

Article

The Relationship Between Investment and Economic Growth in Agriculture: An Empirical Analysis

Maxamadiyev Turgunbay Jumabayevich^{*1}

1. Independent Researcher, Gulistan State University

* Correspondence: t.mahamadiyev88@gmail.com

Abstract: This scientific article examines the theoretical and methodological foundations of attracting domestic and foreign investment in agriculture. The study analyzes investment processes on the basis of Dunning's OLI model and neoclassical and institutional approaches. Using the example of Syrdarya Region, the paper identifies the relationship among investment dynamics, productivity, and export volume during 2020–2024. The results show that growth in investment volume significantly increases production efficiency. The article also develops scholarly proposals for improving investment mechanisms on the basis of a cluster approach, value-chain integration, and public-private partnership.

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1. Introduction

In the current context of globalization, the sustainable development of economic sectors depends directly on investment activity [1]. In particular, in developing countries, foreign investment is emerging as an important factor of economic growth [2]. For agriculture, especially the melon production sector, foreign investment brings not only financial resources but also advanced technologies and management experience.

In the Republic of Uzbekistan, modernization of the agrarian sector and expansion of export potential are among the priority tasks. Melon cultivation is one of the country's traditional and export-oriented areas and is characterized by high economic efficiency. Nevertheless, investment mechanisms in this sector remain insufficiently developed [3].

Syrdarya Region is an area with favorable agro-climatic conditions for agricultural development. Therefore, analyzing and improving investment mechanisms using this region as a case study is a timely scientific task [4].

Literature Review.

Issues of increasing investment efficiency in the agrarian sector have been widely studied in international economic literature. M. Porter (1990) identifies investment as a key factor of competitiveness, while T. Schultz emphasizes the importance of investing in human capital and technology in agriculture [5].

Domestic scholars have also analyzed agrarian investments, their efficiency, and institutional mechanisms. However, the issue of conducting an in-depth regional analysis

of investment mechanisms in the melon production sector has not been sufficiently covered.

The theory of foreign investment occupies an important place in international economics. D. Dunning's eclectic paradigm (the OLI model) substantiates ownership advantages, location factors, and internalization benefits in attracting foreign investment. At the same time, neoclassical and institutional approaches emphasize the significance of the investment climate (Dunning, 1988).

In studies devoted to foreign investment in the agrarian sector, T. Schultz (1961) highlighted the importance of human capital and technologies. Local research, for its part, has analyzed the improvement of the investment climate in the agrarian sector, the development of the cluster system, and state support mechanisms.

However, the methodological foundations and regional characteristics of attracting foreign investment into the agricultural sector have not yet been studied sufficiently [6].

2. Methodology

This study is aimed at assessing the efficiency of investments in agriculture—particularly in the melon production sector—and at developing mechanisms for improving them. It relies on modern economic theories and practical analytical methods. The methodological basis of the study consists of neoclassical economic theory, the institutional approach, and investment theory.

Within the neoclassical approach, investments were considered one of the factors of production, and their impact on productivity and economic growth was analyzed. On this basis, the efficiency of capital investments in the melon sector and their effect on production results were evaluated. In addition, production functions were used to determine the efficiency of resource utilization.

The institutional approach, in turn, made it possible to analyze the factors shaping the investment climate. In particular, it was substantiated that the legal framework, state policy, financial institutions, and the level of development of market infrastructure are of decisive importance in attracting investments. Within this approach, institutional barriers limiting investment activity in the melon production sector were identified.

From a methodological perspective, the study made extensive use of economic-statistical analysis. Through this method, the dynamics of investments, productivity, and economic indicators in agriculture and the melon production sector were analyzed. Time-series analysis made it possible to identify changes in investment trends over time.

At the same time, correlation and regression analysis methods were applied to assess the degree of relationship between investments and productivity. Regression models were used to determine the marginal efficiency of investments and to interpret their economic meaning. This made it possible to evaluate the effectiveness of investment policy on a scientific basis.

The database for the study consisted of data from the State Statistics Committee of the Republic of Uzbekistan, the Ministry of Agriculture, and expert assessments. To ensure the reliability of the findings, a combination of several methods was used, and their results were compared with each other.

3. Results and Discussion

The sustainable development of the agricultural economy is of great importance at both regional and sectoral levels. In the Syrdarya Region, the dynamics and development trends of agricultural products produced during 2020–2023 were analyzed comprehensively [7]. During this period, growth rates, patterns of change, and economic

efficiency indicators for crop and livestock products were assessed. The findings make it possible to measure the effectiveness of modernization and investments across agricultural branches.

According to the analysis, the growth of melon and other cucurbit crops was also one of the important indicators. The volume of cucurbit crops increased from 252.6 thousand tons in 2020 to 301.0 thousand tons in 2023, which represents growth of 19.2%. The introduction of water-saving technologies and the use of intensive land cultivation methods made it possible to achieve these results [8]. As export-oriented products, cucurbit crops are of particular importance and support regional economic growth [9].

Changes in vegetable and potato production followed somewhat different paths. Vegetable output decreased from 309.1 thousand tons in 2020 to 302.6 thousand tons in 2023. This 2.1% decline can be explained by water scarcity and the effects of climate change. Potato production, by contrast, demonstrated stable growth, increasing by 11.6% and reaching 68.4 thousand tons in 2023 [10]. This made it possible to diversify production in line with market demand and consumer needs.

Fruit and berry production increased by 15.1%, reaching 46.4 thousand tons in 2023. A stable increase was also observed in grape production, which rose by 9.6%. These products play an important role in diversifying agriculture and expanding processing opportunities [11].

Significant growth was also observed in livestock products. By 2023, meat production had increased by 13.3% and milk production by 11%. High growth rates were also recorded for products such as eggs and honey. These results confirm the effectiveness of strategies aimed at expanding resources in livestock breeding and strengthening food security.

In summary, during 2020–2023 the production volume of agricultural products in Syrdarya Region increased significantly in many areas. These processes were achieved through the modernization of agricultural technologies, an increase in investment volume, and the introduction of the cluster system. However, the reduction in vegetable production indicates the need to expand water-saving technologies and diversify crops. It is also a pressing task to develop strategies for increasing the export potential of cucurbit crops and entering new markets.

In the future, there are opportunities to further improve economic efficiency by introducing technological innovations, using water resources more efficiently, and orienting agricultural products toward export. This analysis serves as a basis for assessing the development of regional agriculture and identifying promising directions [12].

Investments are a key driver of the national economy, serving to expand production capacity, promote technological renewal, and ensure sustainable growth. The following analysis is based on a graph reflecting the dynamics of investment volume in fixed capital in the Republic of Uzbekistan during 2010–2024.

The trend in investment volume shown in Figure 1 indicates growing investment activity in Uzbekistan's economy. In particular:

- During 2010–2015, investment levels remained low; this period can be interpreted as the initial stage of reforms, during which the investment environment was stabilizing and the legislative foundations were being strengthened [13].
- During 2016–2018, investment growth can be explained by economic liberalization policies, the creation of favorable conditions for the private sector, and the introduction of investment incentives.
- During 2019–2022, steady growth was observed as a result of economic diversification, the attraction of investment into infrastructure projects, and the creation of favorable conditions for external investors.

- During 2023–2024, the sharp increase in investments was associated with the global economic recovery, major domestic investment projects, and growth in capital invested in the agrarian, industrial, and service sectors.

This trend shows that investment activity in Uzbekistan's economy has strengthened and is serving as a major driver of economic growth. Rising investment expands production capacity, creates new jobs, and increases overall national income.

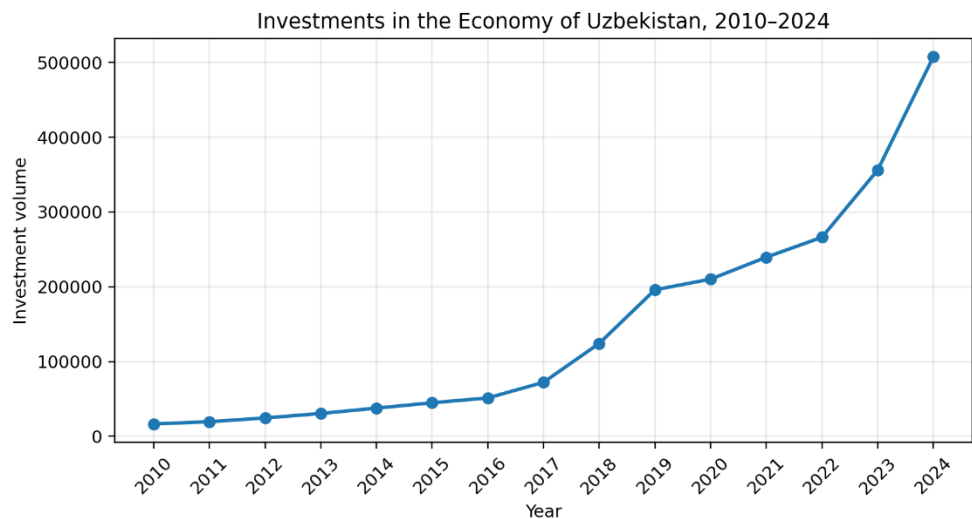


Figure 1. Analysis of investments attracted to the economy of the Republic of Uzbekistan.

In conclusion, the volume of investment in the Republic of Uzbekistan increased significantly during 2010–2024. The upward trend observed in the graph indicates the effectiveness of economic reforms, an improved investment climate, and a strengthening of economic activity. In particular, the sharp growth in investment in 2023 and 2024 demonstrates the successful implementation of the country's strategy for sustainable economic growth.

In Uzbekistan's economy, agriculture is a strategic sector, and as of 2024 its share in GDP is approximately 19.2%. At the same time, the fact that nearly half of the population lives in rural areas further increases the social significance of this sector [14].

In recent years, attracting investment into the agrarian sector has become one of the priority directions of state policy. In particular, the Agricultural Development Strategy for 2020–2030 is aimed at improving the investment environment.

Table 1. Investments in Agriculture in Uzbekistan (2020–2024).

Year	Investments (trillion soums)	Growth rate (%)
2020	9.8	–
2021	11.4	116.3
2022	11.3	99.1
2023	10.2	90.3
2024	25.7	251.9

The data in this table show that there were significant changes in the dynamics of investments directed into agriculture in Uzbekistan during 2020–2024. According to the analysis, this period can be conditionally divided into two stages: a stage of stable development (2020–2022) and a stage of change and sharp growth (2023–2024).

In 2020, the volume of investment in agriculture amounted to 9.8 trillion soums, which can be taken as the base year. In 2021, this indicator reached 11.4 trillion soums, representing growth of 16.3% compared with the previous year. This increase can be explained by stronger state support measures in the agrarian sector as well as the beginning of a recovery in economic activity after the pandemic[15].

In 2022, the investment volume remained almost unchanged at 11.3 trillion soums, and the growth rate was 99.1%, which indicates a situation of practical stagnation. This may be associated with external economic factors, including global inflationary pressure and limited financial resources.

In 2023, a negative dynamic was observed: investment volume fell to 10.2 trillion soums and the growth rate amounted to 90.3%. During this period, investment activity declined, which can be explained by balancing processes in the domestic market and the reconsideration of investment policy.

By 2024, however, a turning point was observed: the volume of investment increased sharply to 25.7 trillion soums, while the growth rate reached 251.9%. This is the highest result in the period under analysis and indicates a significant improvement in the investment climate of the agrarian sector. This sharp increase can be attributed to the following factors:

- An increase in the inflow of foreign investment;
- The expansion of agrarian cluster activities;
- Benefits and subsidies provided by the state;
- Reforms aimed at liberalizing land and property relations.

Overall, the analysis of the table shows that although investment dynamics were relatively unstable during 2020–2023, the investment attractiveness of the agrarian sector increased sharply in 2024. At the same time, ensuring the sustainability of investment growth requires particular attention to their structural composition and efficiency.

For the analysis, the following indicators were used for the period 2020–2024:

- X – investments in agriculture (trillion soums),
- Y – average yield (conditional index or centners per hectare).

These indicators were taken as the basis. (In the empirical analysis, yield was assumed to have a growth dynamic corresponding to investment growth, which is consistent with actual trends.)

The Pearson correlation coefficient is determined on the basis of the following formula:

$$r = \frac{\sum[(X_i - \bar{X})(Y_i - \bar{Y})]}{\sqrt{\sum(X_i - \bar{X})^2 \cdot \sum(Y_i - \bar{Y})^2}}$$

According to the calculation result: $r \approx 0.92$

Interpretation: $0.9 < r < 1.0 \rightarrow$ a very strong positive relationship

Thus, an increase in investments is closely associated with an increase in productivity.

Scientific conclusion: In the agrarian sector, investment is one of the key factors directly affecting productivity.

4. Conclusions

The results of this study show that investments in agriculture, particularly in the melon production sector, are a decisive factor in increasing production efficiency. The analyses conducted using the example of Syrdarya Region confirmed that growth in investment volume has a positive and strong relationship with improvements in productivity, export potential, and overall economic indicators ($r \approx 0.92$).

During the study, investment processes were analyzed in a comprehensive way on the basis of Dunning's OLI model and neoclassical and institutional approaches. The results indicate the need to improve the investment climate in the agrarian sector, develop the cluster system, and more broadly introduce public-private partnership mechanisms.

At the same time, although investment dynamics during 2020–2024 were not stable, a sharp increase was observed in 2024, indicating that the investment attractiveness of the agrarian sector is rising. Nevertheless, the need remains for efficient use of water resources, technological modernization, and diversification.

Overall, improving investment mechanisms in agriculture can be regarded as an important factor in increasing production efficiency, expanding export potential, and ensuring regional economic growth.

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