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Article

Mechanisms For Improving Agricultural Production Management in The Context of The Digitalization of The Economy

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Abstract: International experience and domestic research show that the digitalization of the economy currently opens up new prospects for the development of agriculture. The use of modern technologies makes it possible to optimize agricultural production management processes, reduce costs and, as a result, increase the competitiveness of the agro-industrial complex. Based on this, this study is devoted to the topic of mechanisms for improving agricultural production management in the context of the digitalization of the economy. In the course of the research, attention was paid to specific aspects of the agricultural sector and highlighted the issues of organization and management of production in this area. Based on the results of the analysis, the author's conclusions on the identified problems were formulated, which are presented in the conclusion of the study.

Keywords: digital technologies, agricultural production, management, agro-industrial complex, production process, innovation, government support, automation, economic development, risk factors.

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1. Introduction

Nowadays, in order to guarantee food security and improve people's quality of life, more and more attention is being paid to the introduction of advanced methods in the management of the agro-industrial complex. This field must become high-tech in order to develop successfully.

The use of digital technologies in agriculture is a necessary step that will help reduce the negative impact of external factors on production [1]. Digitalization of the industry will lead to its profound transformation, including changes in technology, production processes and management methods. Greenhouses, as one of the first branches of agriculture, are considered promising for the introduction of digital, automated and robotic technologies [2].

In some countries, there are already examples of using robots that independently sow seeds in greenhouses, destroy weeds and harvest crops. The climate in such greenhouses is controlled by automated control systems.

In an era when digital technologies are becoming an integral part of the economy, Uzbekistan is actively implementing them in its life. The transition to the digital economy is a strategic goal of government policy, opening up new opportunities for scientific, technical and socio-economic development of the country.

It is necessary to emphasize the importance of digital technologies, especially innovative ones, for improving the performance of agricultural organizations. Currently, this industry is facing a number of difficulties, such as insufficient development of agricultural and processing enterprises, high equipment wears and lack of investment.

These problems are often related to the low solvency of enterprises and limited government support. To overcome these difficulties, it is necessary to introduce innovative digital solutions into production processes. This will allow for more efficient use of resources and achieve the best results.

Agriculture is one of the key sectors of the Uzbek economy that actively uses information technology. For the successful development of this industry, it is necessary to introduce digital technologies at all levels of management and production organization. This will allow for more efficient use of resources and increase the productivity of market mechanisms.

For the digital transformation in agriculture to be successful, it is necessary to solve a number of important tasks. First of all, it is necessary to determine which technologies should be used and create organizational and economic conditions that will facilitate the successful implementation of innovations.

Before introducing new technologies and equipment into agriculture, it is necessary to carefully review the methods of organization and control of business processes in this industry. Outdated management approaches can hinder digitalization and make agricultural products uncompetitive in today's market.

In the context of modern agricultural development, the development and implementation of innovative methods of agricultural production management using digital technologies are becoming extremely relevant. The purpose of this study is a thorough study and analysis of existing management mechanisms in the agricultural sector, as well as the development and implementation of advanced approaches to the organization and control of business processes using digital technologies.

Literature analysis.

In order to ensure stable socio-economic development, food security of citizens and improve their quality of life in the field of agriculture, it is necessary to conduct an in-depth analysis and optimize the management mechanisms of production processes at enterprises.

Here we have to answer the question of what production management means. In this regard, scientists G.M.Davletova, O.N.Tuichieva and A.A.Salimov give the following definition: "The basis of the activity of any enterprise is the production process. Therefore, the success of an enterprise depends on how this process is organized. Proper organization of the production process increases its efficiency, reduces material costs, reduces labor costs and reduces production costs. It is advisable to provide information about the production process here.

The production process is a set of actions of these enterprises and tools for the production of products, or, in other words, the production process is the purposeful human impact on objects of labor with the help of tools" [3].

According to the definition of one of the scientists of our country, S.N. Yuldasheva, "Relations between people and their communities through the production of material goods, their distribution, exchange and consumption are called production relations.

The relations of production with the productive forces constitute the mode of production. The degree of development of a society depends on the method of its production" [4].

According to the definition of R.I. Nurimbetov and S.I. Akhmedov, "The essence of the production process is the processing of primary resources - raw materials, energy, semi-finished products, information - and manifests itself in the simultaneous use of labor at the end of various types of production activities. In the production process, the factors of production merge and the products produced on this basis are created" [5].

According to the definition of the Russian scientist B.N. Gerasimov “Production management is an activity aimed at the formation, maintenance and development of the systemic, process and functional activities of an enterprise based on technology, the full–fledged operation of the production system and the creation of an effective process of industrial safety, covering all aspects of the enterprise” [6].

Russian scientists V.S. Kudryashov and O.V. Kuchina talk about production management as follows: “The organizational management mechanism is a system of

managerial actions, techniques and procedures aimed at implementing the functions of the enterprise, as well as the theory and practice of management based on the priority of organizational principles and solving organizational problems. It includes: designing, creating and improving organizational structures, clearly delineating functions, distributing organizational tasks, responsibilities, rights and responsibilities of structural units and individual performers, establishing relationships between them, strictly observing established rules of organizational behavior, and making managerial decisions" [7]

T. N. Kashitsyna and E. S. Lovkova: "Production management includes planning, coordination, control, as well as influencing the elements of the production process, including labor, equipment, production facilities, resource allocation and working methods. In addition, it also includes the development of a product and/or service" [8]

Based on the above, it can be concluded that the functioning of manufacturing enterprises is subject to certain patterns. One of these patterns lies in the organization's compliance with its goals. This pattern determines how production activities should be organized in order to make the most effective use of available resources, stimulate the creative potential of employees and create conditions for their material motivation. These key goals reflect the organization's mission. To achieve these goals, it is necessary to solve a number of organizational issues, which may vary depending on the specifics of a particular enterprise.

For the successful organization of production at the site, it is necessary to determine the optimal ratio of production capacities. It is important to ensure a balance between the number of jobs and the number of employees occupying these places. It is necessary to coordinate the time of operations at each workplace and distribute work responsibilities among employees.

In addition, it is necessary to develop operational plans and assign appropriate tasks to employees. It is necessary to create effective incentives to increase labor productivity. It is also necessary to organize the maintenance of workplaces and perform a number of other important tasks.

2. Meterials and Methods

This study uses various scientifically based methodological approaches to comprehensively study the mechanisms for improving agricultural production management in the context of the digitalization of the economy. In particular: theoretical research of scientific works of industry scientists, study of statistical data, regulatory legal acts, scientific articles and foreign literature. The study of these data was carried out using methods such as a systematic approach, comparative analysis, logical search and logical classification. The scientific conclusions formulated during the study were presented in a form that is close to practice and reflects the real situation, which ensured the reliability of the study and the relevance of the results obtained.

3. Results

The specifics of agricultural production are determined by its complex and multifaceted organization. The development of the complex depends not only on the specifics of agriculture and the food industry, which relate to the traditional economy, but also on the ways they function, as well as on the activities of related industries such as manufacturing, trade and transport. These additional aspects can significantly affect the stability of the entire agro-industrial complex system.

Agriculture is a diverse and intriguing field of endeavor. Its success depends not only on agricultural production and food supply, but also on related sectors such as manufacturing, commerce, and transportation, which significantly influence agriculture [9]. Figure 1 shows the structure of the agricultural production complex..

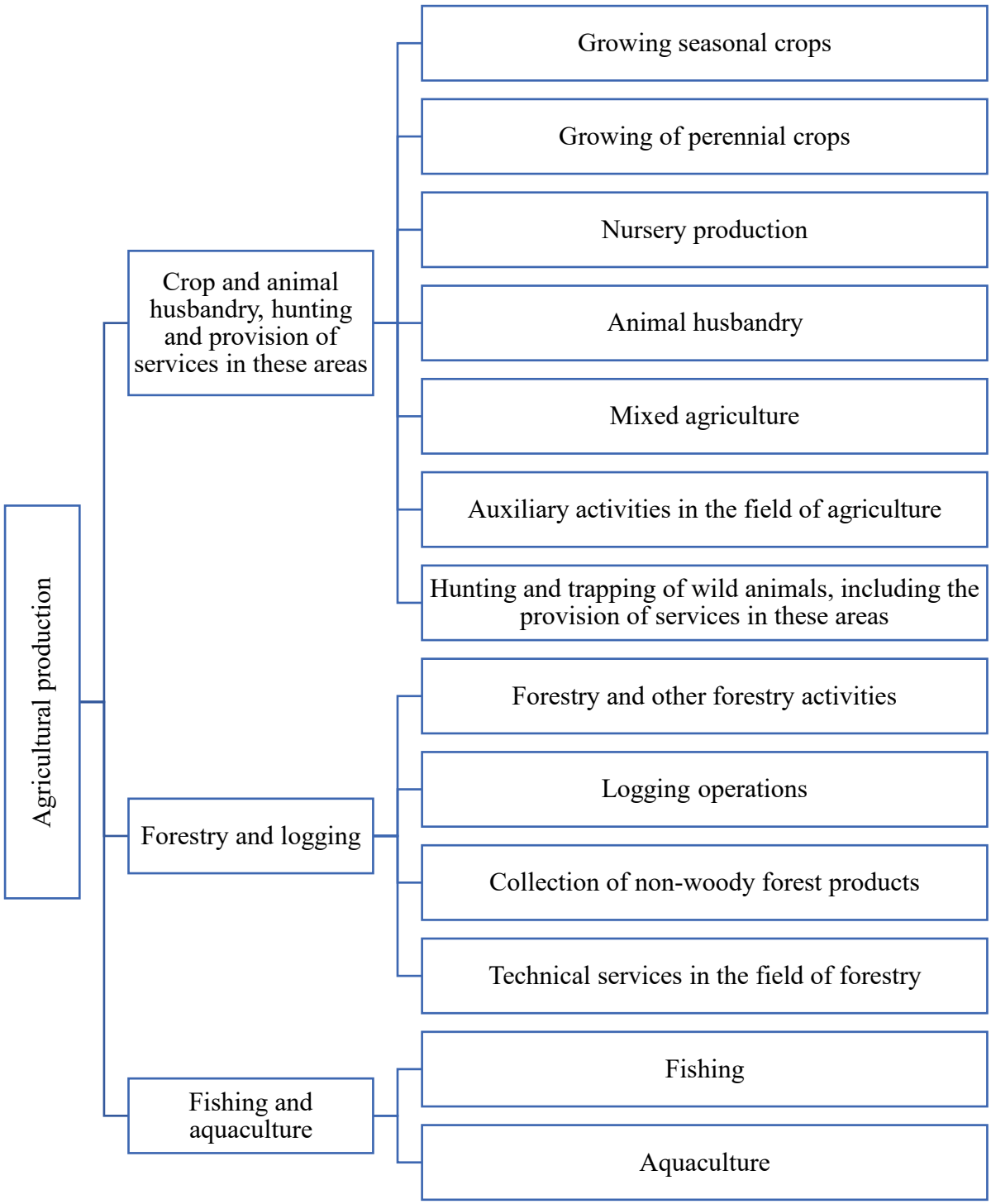

Figure 1. The structure of agricultural production of the complex

For a long time, agriculture has been considered in economics as a separate industry operating independently from other sectors of the economy related to the production and sale of agricultural products. However, at the end of the 20th century, this concept changed under the influence of the rapid development of food supply systems in economically developed countries.

This has led to significant growth in the processing industry, the main directions of which are shown in the figure 2 below.

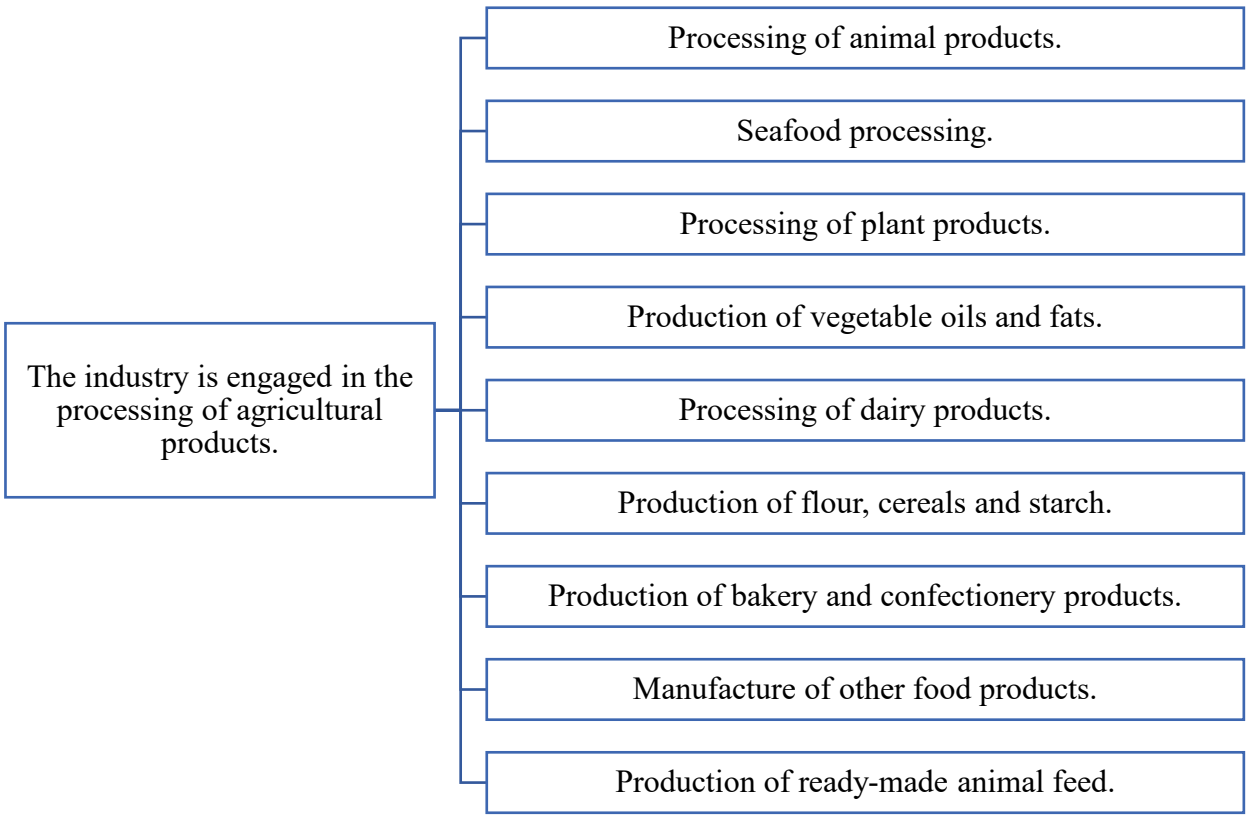

Figure 2. The structure of the processing industry in agriculture.

Currently, the food sector is a complex and high-tech process that includes all stages of production and processing of agricultural products. It is an integral part of the agro-industrial complex (AIC), which also includes various industries not directly related to agriculture, such as technology development, organization of production and sale of finished products.

The agro—industrial complex is the most important component of the economy, which is engaged in the production and processing of agricultural products. It covers all stages: from harvesting to the sale of finished products. It also produces machinery, fertilizers, and other tools necessary for operation.

In addition, the agro-industrial complex is closely linked to other industries such as mechanical engineering, chemistry, light industry, energy, transport, education and science.

According to data provided by the National Statistics Committee of the Republic of Uzbekistan, as of February 1, 2025, the number of enterprises operating in agriculture, forestry and fisheries decreased from 51,051 to 31,297, or by 38.7 percent. However, the volume of products (services) provided by them has increased, including, according to preliminary data, in January-March 2025, the total volume of agricultural, forestry and fisheries products (services) amounted to 52,710.0 billion soums, including in crop and livestock production, hunting and services provided in these areas - 50,015.4 billion soums, forestry - 2,237.6 billion soums, fisheries - 457.0 billion soums [10],[11].

This indicates that agricultural production is moving from a quantitative to a qualitative stage, while the issues of introducing mechanisms to improve their effective management, especially the use of digital technologies, are very relevant. Agriculture and the food industry, like other sectors of the economy, face various challenges and difficulties [12], [13]. Among them are:

1. Unfavorable economic conditions;
2. Rising prices for resources and products;
3. Reduced investment attractiveness;

4. Loss of competitiveness;
5. The introduction of restrictive measures and sanctions;
6. The need for support from the government and other countries.

In addition, agriculture and the food industry are characterized by a high level of risk, since production depends on many factors that cannot be directly influenced. Due to climate change and natural disasters, various risks to the environment arise. Among them are:

1. Increasing the area of land that has been degraded;
2. Reduction of agricultural land fertility;
3. Consequences of natural and man-made disasters.

There are also risks associated with the spread of infectious animal diseases and plant pests new to the republic.

In order to solve existing problems and prevent potential risks, special attention should be paid to the development of crop production.

In this area, we should focus on the following areas::

1. Active use of advanced land reclamation methods;
2. Improvement of tillage methods;
3. The use of mineral and organic fertilizers, as well as effective plant protection products;
4. The use of elite seeds and high-yielding varieties of agricultural crops;
5. The use of modern agricultural machinery.
6. In the field of animal husbandry, attention should be paid to the following aspects:
7. Strengthening the breeding base of farm animals in the region;
8. Creation of modern and highly efficient complexes;
9. Improvement of the food supply;
10. Expansion of export potential.

4. Discussion

During the study of digital transformation in agriculture, it was found that the introduction of digital technologies in this area is closely related to the level of development of the agro-industrial complex, the natural conditions and geographical location of a particular region, as well as with government policy in this area and the activity of the enterprises themselves.

However, there are certain obstacles that hinder the full digitalization of the industry. Overcoming these problems is one of the key tasks facing the state as part of its strategy for the development of the digital economy in Uzbekistan.

In the agro-industrial complex, differences in the structure of production and business can be observed. In particular, the number of small enterprises is one and a half times more than large and medium-sized enterprises, but they account for only 15% of the total agricultural output [14], [15].

So, the scale of the enterprise is of great importance in the process of introducing digital technologies into agriculture. Large companies, as a rule, use more complex automated control systems. This is because they can afford to invest in information technology and cover the costs of implementing and maintaining digital systems.

But even if the industry is dominated by small farms, automation of production processes and resource management can accelerate digitalization. This will reduce the impact of the human factor on the production and marketing of products and increase the effectiveness of work.

In the field of agriculture, two groups of enterprises can be distinguished: highly profitable, using advanced technologies, and businesses that barely make ends meet using outdated methods.

Many agricultural producers face the problem of lack of their own financial resources to implement digital technologies. Digitalization of production requires significant

investments both at the stage of purchase and implementation of new technologies, as well as at the stage of their maintenance and updating. In addition, sometimes it is necessary to develop your own digital solutions. In this regard, there is a need for government support for agricultural and processing enterprises to stimulate the digital transformation of the economy. It is also necessary to provide the appropriate infrastructure and logistical base for the integration of information systems.

An analysis of the technical and technological condition of agro-industrial enterprises has shown that there is a shortage of modern equipment and a high level of depreciation of fixed assets. This creates obstacles to the introduction of digital technologies. The introduction of a contractual life cycle model for equipment can reduce risks for agricultural enterprises and significantly increase the availability of automation and mechanization for small businesses.

To advance in the digital economy, it is crucial to complete the current phase of innovation — the automation of production. In the face of competition and the need to minimize losses, agricultural companies are compelled to expedite the automation of key business operations. For the successful functioning of agricultural enterprises, they require up-to-date, comprehensive, and dependable environmental data. This data can be obtained from both primary and secondary sources. In this context, digitalization of business becomes a means for managing risks and optimizing the collaboration between producers, processors, and sellers of agricultural products.

5. Conclusion

The digital revolution presents new opportunities for the application of advanced market research methods and the creation of a balanced product portfolio. This is especially significant for companies that focus on exports, as they need effective information systems in order to actively engage with international partners. International experience shows that government support for businesses in the field of information technology is crucial for the successful expansion of companies in foreign markets.

At the same time, the implementation of digital technologies offers new prospects for rural development. They enhance communication, provide access to a wide range of services, and expand opportunities for people living in remote areas.

However, a successful digital transformation of the real sector of the economy requires the presence of adequate infrastructure. Given the limited resources available to the government, one possible solution could be to encourage the creation of necessary infrastructure through government support by businesses. The specific characteristics of agricultural production present challenges when it comes to digitizing the industry. Automating biological and environmental processes such as animal reproduction and weather monitoring is challenging due to high levels of climatic and environmental variability.

To address the challenges of integrating digital technologies into agriculture, it is essential to achieve the goals of agricultural development and comprehensive rural development, which includes the spatial development strategy of the country and the establishment of an integrated information ecosystem.

The study conducted a comprehensive analysis of the state of the economy of agro-industrial enterprises in the republic, as well as the level of their technological and digital equipment. Based on the data obtained, the following conclusions were made:

1. In the future, the development of agriculture will be determined by the creation of new sales markets for domestic products and an increase in production volumes. This will make it possible to provide the population with food, as the incomes of the population will increase.
2. Despite the fact that agricultural enterprises have sufficient financing, they are not active in the field of introducing new technologies and do not use them fully. This is due to the insufficient level of modern machinery and equipment.

3. The use of computers in agriculture has its own specifics, since this industry includes many different areas that require the creation of integrated systems, as well as due to the social importance of agriculture.
4. The transition to digital agriculture is fraught with a number of difficulties. In rural areas, there is a shortage of equipment and specialists capable of working with digital technologies, as well as the high cost of their implementation. In addition, the government does not support enterprises in the transition to digital technologies.

The findings of the research underscore the importance of creating frameworks for enhancing agricultural production management in the era of digital transformation. The study uncovered correlations between the metrics of innovation and digital advancement, which will be incorporated into future endeavors.

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