UZBEKISTAN AND FOREIGN EXPERIENCE OF DIGITALIZATION IN AGRO-INDUSTRIAL COMPLEX ENTERPRISES

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Аннотация

Hozirda mamlakatlarda qishloq xo'jaligi ishlab chiqarishida raqamli texnologiyalar asosiy o'rin tutmoqda. Raqamli texnologiyalar natijasida dunyo tobora ko'proq bog'lanib bormoqda. Bugungi kunda O'zbekistonda agrobiznes tushunchasi yangi bosqichga ko'tarilmoqda. Bu, o'z navbatida, sohaga sarmoya kiritilayotganidan, ishlab chiqaruvchilar o'rtasida raqobat kuchayib borayotganidan dalolat beradi. Shu bois raqamlashtirish mahsulotni yerga ekish uchun joy tanlashdan tortib, uni yetishtirish va iste'molchilarga yetkazib berishgacha bo'lgan jarayonda yuqori sifat, samaradorlik va shaffoflikka erishishda muhim ahamiyat kasb etadi. Shu bois agrosanoat korxonalarini raqamlashtirish bo'yicha o'zbek va xorijiy tajribani o'rganishga bag'ishlangan ushbu maqola dolzarbdir. Maqolada bir qancha mamlakatlarda, shuningdek, O'zbekistonda agrosanoatda qo'llanilayotgan raqamli texnologiyalar haqidagi statistik ma'lumotlar tahlil qilinadi va o'rganiladi.

Аннотация

В настоящее время цифровые технологии в сельскохозяйственном производстве играют ключевую роль в странах. Мир становится все более связанным благодаря цифровым технологиям. Сегодня концепция агробизнеса поднимается в Узбекистане на новый уровень. Это, в свою очередь, свидетельствует о введении инвестиций в отрасль и росте конкуренции среди производителей. Поэтому цифровизация важна для достижения высокого качества, эффективности и прозрачности процесса от выбора места для посадки продукта в землю до его выращивания и доставки потребителям. Поэтому данная статья, посвященная изучению узбекского и зарубежного опыта цифровизации агропромышленных предприятий, является актуальной. В статье анализируются и исследуются статистические данные о цифровых технологиях, применяемых в агропромышленном комплексе ряда стран, а также Узбекистана.

Abstract

Currently, digital technologies in agricultural production play a key role in countries. The world is being increasingly connected as a result of digital technology. Today, the concept of agribusiness is rising to a new level in Uzbekistan. This, in turn, indicates the introduction of investments into the industry and the growth of competition among manufacturers. Therefore, digitization is important to achieve high quality, efficiency, and transparency in the process from choosing a place for the product to be planted in the ground to its cultivation and delivery to consumers. Therefore, this article, dedicated to the study of Uzbek and foreign experience of digitalization in agro-industrial enterprises, is relevant. The article analyzes and studies statistical data about digital technologies used in the agro-industry in several countries, as well as in Uzbekistan.

Калит сўзлар

raqamli iqtisodiyot, raqamli texnologiyalar, innovatsiyalar, qishloq xoʻjaligi sanoati, biznes, samaradorlik.

Ключевые слова

цифровая экономика, цифровые технологии, инновации, агропромышленный комплекс, бизнес, эффективность.

Keywords

digital economy, digital technology, innovation, agricultural industry, business, efficiency.

Introduction

The agriculture sector is undergoing a transformation driven by new technologies, which seems very promising as it will enable this primary sector to move to the next level of farm productivity and profitability [1]. Precision Agriculture, which consists of applying inputs (what is needed) when and where is needed, has become the third wave of the modern agriculture revolution, and nowadays, it is being enhanced with an increase in farm knowledge systems due to the availability of larger amounts of data. The United States Department of Agriculture (USDA) already reported in October 2016 that Precision Agriculture technologies increased net returns and operating profits. Also, when considering the environment, new technologies are increasingly being applied to farms to maintain the sustainability of farm production. However, the adoption of these technologies involves uncertainty and trade-offs. According to market analysis, the factors that would facilitate the adoption of sustainable farming technologies include better education and training of farmers, sharing of information, easy availability of financial resources, and increasing consumer demand for organic food. When applying these new technologies, the challenge for retrieving data from crops is to come out with something coherent and valuable, because the data themselves are not useful, just numbers or images. Farms that decide to be technology-driven in some way, show valuable advantages, such as saving money and work, having an increased production or a reduction of costs with minimal effort, and producing quality food with more

environmentally friendly practices. The USDA reported that, on average, corn farm operating profit of Precision Agriculture adopters was 163 dollars per hectare higher than for non-adopters, taking into account that the highest adoption rates for three technologies (computer mapping, guidance, and variable-rate equipment) were on farms over 1500 hectares. Such margins can even go up to 272 dollars depending on the crop.

Literature Review

According to C.J.Hamelink the global information society, coupled with modern innovative capabilities, contributes to the digital transformation of countries, industries, and individual companies. Due to digitization, economic growth is achieved, and the competitiveness of goods and services increases. Given the significant scale and pace of digital transformations that take place today, the speed of responding to their main trends is a significant competitive advantage. In common practice, one of the most successful tools of information and communication technologies determines digitalization [2].

Scientists N.Shpak, and Z.Dvulit mentioned that digitalization is a necessary process for the development of modern organizations. Its main task was to simplify and accelerate the work with large data sets, automate the activity of the enterprise, and establish communications with the external environment. However, there are several major obstacles to implementing the digital business model of an organization based on digitalization. These include the lack of a digitalization strategy, a low level of staff competence in this area [3], fear of change, lack of funding, low level of thinking, and the needs of Internet customers. Modern organizations are not yet able to simultaneously use all the directions and possibilities of digitalization. Most often, they use only individual technologies, and as a result, such a situation negatively affects the development of the enterprise and reduces its competitive advantages.

Scientists Oksana Zghurska and Olena Korchynska discussed that the digitalization of the agroindustry contributes to a significant reduction in production and transaction costs and a significant increase in the level of financial affordability of food, ensuring the rational use of the potential of natural resources and efficient nature management.[4] The introduction of digital technologies in the agricultural sector is possible only through the application of a program-target approach, as well as by improving the efficiency of industry management at the state level.

According to M.K.Abdullayev in modern management one of the most vital issues challenged by the management of a company of a voluntary character is the rational use of information systems in the development of management decisions.[5] The level of rapid development of the economy requires from information systems to provide final users with the accurate and reliable information in a timely manner.

The another article of M.K.Abdullayev discusses the organizational and economic aspects of regulating relations in the field of implementation and use of automated information systems using corporate information systems in enterprise management.[6] Modern tools, functional and structural support of the integrated enterprise information system were developed by combining production planning mechanisms and hardware and software in the enterprise resource planning and production process management system.

Data and Methods

To study the practice of implementing innovative activities domestic and foreign agro-industrial enterprises need to reveal the content of the concept of the digital economy and determine the legal framework in different countries.

In the scientific community, it is believed that for the first time the concept of the digital economy was introduced into wide circulation in 1995 by N. Negroponte, an American computer scientist, who meant by this large-scale translation processes information binary code [1]. Since then there has been an evolution in the definition of this concept. Currently, in European countries, digital economics is understood as a multi-level economic structure, driven by the development of digital technologies for continuous development innovation, investment, and competition that stimulates quality improvement services [7, 8, 9]. Economic publications of Great Britain [8,9] define the digital economy as business processes based on high-quality digital technologies, allowing the implementation of operational activities on the Internet and meeting the needs of entrepreneurs, consumers, and the state.

International economic organizations [12,13] characterize the digital economy as "a new way of the economy based on knowledge and digital technologies", which is based on the use of intangible assets, information, and data. Global consulting companies [14] believe that a digital economy is a form of economic activity arising from the interaction of organizations, consumers, and technical devices through the network Internet.

Most of the developed countries of the world have adopted digital development focused on the implementation of digital transformation economics, in particular [15]:
- Great Britain - "Digital Strategy";
- Germany - "Industry 4.0" and "Smart Networking Strategy";
- European Union - "Europe 2020";
- China - "Internet Plus";
- Japan - "Smart Japan ICT Strategy";
- USA - "Advanced Manufacturing Partnership" and "Industrial Internet consortium".

Prerequisites for the development of digital transformation in Germany have become the leading position of the manufacturing industry of the country in the world market, as well as the development of innovative activities in the field of production and industrial technologies.

Nowadays, digital technologies play a key role in agricultural production in Germany and provide vital activity for crop and livestock industries. Not only most production processes are automated by agricultural producers, but also interactions with suppliers, consumers, the state, and consulting centers.

For the first time using GPS data to support production processes was carried out in the agricultural sector, which allowed rationalize the routes of agricultural machinery and reduce energy costs. The use of big data (Big Data) combined with artificial intelligence provides effective management in the horticulture industry: processing methods are being optimized soil and harvesting processes are monitored in real-time [16,17].

Studies conducted in 2020 [18] showed that about 80% of farmers in Germany use digital technologies in their activities. The most used digital technologies are agricultural machinery with GPS control (45% of respondents), online monitoring tools (40%), artificial intelligence (32%), sensors (28%), robotic equipment, and unmanned aerial vehicle devices (12%). In addition, about half of the respondents' agricultural producers use ready-made digital solutions "Smart farm".

In turn, the UK is the European leader in the implementation of artificial intelligence in the agro-industrial sector. Strategy digitalization of the country's economy includes areas of development 23 infrastructure, digital competencies, cyberspace, building economic growth rates, the digital sector, digital government, and economics of data [19].

In order to introduce digital technologies and information systems in agricultural production in the UK was established by the Center Agrimetrics innovation supports the development of business projects aimed at developing agricultural technological innovation.

An interactive digital map was also created based on GPS data. agricultural lands. These and other specialized large agricultural data is stored on the platform and processed by artificial intelligence, which allows the British farmers to solve problems and make decisions online. The information platform is also used by processing and trade organizations as an electronic trading platform [20].

In 2013, the People's Republic of China began implementing innovative technologies in the agro-industrial complex. In the project's boundaries "Digital Silk Road" [21] Chinese investors finance the implementation of digital technologies in agriculture not only in China but also in other countries.

Implementation of new digital technologies in production processes agricultural industry is carried out using the system approach "Industry 4.0". Farmers successfully apply modern electronic technologies based on the use of big data and artificial intelligence: production monitoring and control systems, "smart" machinery and equipment (UAVs, sensors, automatic navigation, Internet of things), digital management platforms (forecasting economic market conditions, electronic markets, export organization, ready-made digital solutions based on "smart" management) [22, 23].

In addition, innovative technologies contribute to the fight against poverty in China. The "Running Chicken" project [23] involves the provision of chickens for poor families to grow and sell them after four months. The project is implemented using the system of intellectual monitoring, mass slaughter, processing, transportation, and other links production chain. Consumers receive organic and quality a product whose price is higher than the average market value, which allows an increase in the income of low-income families.

Exploring the experience of introducing digital technologies in the agricultural sector, the United States should be singled out with a high level of digitalization - about half of the country's agricultural producers. Agricultural the US industry produces more than 40% of the world's agro-industrial products. More active use of modern innovative technologies hinders the low provision of the territory with stable cellular network communications and lack of equipment connected to the Internet. So Thus, the main

tasks facing the industry are the development of IT infrastructures and the implementation of digital transformation tools.

However, the most promising technologies that are already in the early stages of use and will allow further increase in the added value of the country's agriculture by $500 billion, and labor productivity by 7-9% [24] are:

- using the Internet of things and 5G for condition monitoring land and agricultural crops. GPS data integration, irrigation, nutrient, and other systems can improve the use of resources and improve yields by more accurately identifying and predicting factors that have an adverse effect;

- livestock monitoring using chips and sensors for health monitoring of farm animals, definitions of stress factors, and disease outbreak prevention;

- management of buildings, structures, and equipment for establishing business processes, reducing energy consumption, control technical conditions;

- the use of UAVs and computer vision (inspection of crops and herds, analysis of field conditions, spraying of agricultural crops, planting crops in remote areas of land);

- autonomous agricultural machinery is more efficient and accurate when working in the field, which can provide fuel savings and higher performance.

Results and discussions

The use of digital technologies in the agro-industry is developing rapidly in Uzbekistan. In accordance with the decision of the President of the Republic of Uzbekistan "On approval of the strategy "Digital Uzbekistan - 2030" and measures for its effective implementation", as well as in order to increase the efficiency of the use of digital and geo-information technologies in agriculture and water management several processes are being implemented. Examples of this include the introduction of digital and geo-information technologies in the use of agricultural land, the management and use of water resources through the use of modern computer technologies, and the implementation of automated technologies in livestock and poultry farming.

Currently, the ministry has implemented more than 10 digitization projects, the main issues of which are focused on the use of agricultural land, automation of water resources management, development of e-commerce and electronic market, and testing of agricultural techniques. The goal is to reduce the wandering and excessive wandering of applicants, save their time and financial resources, and increase transparency.

The system of leasing agricultural land is one of the new reforms in the history of Uzbekistan. Last year, the head of state commissioned the introduction of a new mechanism for leasing agricultural land and the development of the "E-IJARA" information system under the responsibility of the Ministry. At the end of 2021, the system was launched.

One of the main tasks of the "E-IJARA" information system is to receive information about vacant and reserved land, land specialization, soil fertility, yield, water supply level, etc. development of projects based on directions.

In addition, based on statistical data on the gross domestic product and the added value of industries in the Republic of Uzbekistan in January-June 2018-2022, the indicators of funds allocated for digitization of agro-industry are as follows [25]:

Information on the value added to digital technologies in the Republic of Uzbekistan in January-June 2018-2022

Years	Billion sums	Percentage(%)
2018	14,125.7	9.1
2019	16,981.3	8.1
2020	17,491.6	7.1
2021	22,036.2	7.4
2022	26,038.6	7.3

The issue of digitization of agriculture, of course, should be based on the experience of developed countries. The transition to 'smart' agriculture in the world is taking place slowly but surely. A large portion of the market (53%) is located in North America. IT technologies are actively used in the field, mainly in the cultivation of cereals, and this is called "precision farming". In general, many countries are confirming that they are actively developing their agriculture through the transition from "analog" to "smart".

Conclusion

The theoretical study allowed determine the main stages in the development of innovation activity in agro-industrial companies and establish that digital transformation is the modern phase of innovative development, which contributes to accelerated business development. In foreign practice, there are different approaches to the assessment of the level of digitalization of organizations, however, methods are poorly developed in evaluating the effectiveness of digitalization, and there are no integrated approaches, taking into account the costs of digital transformation of business. Analysis of organizational and economic conditions and prerequisites for the transition of agro-industrial enterprises to the digital economy revealed the limitations of the digitalization of the agro-industrial complex, consisting of the annual deterioration of the state of the material and technical base. Measures taken by business entities for modernization, reconstruction, and technical re-equipment of the main funds do not cover the real need for their renewal.

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