



## MODERNIZATION OF AGRICULTURAL ENTERPRISES AND PROBLEMS OF USING DIGITAL TECHNOLOGIES IN AGRICULTURAL ENTERPRISES OF THE REPUBLIC OF UZBEKISTAN

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| Article history:  | Abstract:   |
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| <p><b>Received:</b> 28<sup>th</sup> October 2023<br/><b>Accepted:</b> 26<sup>th</sup> November 2023<br/><b>Published:</b> 30<sup>th</sup> December 2023</p>         | <p>The article discusses the digital transformation of the agro-industrial complex of the Republic of Uzbekistan. An analysis of foreign experience in introducing digital technologies in agriculture was carried out. The main tasks of digital transformation of the agro-industrial complex are presented. Key directions and initiatives will allow, with the help of data, to carry out the digital transformation of the agro-industrial complex using digital platforms. The digital platform will allow each participant to receive reliable, timely information about the promotion of goods along the entire chain from manufacturer to consumer. The analysis shows that the introduction of digitalization will allow, on average, to increase the volume of consumption of agricultural products in the republic.</p> |
| <p><b>Keywords:</b> Digitalization, agro-industrial complex, agriculture, digital platforms, digital transformation, digital farmer, technological development.</p> |   |

**INTRODUCTION.** The world community has already entered the era of digital globalization, which is driven by the flow of data, including data, ideas and innovation. Smart devices are smaller, faster, cheaper and more powerful, and are becoming the key to solving many problems.

Today, smart digital solutions can improve agricultural productivity and overcome sustainability challenges.

Modern agriculture in Uzbekistan is not yet one of the most innovative, but the agricultural sector is beginning to change under the influence of various bio- and nanotechnologies, using various genomic methods and varieties; Manufacturers are moving from a product model to a service model, connecting supply chains and tailoring their products to the needs of a specific consumer. And in each of these trends, digital technology plays an important role.

As noted by the President of the Republic of Uzbekistan in his Address to the Oliy Majlis, "First of all, it is necessary to completely digitalize the spheres of construction, energy, agriculture and water

management, transport, geology, cadastre, healthcare, education, and archival affairs.»<sup>1</sup>

It was also especially noted in the Decree of the President of the Republic of Uzbekistan "On the State Program for the Implementation of the Action Strategy in five priority areas of development of the Republic of Uzbekistan in 2017–2021 in the "Year of Development of Science, Education and Digital Economy" on the development of a Program of practical measures for the widespread introduction of digital technologies in agriculture..<sup>2</sup>

In accordance with the goal "transformation of priority sectors of the economy and social sphere, including healthcare, education, industry, agriculture, construction, urban services, transport and energy infrastructure, financial services, through the introduction of digital technologies and platform solutions," it is necessary to develop sectoral programs. [1]

An analysis of foreign programs and industry projects shows that in most cases, by digitalization or digital transformation, the authors mean mainly automation of management, including the management

<sup>1</sup> Mirziyoyev Sh.M. Message from the President of the Republic of Uzbekistan to the Oliy Majlis" 01/24/2020. <https://president.uz/ru/lists/view/3324>.

<sup>2</sup> Decree of the President of the Republic of Uzbekistan "On the State Program for the Implementation of the Action Strategy in five

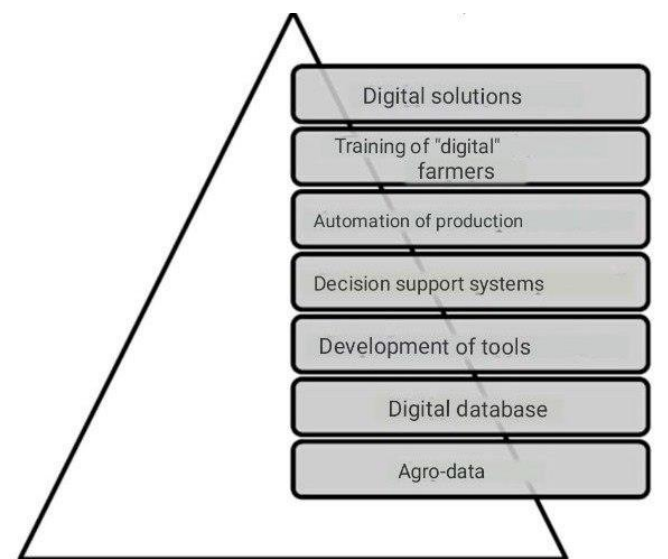
priority areas of development of the Republic of Uzbekistan in 2017–2021 in the "Year of Development of Science, Education and Digital Economy" dated 03/02/2020.

of technological processes, of course, based on new digital technologies, including BIG DATA, blockchain, artificial intelligence, robotization, etc.

In recent years, smartphones and broadband internet have become increasingly popular. Almost everyone has a very powerful computer and a stable connection to all types of data. Another technological breakthrough called digitalization has once again stimulated economic management and hopes to bring revolutionary improvements in economic and social systems. But historical experience does not give optimism. First of all, we must understand why previous efforts to introduce computer technology have not lived up to expectations. In particular, thanks to the increase in computer capacity hundreds of times, as well as significant networking and communication capabilities, government and corporate governance remains almost the same, very low, while the number of managers increases in most government and corporate structures?

In our opinion, the answer is to solve an almost identical problem at all stages of technological

development - automation of existing management processes. The task of changing economic and management models has not been set or solved. In this case, of course, local improvements were made, especially in process control, but there were no advances or changes. It follows that the digital transformation of business processes for economic growth should be aimed, first of all, at the introduction of new economic models and fundamentally new management systems that are possible or necessary for the transformation of digital technologies. Unfortunately, the terminology in the field of digitalization has not yet been fully developed. For those interested in different approaches to basic categories in this area, I can recommend an article by well-known experts in digitalization R. Bukht and R. Hicks.<sup>3</sup> For the purposes of correct prioritization, it is proposed to adopt the following formulations. We will refer to digitalization or digital transformation as the representation of real objects and processes in digital images that represent these objects in models and further interactions (Fig. 1).[3]



**Fig.1. Digital transformation of the agro-industrial complex.<sup>4</sup>**

The main task of the digital transformation of the agro-industrial complex is the integration of objective data flows, which consists of the following stages:

1. Agricultural data - primary data that is divided and not generated;
2. Digital database, including mapping, digitization, satellite data;
3. Development of equipment, including geoportal, mobile applications, etc.;

4. Decision support systems (analysis and big data);
5. Automation of production (robotic technology and introduction of elements of artificial intelligence);
6. Training of "digital" landowners (education and training of farmers of the new generation);
7. Digital solutions. The end result of addressing the entire digital transformation process will be digital solutions and its implementation. Key directions and initiatives (pilot projects) will allow, with the help of

<sup>3</sup> Bukh R., Heeks R. Defi ning, Conceptualising and Measuring the Digital Economy. Global Development Institute working papers. 2017. No. 68. URL: <https://diodeweb.files.wordpress.com/>

<sup>4</sup> Compiled by the author based on research.



data, to carry out the digital transformation of the agro-industrial complex using digital platforms.

Thus, digitalization of the agro-industrial complex is an integrated approach, from collecting and compiling data to training new types of specialists.

This definition emphasizes that digital data must be a "key factor" and its processing must "significantly improve efficiency." Of course, these conditions are very vague and difficult to verify. Meanwhile, when financing digitalization and digital economy programs, it is useful to have clearer rules. [2]

In this regard, the President of the Republic of Uzbekistan noted "that the formation of a digital economy will require appropriate infrastructure, huge funds and labor resources. But, no matter how difficult it is, we must definitely start this work today, otherwise tomorrow will be too late. Therefore, accelerating the transition to the digital economy will be our priority for the next five years."

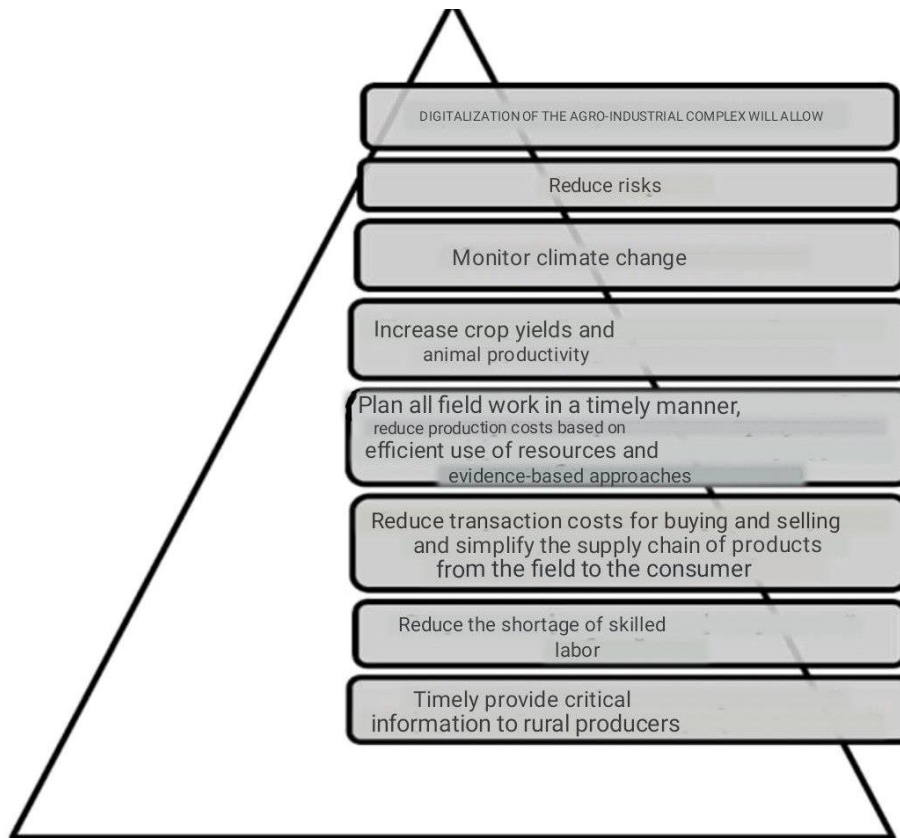
The key problem of farmers in Uzbekistan is that at least some technologies are becoming available only to large and medium-sized businesses. So far, not all farmers can use advanced solutions. However, digitalization tools will become cheaper, and the cloud is designed to make their use widespread.

In our opinion, for the agro-industrial complex of Uzbekistan to become truly digital, it is very important to stimulate communications between agricultural enterprises and innovative technology centers, and such a system should be built at a level closer to companies.

Many participants in the agricultural market today do not understand why they need this or that technology if they have a tractor driver who does everything perfectly without robots. Thus, companies responsible for technological development are not interested in investing in it due to lack of budgets.

The issues of digitalization of agriculture remain quite unexplored. It should be noted that few academic

economists have problems with the digitalization of the agro-industrial complex. These are scientific works of such authors as Tasueva T.S., Rakhimova B.Kh., Dagaeva Kh.Kh., Voronin E.A., Semkin A.G., Ilyinskaya I.N., Osipov V.S., Bogoviz A.V., Medennikov V., Muratova L., Salnikov S., Gorbachev M. Among the academic economists of Uzbekistan who are interested in the problems of digitalization of the economy, one can single out academician K. Abdurakhmanov, Sh.D. Kudbieva, A.Yu. Magrupov, U.P. Umurzakov and others. In this regard, it is of interest to study the features of the implementation and development of effective digital technologies in the agro-industrial complex to identify problems and promising areas of digitalization of the agro-industrial complex. An important issue for ensuring the sustainable implementation of modern digital technologies in the agricultural sector is the training of IT specialists. It is necessary not only to improve the qualifications of existing specialists, but also to open a specialty in agricultural universities for training specialists in the field of digital technologies for the agro-industrial complex. Carrying out research on this issue, we can conclude that the creation of reference digital models of production processes in the agricultural sector will improve the business efficiency of agricultural producers. (Fig. 2) The introduction of the Digital Platform will create a completely new model of economic behavior of agricultural producers and will give them additional income many times greater than all government support for the agricultural sector.[5] The digital platform will reduce the added value of resellers by 10%. The digital platform will allow each participant to receive reliable, timely information about the promotion of goods along the entire chain from manufacturer to consumer. This will increase the time frame for the return of funds and reduce bank rates, since banks will receive additional guarantees of return by receiving information about the goods pledged.



**Fig.2. The effect of introducing the digital economy in the agro-industrial complex. <sup>5</sup>**

Basically, the initiators of the digitalization of management systems in the global agricultural industry are industry world leaders. "For example, Enteligen for dairy farms from Cargill - this tool helps optimize daily operations for caring, feeding, and monitoring the health of dairy cows. The Pork MAX complex offers similar options for pig farms. The solution of the Israeli LR Group is used to collect information from sensors on animals, data from laboratories and veterinary services," says Nikitochkin. Certain experience, according to him, is already being adopted by Russian companies, for example, ANT is now developing a SmartPIG product, similar in functionality to Cargill.

The introduction of digital technologies in the agricultural sector must be approached selectively; not everything in the agricultural industry should be digitalized. Unlike many countries, there is not much land. There is a shortage of fresh water in the republic, and therefore it is necessary to introduce modern technologies in the collection and purification of rainwater and snow. It is also necessary to take into account the relative cheapness of labor.

Experts admit that comprehensive digitalization could reduce costs and final prices for food products. But for this we need to build an ecosystem of digital connections. Moreover, not only the processes within

agricultural production must be connected, but also suppliers of raw materials, sales, logistics, and transport links. [7]

As the President of the Republic of Uzbekistan noted, "The existing growth rates in the field do not satisfy us at all. Therefore, until we widely introduce market mechanisms into agriculture and increase the interest of farmers and farmers themselves, the expected breakthrough will not occur. In this regard, we will gradually switch to a system of purchasing cotton and grain based on market principles, abolishing the practice of state orders for the procurement of these products. If we do not follow this path, then our farmers and dekhkans will not be able to grow products freely and will not receive the expected income, and the khokims' working methods will remain the same.

The activities of the State Support Fund for Agriculture will be improved, and affordable loans will be allocated to other sectors of agriculture.

The Ministry of Agriculture must completely abandon such outdated methods of work as coordinating the activities of enterprises, distributing resources, and setting planned targets. On the contrary, it should turn into a service organization, providing services to private agro-industrial enterprises in assessing the condition of land, the optimal selection of

<sup>5</sup> Compiled by the author based on research.



crop varieties and seeds, pest control, financial assistance, and searching for markets.”

Today the terms “automation”, “information” and “digitalization” are often confused. At its core, digitalization is aimed at obtaining the maximum amount of primary data and building on its basis a real digital twin of an agricultural enterprise, as well as further aggregation and analysis of this data using the most modern methods and algorithms. Indirectly, the analysis of the data obtained should influence both informatization in terms of rethinking the built-up automated processes taking into account real data and their aggregation, and automation in terms of developing a strategy for saturating the enterprise with additional means of objective monitoring: sensors, control devices, etc. And one more thing that properly structured digitalization definitely allows you to do: play out different options for business development on a digital twin as close as possible to the original, which, in turn, can significantly reduce risks for the business.

Research has shown that comprehensive digitalization of agricultural production will allow farmers to reduce costs by 23%. Thus, the average cost savings when using land using GPS navigation technologies is 11-14%, with differentiated application of fertilizers - 8-12%, and thanks to parallel driving systems - 8-13%. With ineffective use of agribusiness tools, up to 40% of the crop is lost.

The analysis shows that the introduction of digitalization will allow an average increase in the volume of consumption of agricultural products in the republic.

Firstly, the inaccessibility of modern means of mechanization and automation for the vast majority of agricultural producers is the main reason for extremely low labor productivity and, accordingly, high unit costs of production. The transition from the model of selling agricultural machinery and automation equipment in ownership to the model of payment for their functions based on the actual volume or even the results of consumption, which is the basis of digital transformation, solves the problem of availability of equipment and, consequently, increasing labor efficiency. Since the level of productivity in the agricultural sector is insufficient, it may well increase by 3-5 times. [6]

Secondly, digitalization, due to its end-to-end nature, makes it possible to informationally link the needs of a specific end consumer and the capabilities of a specific agricultural producer, thus eliminating many unnecessary intermediaries, which now account for up to 80% of the retail price of a product.

On the other hand, farmers may face difficult challenges when adopting precision agriculture technologies. These include issues of integrating new systems with existing business processes, and the lack of a comprehensive solution that would ensure

automation and transparency of all business processes. A whole block of personnel issues arises: a lack of IT specialists adapted to the agricultural sector, a shortage of agronomists capable of working with computer programs and applications, low qualifications of farmers and their workers who will have to maintain new equipment. And the success of the entire process of digitalization of the agricultural sector in Uzbekistan largely depends on how quickly and competently these issues are resolved.

In this regard, the President of the Republic of Uzbekistan noted that in order to improve the level of qualifications of workers. “In 2020, through the El-Yurt Umidi Foundation, more than 700 scientists, professors and teachers will be sent abroad to conduct scientific research and improve their skills. In order to train highly qualified specialists in the field of information technology, together with our foreign partners, the “1 million programmers” project was launched. Modern information technologies need to be introduced at all stages of the education system. Considering that last year the work on connecting all cities and regional centers to high-speed Internet networks was completed, we should provide all villages and mahallas with this opportunity in the next 2 years.” [2]

**CONCLUSIONS AND OFFERS.** Thus, through the digital transformation of the agro-industrial complex of the Republic of Uzbekistan, it is possible to solve the following problems:

- ✓ *increasing labor efficiency;*
- ✓ *integration of information resources of ministries and regions of Uzbekistan to ensure global planning in the industry and provide accurate recommendations to market participants, including using artificial intelligence;*
- ✓ *provision of government services and portals for agricultural producers in order to create mechanisms and support measures for the introduction of digital technologies in the regional departments of the agro-industrial complex of Uzbekistan;*
- ✓ *integration of the functionality of the digital agriculture platform to ensure access of agricultural enterprises to government, banking and insurance products and development of a reverse interaction scheme (access of the listed structures to commodity-producing enterprises with their own offers;*
- ✓ *creating an environment to increase the transparency of agricultural markets for farms and consumers based on the traceability of both agricultural raw materials and final products (tags, chips, identifiers, technologies, devices, systems);*
- ✓ *stimulating developments and providing access to various digital open platforms (digital field, herd, management of equipment, greenhouses, etc.) for agricultural producers and developers;*



✓ provision of a package of personal data (matrix) and new information and technological solutions for market participants;

✓ introduction of online trading platforms and systems for promoting agricultural products (raw materials, semi-finished products, processed products), taking into account the size of the enterprise (farmers and personal subsidiary plots are not able to compete for profitable trading platforms);

✓ creation of a platform for the processes of generating proposals for adjusting regulations and regulatory and technical requirements for the transition to the digital economy;

✓ formation of educational and methodological platforms (standards, methods, training programs);

✓ increasing the export potential of agricultural products, ensuring the compatibility of processes and standards of production of Uzbekistan's products with global ones.

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