IMPLEMENTATION AND DEVELOPMENT OF DIGITAL TECHNOLOGIES IN AGRICULTURE

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Abstract: *This article reveals the concept and essence of implementation and development of digital technologies in agricultural sphere, considers its impact on the agriculture: to feed a growing population, to meet the demand for quality food products and services, on improving the efficiency and profitability of agriculture.*

Keywords: *digitalization, information technology, cluster-network system, cloud technology, agriculture, agro product, digital economy.*

Introduction

Currently, the introduction of the digital economy in the Republic of Uzbekistan is indeed a serious driver of effective growth for the economy of our country. Our country's high intellectual potential, well-developed telecommunications infrastructure, efficiently operating high-tech enterprises form the necessary environment for the introduction and further development of an innovative economy.

In this regard, digital transformation is one of the main trends in the global economy. Advanced countries have already developed a number of tools to get away from the trivial methods of doing business and public administration, and are successfully using them in practice. The relevance of the chosen topic is due to the fact that the Republic of Uzbekistan is only embarking on the path of creating the economy of the future, and therefore the term “digital economy” may not be fully understood. The starting point for the development of the digital economy in our republic can be considered the Message of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev in his message to the Oliy Majlis “... it is necessary to launch a large-scale system program for the development of the economy of a new technological generation, the so-called digital economy” [1].

The easiest way for digital transformation is in the high-tech industries associated with the development and distribution of software. In addition, the financial sector and the service sector are rapidly modernizing. Among industrial enterprises, noticeable progress is seen in the chemical industry, mechanical engineering, FMCG production. Almost all industries are inevitably involved in the global digitalization process [2].

The modern economy is post-industrial, and it is often called the new, innovative, economy of knowledge, competencies, network interaction. It should be noted that this series of definitions, on the one hand, has different meanings, and on the other hand, characterizes the same period of economic activity. The combination of two industries - the agro-industrial complex (AIC) and software development (software) - opens up great opportunities for Uzbekistan.

As it is considered, agriculture is not attractive because of the long production cycle, which was exposed to natural risks and large crop losses during cultivation, harvesting and storage, the inability to automate biological processes and the lack of progress in increasing productivity. and innovation. The use of information technology in agriculture

was limited to the use of computers and software, mainly for financial management and business tracking. Not so long ago, farmers began to use digital technology to monitor crops, livestock and various elements of the agricultural process.

Technologies developed, and a sharp leap in attention to the segment occurred when technology companies turned their attention to agriculture, which, together with partners, learned to control the full cycle of crop production or livestock production using smart devices that transmit and process the current parameters of each of them, the object and its environment (equipment and sensors that measure the parameters of soil, plants, microclimate, animal characteristics, etc.), as well as unhindered communication channels between them and external partners. By combining objects into a single network, exchanging and managing data based on the Internet of things, increasing computer performance, developing software and cloud platforms, it became possible to automate the maximum number of agricultural processes by creating a virtual (digital) model of the entire production cycle and creating interconnected chain links, as well as with mathematical precision, plan a work schedule, take emergency measures to prevent losses in case of fixed the risks, calculate the possible yield, production costs and profits.

Research methodology

During the research there have been used a number of methods, including comparative analysis, logical analysis, analysis and synthesis, induction, deduction methods. The research methodology of given article is conducted with quantitative data. It can be seen, the article is written to prove basic fundamental-theoretical aspects of the cotton industry entities and how to manage them in order to minimize the expenses and receive more profit for the company. Furthermore, quantitative methods are based on data that can be objectively measured with numbers.

Analyses and results

“Goldman Sachs predicts that next-generation technology can increase global agricultural productivity by 70% by 2050” [3].

Agriculture is on the verge of the Second Green Revolution. Experts estimate that thanks to precision farming technologies based on the Internet of things, a surge in yields of a scale that mankind has not seen even at the time of the advent of tractors, the invention of herbicides and genetically modified seeds.

The world's population is growing. In 30 years, humanity will need 1.7 times more food than it produces now. For this purpose it is necessary to modernize agriculture seriously.

According to UN forecasts, the world population by 2050 will reach 9.8 billion people, to feed it, it is necessary to increase food production by 70% [4].

This means that farmers must change the production processes, make them as efficient as possible. The technologies have evolved, became cheaper and have advanced to such a level that for the first time in the history of the industry it has become possible to obtain data on each agricultural object and its environment, mathematically accurately calculate the algorithm of actions and predict the result.

The industry, which was the farthest from IT, began to receive data. And with them inquiries for vacancies of specialists in the field of Big Data, Data Science, mathematics, analytics, robotics.

Digitalization and automation of the maximum number of agricultural processes is included as a conscious need for a development strategy for the largest agro-industrial and engineering companies in the world.

By 2010, there were no more than 20 high-tech agricultural companies in the world, and for the period 2013-2016. Investors have already invested more than 1,300 new technology startups totaling more than $ 11 billion in 4 years. A new investment segment, AgroTech (Agrotech), was formed, which in 2014 overtook FinTech (Fintech). Moreover, Canada, India, China, and Israel are also notably active [5].

A long value chain of agricultural products and a large number of unresolved problems in the industry that can be solved using IT and automation is one of the main reasons for the investment attractiveness of the industry.

Nowadays elements and modern IT instruments in agriculture are [6]:

- SMT: GPS / Glonass trackers, fuel sensors
- Animal Activity Sensors / Boluses
- Personal Identifiers (RFID Cards, IButton)
- Parallel driving systems
- Precision farming systems
- UAV / Drones
- Smart weather stations
- Weight measuring instruments
- IP cameras
- Smartphones / Tablets
- Animal milking systems
- ERP systems

The concept and essence of the digital technologies in agriculture.

The standard processing schedule (continuous irrigation, fertilizer, chemicalization) do not take into account local characteristics and natural variability and lead to an ineffective result - over-use of resources or undetected problems. Drought or excess moisture, lack or excess of fertilizer, weeds and insects require immediate intervention. An outbreak of the disease may occur unexpectedly and it is not always easy to determine its cause; with late detection and mistreatment, the disease can destroy part of the crop.

During the season, the farmer has to make more than 40 different decisions: what seeds to plant, when to plant, how to treat them, how to treat a diseased plant, etc., how to cope with situations threatening the well-being of the field. The lack of information for decision making leads to the fact that in the process of planting, growing, caring for crops up to 40% of the crop is lost. During harvesting, storage and transportation another 40% is lost. Moreover, as scientists have revealed, besides the weather, 2/3 of the loss factors can be controlled today using automated control systems (Hi-Tech Management) [5].

The task of IT is to maximize automation of all stages of the production cycle to reduce losses, increase business productivity, and optimize resource management. But even in this case, the result applies only to plants ready for harvesting or animals, but does not guarantee profit, because the crop still needs to be collected, stored, carried out primary processing and transported to the buyer / consumer. Further automation represents a higher level of digital integration, which affects the most complex organizational changes in the business, but their implementation can dramatically affect

the profit and competitiveness of products and the company as a whole. Integration of the received data with various intelligent IT applications that process them in real time realizes a revolutionary shift in decision-making for the farmer, providing the results of the analysis of multiple factors and the rationale for subsequent actions. Moreover, the more sensors, sensors and field controllers are connected to a single network and exchange data, the more intelligent the information system becomes and the more useful information it can provide to the user.

According to experts in the Uzbekistan, the general level of automation and informatization of agricultural enterprises is not satisfactorily developed.

Even the elementary supply of farms with the simplest information technologies - a computer with access to the global information network "Internet" today is an overwhelming problem for Uzbek farms. Meanwhile, based on statistics, we can observe the following picture of the use of information technology in agriculture around the world (see table. 1).

Table 1.

Farmers using the information technologies (Data for 2018) [7]

Country	***Number of farms***	***Number of farmers using computers***		***Number of farmers using internet***	
		number	**%**	**number**	**%**
Norway	70 000	52 000	74.3	40 000	57.1
Denmark	60 000	48 000	80	30 000	50
Finland	80 000	50 000	62.5	40 000	50
Netherland	100 000	60 000	60	50 000	50
Switzerland	30 000	24 000	80	14 000	46.7
Great Britain	80 000	60 000	75	30 000	37.5
Germany	170 000	75 000	44.1	55 000	32.4
Japan	426 000	144 000	33.8	52 000	12.2
Spain	100 000	45 000	45	10 000	10
France	330 000	110 000	33.3	25 000	7.5
Italy	260 000	80 000	30.8	10 000	3.8
Poland	200 000	100 000	50	5 000	2.5
Czech	175 000	30 000	17.1	4 000	2.3
Russia	275 000	9 000	3.3	3 000	1.1

The table shows that the most intensive use of information technology occurs in the European Union. At the same time, the use of computers for communication with the global Internet rarely exceeds 50%. Many of the farmers work to provide food for themselves and their loved ones, and do not consider it necessary to increase the informatization and automation of their farms. But recently in the sphere of agro-industrial complex huge efforts on introduction of information technologies are made. First of all it concerns programs of optimization of placement of agricultural crops in zonal systems of crop rotation and rations of feeding of animals. Applied computer programs on calculation of doses of fertilizers, regulation of a mode of food of plants in greenhouses, and also on management of technological processes in processing and storage of meat and meat products are

developed. There are programs for the complex of land management and land management.

Currently, the Republic of Uzbekistan occupies the 76th place in the world in the development of the digital economy based on the BCG rating. The calculation of the BCG digitalization index is based on the growth dynamics of online spending and user activity. However, like most indices, the BCG digitalization index is a statistical indicator that has a share of conventionality [8].

Conclusions and recommendations

The agro-industrial complex (AIC) is the most important intersectoral complex. It was created to provide the population with food and is one of the main priorities of the economy. AIC is a complex bioeconomic production system. Its central link is agricultural production, the main resources of which, along with tools and labor resources, are land, climate, weather, which together constitute a bioclimatic potential.

In the world of digital technology, innovative technologies for effective management should be introduced in all spheres of life. New challenges in agriculture: to feed the growing world population, to satisfy the demand for high-quality food products and services are no less acute problems of increasing labor efficiency, profitability of the agricultural enterprise.

1. The digital economy has enormous potential for promoting economic development in all areas, as well as in agriculture.
2. The Internet significantly activates the existing markets for goods, services and labor, as well as the principles of the functioning of the agricultural sector.
3. Directions for further research are seen in the development of proposals to address the problems of digital transformation of the agro sector, in the development of a system for ensuring digital economic security.
4. For these purposes, the republic should work on the creation of technology parks, research and production clusters and other innovative projects, the widespread and accessible training of farmers of digital literacy, the introduction of digital technologies, ensuring the coverage of the country`s rural area with the Internet with a network of 5G or higher, and the introduction of electronic management in the activities of farms.
5. All these measures will require huge financial investments from the state, trained specialists to educate employees of farms and the population in the basics of the digital economy, but this is a dictate of the time and the requirements of advanced information technologies that will be put at the service of the people.
6. Thus, the Digital Uzbekistan-2030 program is not just another major state project of the country, it is an important aspect of the innovation activity of the Republic of Uzbekistan, the main purpose of which is not only to achieve a high level of development, but also to integrate and interact with developed countries of the world.

References

1. Speech of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev to Oliy Majlis, dated December 28, 2018 // People’s Word, dated December 29, 2018.

2. Odintsov S.A., Vashchenko A.V. The development of theories of the information society and the concept of "Cyber-space" // Political Mathematical Network Electronic Scientific Journal of the Kuban State Agrarian University. 2016. No. 121. S. 1-14.

3. http://www.goldmansachs.com›worldwide

4. http://www.un.org/en/sections/observances/united-nations-observances

5. http://www.tadviser.ru/index.php

6. http://agrarnyisector.ru

7.Чибисова И.С. Применение информационных технологий в сельском хозяйстве России.// Эпоха науки № 13 – Март 2018 г. Технические науки

8. North D. Institutions // Journal of Economic Perspectives. 2018.No.1.