



## Article

# Main Directions of Ensuring Economic Efficiency in Agriculture

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**Abstract:** In the context of global challenges such as climate change, food insecurity, and natural resource scarcity, the need to improve the economic efficiency of agriculture through sustainable approaches has become increasingly important. Modern agricultural development emphasizes the integration of resource-saving and environmentally sustainable technologies, diversification of production, and the implementation of innovative and institutional reforms to enhance agroecosystem efficiency and ensure food security. Despite growing research in sustainable agriculture, there remains insufficient analysis of how these approaches can be effectively adapted to national conditions, particularly in the context of economic efficiency and transformation processes in Uzbekistan's agricultural sector. This study aims to identify the main directions for ensuring economic efficiency in agriculture by analyzing sustainable practices, technological innovations, and policy measures. The findings indicate that the introduction of advanced technologies, rational use of land and water resources, diversification of crops, and implementation of national development strategies significantly contribute to increased productivity, reduced resource consumption, and improved rural incomes. The study provides a comprehensive assessment of the interrelationship between sustainability, innovation, and economic efficiency within the agricultural sector under conditions of ongoing reforms. The results suggest that strengthening resource-saving technologies and continuing systemic reforms are essential for enhancing food security, supporting rural development, and ensuring long-term economic stability, while further research should focus on optimizing agro-technological practices and adapting global experience to local conditions.

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## 1. Introduction

In the context of current global problems - climate change, food supply imbalances and natural resource scarcity - there is a growing need to reconsider theoretical approaches to stabilizing agriculture and to base them on a combination of economic, social and environmental factors [1].

Scientific research aimed at developing sustainable agriculture in the world is mainly focused on the use of resource-saving and environmentally sustainable technologies in agriculture, ensuring food security, diversifying agricultural production, reducing the impact of climate change, increasing the efficiency of agroecosystems, and assessing the effectiveness of institutional and political and economic reforms in the agricultural sector [2].

The development of sustainable development criteria, their adaptation to the conditions of national economies, and the transformation of agriculture in the context of digital transformation are also emerging as relevant areas of modern research. In this regard, in the experience of many countries, integrated agrarian policy, agroecology and inclusive development models are at the center of scientific research [3].

In recent years, large-scale work has been carried out to reform agriculture and introduce market mechanisms. It is worth noting that a quarter of the country's gross domestic product falls on the agricultural sector. At the same time, about 24.9 percent of the employed population in the republic is engaged in the agricultural sector, which is 3.5 million people. This indicates that the role of the agricultural sector is extremely important not only in ensuring the stability of the economy and increasing the well-being of the population, but also directly depends on the reforms implemented in the sector [4].

## **2. Methodology**

Methods of economic analysis, statistical comparison, observation and expert assessment of sustainable agriculture in the country were used. Also, local and foreign experiences were studied and their specific aspects were summarized on the basis of analysis. The results of the research serve to develop scientifically based proposals for improving sustainable agriculture and increasing its efficiency [5].

### **Literature Review**

In order to improve the theoretical foundations of sustainable agricultural development in Uzbekistan, the state has set a number of tasks, including the efficient use of resources, ensuring environmental sustainability, introducing innovative technologies, and implementing institutional reforms in the agricultural sector. Based on these tasks, measures are being taken to improve land and water resources, introduce modern agricultural techniques, increase the export potential of agricultural products, and improve the system of state support for farmers and peasant farms [6].

In the international literature, a study entitled Innovative Activities of Agriculture in Uzbekistan examined the possibilities of increasing the efficiency of the agricultural sector in Uzbekistan through agrotechnical measures and innovative activities [7]. These facts indicate that the implementation of agrotechnical measures through innovations in local conditions can give better results in agricultural sectors. In the field of sustainable agricultural development in Uzbekistan, scientific research is being conducted by local scientists such as Ya. Aliyev, U. Gafurov, B. Salimov, Q. Choriyev, N. Khushmatov and T. Farmonov. They pay special attention to the issues of saving resources, introducing innovative technologies and ensuring environmental sustainability in the agricultural sector. In particular, Ch. Murodov's research on improving agrotechnical methods and improving the quality of agricultural products, Q. Choriyev's scientific work on mechanisms for rational use of land and water resources, N. Khushmatov's research on agroecological monitoring systems, and T. Farmonov's research on agrarian innovations are making a significant contribution to ensuring stability in the country [8].

## **3. Results and Discussion**

Sustainable agricultural development is the basis for ensuring food security and maintaining ecological balance. This process requires the introduction of advanced technologies, diversification, rational use of water and land resources, and improvement of rural infrastructure. The main goal is to achieve economic efficiency and increase the standard of living of the rural population through innovative approaches.

The main directions of sustainable agricultural development:

Diversification: Adaptation to market changes and ensuring stability through diversification of farm activities.

Advanced technologies: Introduction of modern information technologies and innovative approaches.

Resource conservation: Rational use of water and land resources, sustainable development of rural areas [9].

Programs: Implementation of the Agricultural Development Strategy for 2020-2030.

These measures will serve to increase the volume of agricultural production and ensure environmental sustainability.

Sustainable agricultural practices are inextricably linked to the implementation of agro-technological trends. It is time to think about how to get more profit from less money in agriculture, rather than spending more. Agriculture remains the most important sector in the economy of Uzbekistan and accounts for 17 percent of gross domestic product. In order to meet the country's food demand, it is important to increase agricultural production and employment of the rural population and increase their income.

The changing climate, with its erratic rainfall, cold winters and dry summers, is negatively affecting the steady increase in crop yields. Another factor contributing to the decline in crop yields in agriculture is the irrational use of land and water [10].

The relatively low efficiency of irrigation networks and the inoperability of large-scale irrigation systems lead to the deterioration of the land reclamation condition and inefficient use of water. The implementation of irrigation technologies on farms using various water sources (precipitation, additional water and alternative water sources) for water management and its effective use, combined with work on preserving and future increasing the availability of nutrients and soil fertility for the main crops and crop diversity (crop diversification), will lead to a certain increase in crop yields.

In solving the problems of land and water use in production conditions, it is aimed at increasing crop productivity while maintaining soil fertility, increasing the effective use of nutrients and water. Thanks to the newly demonstrated updated technologies, it is possible to increase crop productivity due to land and water use, ensuring the income of the rural population and food security, preserving the natural resources of the region and stabilizing agriculture [11].

FAO has focused its attention on increasing farmers' incomes on rainfed and irrigated lands, that is, on the implementation of work on sustainably increasing the productivity of crops grown in agricultural production. The proposed technologies are being adopted by farmers and are being introduced on large areas with their participation.

Despite the fact that agrotechnical measures based on plowing and traditional deep plowing in agriculture have led to a deterioration in the soil condition, there is a concept in agriculture that considers deep plowing with plowing to be a guarantee of high yields. However, it is worth noting that it is time to think about how to get more profit with less money, and not about how to get more profit with less money. In world practice, the number of regions that are achieving high yields of agricultural crops while saving resources is increasing year by year [12].

In Uzbekistan, direct sowing technology can be used instead of the technology of preparing the soil between cotton rows with a cultivator or disk and sowing wheat. Currently, the sowing rate of wheat in areas sown with a cultivator is much higher (250 kg/ha).

Several studies have been conducted in various projects implemented by FAO to reduce the planting rate and improve the economy of farmers. Direct sowing in cotton fields where cotton has been harvested twice or thrice, when planted with a seeder, not only yields higher than the traditional planting method, but also brings additional income [13].

If agricultural machinery were produced in Uzbekistan, farmers would benefit even more from growing crops. In the traditional seeder method, several technological processes such as plowing, harrowing, chiseling and sowing are performed, and when sowing grain with a SZ-3.6 seeder, 7,360 liters of fuel and lubricants were consumed per 100 hectares of cultivated area, while when sowing wheat with a new seeder that allows direct sowing, 860 liters of fuel and lubricants were consumed per 1 hectare of cultivated area (10 times less). That is, the amount of petroleum products saved per 100 hectares of cultivated area was 6,500 liters.

If we add to the oil products saved in agriculture, in addition to the cost of wages and depreciation of tractors, it is clear that the amount of profit that a farmer can receive from one hectare of land as a result of savings is quite significant. Also, due to the reduction in the number of tractors entering the cultivated area for soil cultivation, the process of soil compaction is significantly delayed, and in addition, crop yields are increased.

In Uzbekistan, the cultivation of legumes and other crops as a repeated crop is an important direction that can be used in the cotton-wheat rotation system.

In Uzbekistan, legumes such as mung beans, soybeans, and beans can be sown as a second crop after winter wheat is harvested and yield 1.5–2 t/ha. In addition to legumes, the cultivation of corn, sesame, melon, carrots and other vegetable crops creates great opportunities for crop diversification in Uzbekistan. Of the legumes used for food, mung beans have an economic advantage in all regions of Uzbekistan. It is known that legumes enrich the soil with nitrogen, which is why they are very important for soil protection and resource-saving technologies in agriculture. In addition to nitrogen accumulation, the increase in soil quality of these crops has a positive effect on crops. The accumulated nitrogen reduces the nitrogen demand of crops grown in the following year during the growing season, which leads to a decrease in the costs of growing crops [14].

In Fergana region, carrots are considered a very economically productive crop, distinguished from other crops by their high productivity and market prices. In Uzbekistan, this crop has long been the most widely used vegetable crop, and each family consumes it in large quantities. Carrots are a labor-intensive crop, which is why their productivity is quite low in the country. In the republic, corn is grown by farmers on very large areas as a secondary crop for livestock. Since there is always a high demand for fodder and grain crops in livestock farming, corn is grown on large areas.

Also, in accordance with the New Uzbekistan Development Strategy for 2022–2026, it was set as a priority goal to increase the income of farmers by at least 2 times through intensive development of agriculture on a scientific basis, and to increase the annual growth rate of agriculture to at least 5 percent.

Also, due to the increasing depletion of water resources, a number of measures are being implemented in this area. In particular, the concept of water management development for 2020–2030 was approved. It is worth noting that in 2017–2022, a total of 1.4 million hectares of land were covered with water-saving technologies. The goal is one - to achieve economic benefits, as well as to ensure food security and increase the well-being of the people [15].

In our country, the policy of optimizing arable land and zoning agricultural crops, the cluster system, the creation of modern greenhouse farms, and the expansion of homestead farming practices have significantly improved the living standards of the rural population.

Today, a number of works are being carried out within the framework of the Strategy for the Development of Agriculture for 2020–2030 and the following 9 priority areas identified in it:

- Development and implementation of a state policy on food security;
- Creation of a favorable agribusiness environment and value added chain;

- Introduction of mechanisms for reducing state participation in the sector and increasing investment attractiveness;
- Rational use of natural resources and improvement of the environmental protection system;
- Development of modern management systems;
- Increasing the efficiency of state spending and its gradual redistribution through the development of sectoral programs;
- Development of a system of science, education, information and advisory services;
- Implementation of rural development programs;
- Creation of a transparent system of sectoral statistics, etc. It was also noted that international experts were involved in the transformation of public administration in agriculture and further deepening reforms based on world experience.

It should be noted that in 2025, the number and area of crops sown as a repeated crop on the area harvested with winter wheat has increased significantly compared to previous years.

The achievement of a significantly higher production of agricultural products in our republic compared to previous years will, in turn, lead to an increase in the export of agricultural products, and on the other hand, it will help to fill the domestic market with various cereals and legumes and satisfy the demand for feed crops.

#### 4. Conclusions

In the regions where about 50 percent of the country's population lives, which accounts for 4 quarters of the economy and employs about 3.5 million people, accelerating relevant reforms in this sector will serve to increase the well-being of our country's population in the future and ensure sustainable economic development.

In Uzbekistan, soil protection and resource-saving technologies in agriculture are a very important economic sector in the rational use of land and water. We are far from saying that plowing is not necessary at all. However, it is worth noting that it is also wrong to say that high yields can be obtained only through deep plowing. Most specialists working in agriculture may have noticed that earthworms, one of the factors determining soil fertility, are decreasing in our soils. In order to develop agriculture, it is necessary to involve new methods of scientific research on resource-saving technologies in production.

In conclusion, the effective use of agro-technological measures in agricultural sectors is one of the most important factors not only in increasing production efficiency, but also in ensuring employment of the rural population, strengthening food security, and contributing to the economic development of the country. In this regard, it is important to consistently continue systemic reforms and implement best practices.

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