

**IMPROVING THE USE OF STATE CONCESSIONAL FINANCING
MECHANISMS IN SUSTAINABLE AGRICULTURAL DEVELOPMENT.**

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Abstract. This article explores the concepts of “sustainable agriculture”, the factors driving sustainable agricultural development, and the value chain and financing in the agricultural sector. It examines aspects of agricultural insurance and government subsidies, mechanisms for reimbursing agricultural premiums, the role of human capital and innovation transfer, and the recruitment of foreign specialists and reimbursement of their services. Specific proposals for financing sustainable agricultural development are also presented.

Keywords: sustainable agriculture; factors of sustainable agricultural development; preferential loan; financial indicators; public-private partnership; investment policy; agricultural insurance; subsidy; technology consulting; green bonds.

Introduction

Uzbekistan currently faces the challenge of transforming the quality of its economic development, ensuring economic growth not through raw materials industries and exports, but through knowledge-intensive factors and the formation of an innovative economy. A development model based on raw materials industries is considered ineffective and does not create the conditions for long-term sustainable development.

According to estimates by the Food and Agriculture Organization of the United Nations (FAO), to meet growing demand by 2050, the agricultural sector will need to produce nearly 50% more food, feed, and biofuels than it did in 2012. With timely action, meeting this high demand will not pose a significant challenge. The highest growth in agricultural production occurred between 1960 and 2015, during which global agricultural output more than tripled (FAO, 2017).

However, a number of factors, including climate change, increasing pressure on natural resources, insufficient investment in agriculture, and technological deficiencies, are making it more difficult than ever to maintain this rate of production growth. Only innovation and intensive technological development offer the prospect of sustainably meeting food demand. This can only be achieved through effective public policies that increase investment and develop public-private partnerships, which will exploit opportunities to maintain current productivity levels, sustainably increase incomes, and achieve sustainable poverty reduction. “We strive to ensure that every investor, when mentioning Uzbekistan, imagines, first and foremost, stability and confidence in the future” (Sh. M. Mirziyoyev). These words from our esteemed President also confirm the relevance of this topic.

Literature Review

Our research shows that sustainable agriculture is the practice of farming in a sustainable manner that meets society's current needs for food and textiles without compromising the ability of future generations to meet their own needs [1]. The Food and Agriculture Organization of the United Nations (FAO) defines sustainable agricultural development as increasing food production and ensuring food security through sustainable methods.

According to a group of Polish scientists, the goals of sustainable agricultural development are:

- Ensuring a high standard of living for agricultural workers;
- Implementing production methods that do not cause pollution or other environmental hazards;
- Maximizing the use of renewable resources;
- Preserving rural society and traditional ways of life;
- Considering ethical aspects in animal husbandry [2].

In our opinion, sustainable agricultural development in the country is the result of the integrated impact of four groups of factors: ecological-economic, socio-economic, organizational-technological, and socio-ecological-economic. We believe that the strategic direction for the sector's development should be to maximize the use of natural and biological factors in the productivity of agricultural crops and livestock. Among the above-mentioned groups of factors, we will examine in detail the investment component within the fourth group—socio-ecological-economic factors (investment resources, level of rural development, and the environmental situation in the region) [3].

Issues of value chains and financing in agriculture, as well as studies helping to explain the economic efficiency of low-interest long-term loans, are presented in the works of such scholars as Johan Swinnen, C. Peter Timmer, and A.V. Vakhobov. Agricultural insurance and government subsidies, as well as mechanisms for reimbursing insurance premiums to agricultural entities, are examined in the works of O. Mahul, C. Stutley, and B.B. Mamurov. Issues of human capital and innovation transfer, attracting foreign specialists and compensating their expenses, as well as the concept of the “knowledge economy” are examined in the studies of Gary S. Becker, Everett M. Rogers, J.R. Anderson, and I.S. Tukhsanov. The main conclusion drawn from international agricultural development experience is that economic entities in the sector are consistently provided with preferential credit resources, the forms of which have their own specific characteristics and approaches in each country. The primary goal of providing preferential loans is to create maximum and comprehensive convenience for farm production activities. The core principle is that a certain portion of the interest rates on the loans is covered by the state budget.

In our study, we propose the following:

Financing projects aimed at creating value chains in the food sector with funds from international financial institutions through commercial banks in national currency at a base rate of 4% per annum for 10 years (with a 5-year grace period) to ensure the country's food security; reimbursement of 50 percent of the insurance premium paid by fruit and vegetable clusters and farms when using crop insurance services against risks (if there is an export contract), but no more than 1 percent of the total insured amount; compensation paid through the district offices of the Ministry of Agriculture to fruit and vegetable clusters in the amount of 50 percent of the costs of attracting qualified agronomists, entomologists, and laboratory specialists from abroad, but no more than the equivalent of US\$1,000 per specialist per month. The rationale for these proposals is provided below.

Research Methodology

The following methods were widely used during the research: scientific abstraction; induction and deduction; statistical grouping; comparison and systems analysis; regression analysis; expert assessment; hierarchical analysis methods.

Analysis and Results

To assess the effectiveness of investments aimed at sustainable agricultural development, we will examine the investment activities of the Orol farm, located in the Andijan district of the Andijan region. This farm was established by Resolution No. 0262 of the Andijan district khokim on October 10, 2011. It is located within the Orol agricultural municipality and specializes in cotton, grain, and livestock farming. The farm also carries out other activities not prohibited by national legislation; its manager is Azamat Aliyev.

In 2022, the Orol farm purchased agricultural machinery—a Belarus-892.2 tractor—worth 390 million soums using preferential loans from Agrobank (for a 10-year term at a rate of 10% per annum). The goal of this investment is to expand the farm's operations and reduce the cost of grain and cotton crops. Let's consider the impact of this investment on the farm's operations.

The decline in technical equipment on farms leads to poor and incomplete tillage, delays in agricultural work, and, consequently, reduced yields. Furthermore, under the pretext of saving fuel, land protection measures against wind and water erosion are neglected, creating conditions for dust storms and leading to the erosion of the fertile soil layer.

Why is the decision to purchase agricultural machinery on credit made? Research shows that when comparing two agricultural options—using equipment from service companies (machinery and tractor fleets) and using one's own equipment—the latter is considered more profitable [4].

That is why the state in our republic is placing great emphasis on strengthening the material and technical base of agricultural producers. Specifically, in 2022, preferential loans were allocated through JSCB Agrobank for the purchase of equipment by farms. The aforementioned farm's financial statements for 2021–2023 were used as the source of information for the analysis. In 2021, the farm's net profit amounted to 5,150,000 soums; the following year, this figure reached 32,335,000 soums, and in 2023, it amounted to 29,885,000 soums. These indicators are considered relatively low, and the presence of a "deferred expenses" item in 2023 of 207,343.5 thousand soums means that actual net profit should be lower. The change in relative indicators, which provides a clearer picture of the financial position, is presented in Table 1.

Table 1. Changes in financial indicators of the Orol farm as a result of investment activities [5].

№	Indicators	2021.	2022.	2023.
1	Solvency (coverage) ratio	1,25	1,42	0,89
2	Ratio of working capital to equity	0,20	0,30	-0,53
3	Profitability ratio	0,01	0,04	0,10
4	Ratio of equity to short-term debt	0,28	0,45	0,22

The most notable aspect of the data in Table 1 is that in 2023, the Orol farm's return on investment ratio began to improve: it rose from 0.01 (three years ago) to 0.10. It's worth noting

that if this ratio is below 0.05, the enterprise is considered low-profit. However, other indicators show negative trends. In 2023, the solvency ratio fell to 0.89 (a value below 1.25 is considered unsatisfactory). The working capital ratio fell to -0.53 (a value below 0.2 is considered critical).

Fluctuations in the equity-to-current debt ratio were also observed, having decreased to 0.22 after an initial increase. This ratio determines the extent to which borrowed funds are repaid from internal sources; a value below 1 indicates high financial risk. Consequently, the farm's situation remains unfavorable based on this indicator.

Summarizing the above, it can be concluded that the farm's financial condition at the end of 2023 is unsatisfactory. In our opinion, the following factors contribute to this: the farm's outstanding debt to suppliers amounting to 468 million soums; unsold finished goods balances amounting to 331 million soums; incurred deferred expenses amounting to 207 million soums; long-term debt to the bank on the loan and interest amounting to 627.6 million soums.

In our opinion, this suggests that agricultural producers are in dire need of government support. Furthermore, it would be beneficial for farms to specialize in growing in-demand, high-yield, and export-oriented products through production diversification.

Studying the experience of developed countries in improving the investment climate and risk management in agriculture is crucial for national economies. The study analyzed effective models from countries such as Israel, Türkiye, and Chile.

The effectiveness of investment in Israeli agriculture is explained by the continuous financing of the production-storage-processing chain. Israel's investment policy involves channeling international financial resources through commercial banks on preferential terms: long-term (10-15 years) and at low interest rates. The primary focus is not only on crop production but also on the creation of high-tech processing facilities. Relevance for our study: our proposal to channel funds from international financial institutions in national currency at a 4% interest rate logically aligns with the Israeli model of targeted financing.

In Israel, the Smart Money system and value chain financing have enabled agricultural yields to reach some of the highest levels in the world. Investments in innovative financing and water-saving technologies have increased greenhouse tomato yields from 60–70 tons to 300 tons per hectare (compared to the global average of 50–80 tons using traditional methods).

Following the reforms, Israel shifted from exporting fresh fruits and vegetables to exporting processed products with high added value. As a result, agricultural export revenues have exceeded \$2.2 billion over the past 20 years. Water use efficiency—the value of the product obtained from each cubic meter of water—has increased by 40% as a result of the reforms. Key factors in this success include preferential loans and value chain-focused technologies.

Let's move on to the economic efficiency assessment portion of our study. To forecast the expected changes in Uzbekistan's agriculture if our proposals are implemented, we will use existing trends and a “growth coefficient” based on international experience.

Processing capacity development forecast: Providing foreign loans at a 4% interest rate for 10 years will dramatically increase processing capacity.

- Current status: The processing rate of fruit and vegetable products is approximately 15-20%.

- Forecast: Due to long-term and low-cost resources, this figure could reach 35-40% by 2030. Export revenue from finished products (juices, canned goods, freeze-dried products) instead of raw materials will increase by an average of 1.8 times per ton of product.

Turkey's Experience in Agricultural Insurance: In Turkey's experience, the primary principle of agricultural insurance is “Public-Private Partnership”. The TARSIM (Tarım Sigortaları Havuzu) system, created in 2005, serves to centralize the insurance market and reduce costs for farmers.

- Mechanism: In Turkey, 50% of insurance premiums are covered by the state budget. This mechanism allows for expanded insurance coverage and minimizes the risks of commercial banks when lending to agricultural projects. Applying this experience to Uzbekistan—by subsidizing the insurance costs of farmers with export contracts—will ensure the sustainability of the food supply chain.

Results of reforms in Turkey: The introduction of the agricultural insurance system in Turkey has dramatically reduced the risks of investing in the sector. **Insurance coverage:** While only 0.5 million insurance policies were issued in 2006, when the system was launched, this figure exceeded 2.1 million by 2020. **Export growth:** After stabilizing the insurance system, fruit and vegetable exports increased from \$1.6 billion in 2005 to \$3.5 billion by 2022 (more than doubling). **Compensation:** With the state paying 50% of the insurance premium, farmers were reimbursed 70–80% of damages from natural disasters, preventing bankruptcy. The state-subsidized insurance system (TARSIM) was a key factor in this success.

Economic efficiency of agricultural insurance. Currently, the level of fruit and vegetable crop insurance in Uzbekistan remains low (approximately 5-7%). It is projected that with the implementation of our proposal for 50% premium compensation, the volume of insured acreage will increase 3-4 times over the next three years.

Economic impact: direct losses of farmers from natural disasters (frost, hail) will be borne by insurance companies rather than the state budget. This will increase the financial sustainability ratio in agriculture from 0.15 to 0.45.

Our proposed 4% loans and 50% insurance coverage will serve as an “economic driver,” similar to the experience of Turkey and Israel. These figures confirm that state-sponsored risk sharing (insurance) and financial burden sharing (preferential loans) will allow for at least a twofold increase in exports.

Chile's Experience in Technology Transfer. Chile's Technology Transfer program is considered one of the most successful models for attracting foreign experts to develop new agricultural technologies. The Chilean government encourages export-oriented clusters by reimbursing up to 50% of the salaries and costs of foreign specialists (agronomists, laboratory staff). This allows for the upgrading of local personnel and the improvement of product quality to international standards.

As a result, although this system may not directly reduce production costs, it increases their competitiveness in foreign markets by 2-3 times. Attracting qualified agronomists and entomologists prevents a “technological crisis.” Based on the experience of Israel and Turkey, yields in intensive orchards and greenhouses can be predicted to increase by 25-30%.

Quality control will also improve: in clusters employing foreign specialists, the “exportability level” of products (compliance with international standards) will increase from the current 40-50% to 80-85%. Thanks to these reforms, Chile, which previously had problems with fruit quality, has become the world's number one fruit exporter in many areas within 10-15 years. Subsidies for foreign experts and consulting have been key factors in this success.

The analysis shows that the sustainable development of agriculture requires the integration of the following three key factors:

1. Long-term, low-cost loans (based on the Israeli model);
2. Insurance based on government subsidies (based on the Turkish model);
3. Support for technological consulting (based on the Chilean model).

The combined use of these mechanisms will not only improve the financial stability of farms but also enable a qualitative technological breakthrough in the agricultural sector.

Table 2. Comparative forecast table (for 2026–2028) [6].

№	Indicators	Current status (approximate)	Forecast (when implementing proposals)	Economic effect
1	Processing level	18%	35%	Doubled added value
2	Insured area	7%	30%	Reduced financial risks
3	Average yield (intensive)	100% (base)	130%	Increased production volume by 30%
4	Export revenue (per ton)	\$600–700	\$1,100–1,200	Significant increase in foreign exchange earnings

In our study, we used the following simplified cost-effectiveness formula:

$$E = \frac{(V_p - V_c) + I_s}{C_{inv}}$$

In the presented formula, the indicators are defined as follows:

- E — economic efficiency of investments;
- V_p — projected production volume (increase after the implementation of proposals);
- V_c — current production volume;

- Is — funds saved through insurance compensation;
- Cinv — volume of directed preferential investments.

Based on the conducted research on improving the use of investments in sustainable agricultural development, the following conclusions and proposals were formulated:

1. Financing system:

- To ensure the country's food security, it is advisable to allocate funds from international financial institutions through commercial banks in national currency at a rate of 4% per annum for a period of 10 years (with a 5-year grace period).
- Expected result: This low-interest, long-term resource will allow for the expansion of processing capacity. According to calculations, this will increase the efficiency of the horticultural value chain by 1.8 times.

2. To improve the agricultural insurance mechanism:

- It is necessary to introduce a system of state coverage of 50% of the insurance premium (but no more than 1% of the insured amount) for clusters and farmers with export contracts.
- An analysis of the Turkish (TARSİM) experience shows that this approach will increase insurance coverage to 30% and ensure the financial stability of agricultural entities in the event of natural disasters.

3. Human capital and innovation transfer:

- It is proposed to reimburse 50% of the costs of attracting highly qualified foreign agronomists, entomologists, and laboratory specialists through the Ministry of Agriculture (equivalent to up to \$1,000 per month).
- Economic impact: By attracting foreign technologies and knowledge, the level of export suitability of products (compliance with Global GAP standards, etc.) will increase from 40% to 85%, and average yields will increase by 25-30%.

4. Overall economic efficiency:

- The proposed measures will not only increase the return on investment (ROI) in agriculture but also create an environment of “investment attractiveness” in the industry. This will serve as a key factor in increasing the processing level in the sector from the current 18% to 35-40% by 2030.

Conclusion and Proposals

Based on the study results, the following proposals were developed.

To ensure the country's food security, projects aimed at creating value chains in the food sector will be financed by international financial institutions through commercial banks in national currency at a base rate of 4% per annum for a period of 10 years (with a 5-year grace period).

In the area of agricultural insurance, fruit and vegetable clusters and farms with export contracts will be reimbursed 50% of the paid crop insurance premium, but no more than 1% of the total insured amount.

In the area of personnel provision, compensation will be paid through the district offices of the Ministry of Agriculture to fruit and vegetable clusters in the amount of 50% of the costs of attracting qualified foreign agronomists, entomologists, and laboratory specialists (equivalent to no more than \$1,000 per specialist per month).

In our opinion, the strategic direction for agricultural development should be the maximum utilization of natural and biological factors for crop and livestock productivity.

An analysis of food consumption in the Andijan region's compliance with rational consumption standards revealed that meat and egg consumption is below medically recommended levels. Therefore, to ensure the health and well-being of future generations, it is necessary to increase the supply of meat and eggs. To this end, it would be appropriate to strengthen support for livestock farms through subsidies and additional funding for pasture conservation measures.

When examining the sources of investment in agriculture in the Andijan region from 2017 to 2021, foreign loans accounted for 81.9% of foreign sources, while foreign direct investment (FDI) accounted for only 18.1%. Therefore, it is necessary to stimulate the influx of foreign direct investment. From this perspective: it is necessary to organize the posting and regular updating of a comprehensive database on the investment portal regarding the investment potential of regions, existing opportunities, and other information of interest to investors; it is advisable to develop a list of ready-made investment proposals reflecting the potential of each region and present them to foreign investors on a recommendatory basis.

It is essential to integrate generally accepted international principles of sustainable finance into the development of the green finance market in the country. Based on an analysis of international practices, green bonds and loans are viewed as a specialized financing instrument for environmental projects. To facilitate their wider adoption, the government must adopt a number of legal, organizational, methodological, and advisory measures aimed at increasing the interest of issuers and investors in issuing and purchasing green bonds.

Based on an econometric model of the factors influencing the use of investments in sustainable agricultural development, projected investment volumes up to 2030 were developed. This forecast showed that labor force and arable land will decline in the future.

Under these conditions, achieving sustainable agricultural development is possible through increased labor productivity, increased crop yields, and crop diversification. In our opinion: to increase labor productivity, investments must be directed toward smart agriculture; to increase crop yields, additional funding is required for seed production and livestock farming; to prevent further decline in arable land, strict controls must be established over the withdrawal of irrigated agricultural land from cultivation.

In our opinion, it is necessary to adopt the Law of the Republic of Uzbekistan "On Investment Development of Agriculture".

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