual	These technologies can be used in the process of training specialists.	

Table 1: Possibilities of using and obstacles to the implementation of technologies of the departmental project "Digital Agriculture".

Let us emphasize that in agriculture the situation is complicated by the fact that the effectiveness of activities is largely outside the influence of humans. In addition to market conditions, other variables also affect agricultural production.

The use of digital technologies creates conditions for overcoming the negative impact of these factors.

The use of technologies of the "Internet of Things" makes it possible to maximize the size of the yields obtained.

The main task of information technology is to maximize the automation of all production processes. The use of new technologies contributes to the fact that agricultural producers increase the quantity, quality, efficiency of resources in the process of agricultural production [2, 16-19]. Technologies of the "Internet of Things" make it possible to process large amounts of information and create opportunities for making informed decisions. An example of such a technology would be the use of GPS navigators and sensor sensors located on agricultural vehicles, such as tractors, to generate real-time data and send it to cloud storage for further processing.

Today's generation is witnessing the beginning of revolutionary changes in agriculture [16-24]. We are talking about a new generation of Agro technology - the so-called precision farming.

The scientific concept of precision farming became possible because the surface within one field is not uniform. These irregularities can be identified and evaluated using macro imagery, satellite imagery, global positioning systems such as GPS, and special sensors.

Analysis and processing of the information received is carried out using special programs based on geographic information systems. The results of the use of precision farming is a decrease in the cost of fertilizers, plant protection products and an increase in productivity [25-27]. The process of further introduction of precision farming into practice will be determined by the ability to overcome obstacles along the way. These obstacles are both technological and market-driven.

One example of IoT technologies is robotic flying vehicles, or so-called drones.

Thanks to a modern mapping and geolocation system, drones can fly around fields every day. Unlike airplanes used to analyze field conditions, drones can fly several meters above crops and even operate in the dark.

Other advantages of using drones include:

- Wide potential in predicting the state of crops. Thanks to drones, they collect and process data much more accurately, and this has a positive effect on yields and profitability;
- unlike traditional fertilization from one end of the field to the other, the use of drones makes it possible to find out what the condition of plants is in a particular place at a certain time with an accuracy of square meters of sown area and, in accordance with their condition, whether it is necessary to apply treatment.

Drones equipped with infrared cameras, growth sensors, pollination modes collect information about the state of seedlings and soil;

- The study of the state of crops occurs at the stages of planting and harvesting, and less attention is paid to the intermediate state of the sprouts. Thanks to the use of drones, there will be no need to work in the field with special measuring instruments, which, undoubtedly, is quite tedious (especially in hot summer weather). In addition, data on the state of crops can be received at any time of the day.

Large agricultural holdings have the greatest opportunities to invest in the latest technological developments.

However, despite the powerful market for agricultural products, there are no investment funds in our country, that have invested in aggrotech startups. Nevertheless, individual investments in this sector have been made. In addition to investments carried out by agricultural holdings, domestic IT companies are also investing in new technological developments.

The main directions of development of agriculture in the future will be organic and eco logical products [23, 24, 28, 29]. The Internet of Things technologies will add to their effectiveness, with the help of which it is possible to obtain information about soil moisture, the optimal ratio of feed for livestock, harvesting and yield. The use of Internet of Things technologies will take agriculture to a new level.

Analysis and Results

"Smart" technologies in the global agriculture are already becoming commonplace, and in our country the level of application of the "Internet of Things" technologies remains rather low.

Due to the significant income, domestic agricultural holdings have the financial opportunity to invest in the development and creation of innovative products. They are the main investors and buyers of such products, realizing the benefits of the latest technology.

Findings

Harnessing the power of the Internet of Things lays the foundation for transforming the state into one of the world's largest food producers.

Digital agriculture of the Internet of Things, large-scale measures are being taken to develop the digital sector of the economy and agriculture, electronic document management systems are being introduced, electronic payments are being developed, and the regulatory framework in the field of electronic commerce is improving. Digital agriculture. Operating on information technology platforms is developing at an intensive pace, which requires the creation of new models of such platforms. Block chain technologies (technologies of a distributed data register), artificial intelligence, the use of the capabilities of supercomputers, as well as activities with crypto assets are one of the areas of development of the digital economy in many countries of the world. Block chain technologies are gradually being introduced not only in many sectors of agriculture, but also in the system of government and other social relations.

Agriculture is becoming the most important area for using the most modern digital technologies.

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