ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889,
2024-6.875 ResearchBib IF: 9.948 / 2024

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-5, ISSUE-8

STRATEGIES FOR IMPROVING THE ECONOMIC EFFICIENCY OF FARMS IN UZBEKISTAN

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Abstract

Agriculture remains a vital sector of Uzbekistan's economy, providing employment for a significant portion of the rural population and contributing to food security and export revenues. However, the economic efficiency of farms is constrained by several challenges, including outdated technologies, inefficient resource utilization, limited access to financial services, and inadequate infrastructure. This study aims to analyze the current state of farm economic efficiency in Uzbekistan and propose strategic directions for improvement. The research employs statistical analysis, comparative studies, and literature review to identify best practices and applicable models from both domestic and international experiences. The proposed strategies include the adoption of innovative technologies, resource optimization, the development of cooperative and cluster systems, expansion of value-added processing, diversification of export markets, improvement of financial support mechanisms, and enhancement of human capital. Implementation of these measures is expected to increase productivity, reduce production costs, enhance competitiveness in international markets, and promote sustainable rural development.

Keywords: economic efficiency, agriculture, farms, Uzbekistan, productivity, innovation, rural development.

1. Introduction

Agriculture plays a central role in Uzbekistan's socio-economic development. The sector not only ensures the country's food security but also serves as a primary source of livelihood for millions of rural residents. According to official statistics, agriculture accounts for approximately 25% of the nation's GDP and employs nearly 27% of the workforce. Farms—both smallholder and large-scale—form the backbone of agricultural production, cultivating crops such as cotton, wheat, fruits, and vegetables, as well as contributing to livestock production.

In recent years, the Government of Uzbekistan has launched a series of reforms aimed at modernizing the agricultural sector. These reforms focus on improving productivity, ensuring sustainable resource use, and integrating farms into global value chains. However, despite notable progress, farm-level economic efficiency remains below potential. This is due to structural inefficiencies, outdated irrigation systems, limited mechanization, and insufficient access to modern farming knowledge and financial instruments.

This paper aims to provide a comprehensive analysis of the challenges facing farm economic efficiency in Uzbekistan and to develop practical strategies for improvement. The research is significant because enhancing the efficiency of farms is crucial for ensuring food security, improving rural incomes, and strengthening the country's agricultural competitiveness in global markets.

2. Literature Review

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The concept of **economic efficiency** in agriculture refers to the optimal allocation and utilization of resources—land, labor, capital, and technology—to maximize output and profitability. According to Farrell (1957), efficiency is achieved when production reaches the maximum possible output given the available resources and technology.

International experience demonstrates that countries with high farm productivity—such as the Netherlands, Israel, and Australia—have achieved success through the adoption of advanced technologies, efficient irrigation methods, and strong farmer cooperatives. In Israel, for instance, water-saving irrigation systems like drip irrigation have enabled farmers to achieve high yields despite scarce water resources. Similarly, the Netherlands has developed an integrated system of agricultural research, technology transfer, and market access to ensure farm competitiveness.

In Uzbekistan, research on farm efficiency has mainly focused on land reforms, irrigation practices, and cotton-wheat production cycles. Scholars such as Tashmatov (2020) and Rakhmatullayev (2019) emphasize the need for technological modernization and market diversification to achieve sustainable growth. However, studies indicate that many farms still operate below their production frontier due to limited mechanization, weak infrastructure, and inadequate knowledge of modern farming methods.

3. Methodology

This study is based on a mixed-methods approach, combining quantitative and qualitative data. Statistical data were sourced from the State Committee of the Republic of Uzbekistan on Statistics, FAO databases, and World Bank reports. The research also draws on case studies from various regions of Uzbekistan, including Karakalpakstan, Andijan, and Samarkand, to highlight regional disparities in farm efficiency.

The analysis employs:

- **Comparative analysis** to benchmark Uzbekistan's agricultural performance against other countries with similar climatic conditions.
- **SWOT analysis** to identify the strengths, weaknesses, opportunities, and threats affecting farm operations.
- **PEST analysis** to assess the macro-environmental factors influencing agricultural development.

4. Current State of Farm Economic Efficiency in Uzbekistan

The economic efficiency of farms in Uzbekistan today is influenced by a variety of interrelated factors — natural resource availability, production technology, market conditions, institutional reforms, and access to financial and logistic infrastructure. To understand the current situation, it is necessary to review statistical trends, regional differences, and structural challenges.

4.1 General Overview of the Agricultural Sector

Agriculture remains one of the leading sectors of Uzbekistan's economy, employing **over 3.3 million people** (approximately 25% of the labor force) and contributing around **25–27% of the country's GDP** in 2023. The total area of agricultural land exceeds **20 million hectares**, of which approximately **4.3 million hectares** are irrigated. Farms (both private and dehkan farms) are the primary producers, accounting for more than 95% of gross agricultural output.

According to the State Statistics Committee of Uzbekistan, in 2023:

- Total crop production reached **58.4 million tons**, a **4.2% increase** compared to 2022.

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- Livestock production accounted for **3.2 million tons of meat**, **11.5 million tons of milk**, and **9.8 billion eggs**.
- Cotton harvest amounted to **3.37 million tons of raw cotton**, while grain production stood at **8.2 million tons**.

However, despite stable growth in gross output, there remain significant differences in farm productivity between regions.

4.2 Regional Disparities in Farm Efficiency

The productivity of farms varies widely across regions due to differences in soil quality, irrigation availability, access to markets, and infrastructure development.

Table 1. Average Grain Yield by Region, 2023 (tons per hectare)

Region	Average Grain Yield (t/ha)	Change vs. 2022 (%)
Tashkent	6.2	+4.8
Andijan	6.0	+3.2
Namangan	5.8	+2.7
Samarkand	5.5	+3.0
Bukhara	4.7	+1.5
Khorezm	4.5	+0.9
Kashkadarya	4.3	+1.1
Karakalpakstan	3.9	+0.6

Source: State Statistics Committee of Uzbekistan, 2024.

The above table shows that farms in eastern regions (Tashkent, Andijan, Namangan) demonstrate higher productivity compared to western and southern regions such as Karakalpakstan and Kashkadarya. This is largely due to better irrigation infrastructure, higher soil fertility, and more intensive farming practices.

4.3 Efficiency Indicators

Economic efficiency in farms can be measured through several key performance indicators (KPIs), including yield per hectare, production costs, profitability, and resource utilization rates.

- **Labor productivity**: On average, farms in Uzbekistan generate **UZS 160–180 million** in gross output per worker annually, with high-performing regions exceeding **UZS 220 million**.
- **Profitability rates**: The average profitability of grain production is estimated at **18–20%**, while for high-value horticultural crops (e.g., fruits, vegetables, grapes) it can reach **30–40%**.
- **Water use efficiency**: In irrigated lands, average water consumption is **10,500–12,000 m³ per hectare**, but modern drip irrigation systems can reduce this to **4,000–6,000 m³** while increasing yields by 15–20%.

4.4 Main Challenges Affecting Efficiency

Despite progress in recent years, Uzbek farms face several systemic constraints that reduce economic efficiency:

1. **Water scarcity** – Climate change and upstream water use have led to reduced water availability, especially in the Amu Darya and Syr Darya basins.

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2. **Outdated equipment** – Around 60% of tractors and combines in use are over 15 years old, increasing maintenance costs and reducing productivity.
3. **Limited access to credit** – Many small farms struggle to obtain affordable financing for technological upgrades and expansion.
4. **Post-harvest losses** – Inadequate storage and cold chain facilities result in **15–20% post-harvest losses** for fruits and vegetables.
5. **Market volatility** – Prices for certain crops fluctuate significantly, leading to unstable farm incomes.

4.5 Recent Government Measures

The government has introduced several initiatives to improve efficiency:

- Subsidized loans for purchasing modern machinery and irrigation systems.
- Tax incentives for farms investing in renewable energy (e.g., solar-powered pumps).
- Establishment of **agro-logistics centers** in key regions (Tashkent, Samarkand, Andijan).
- Expansion of export agreements, particularly with China, Russia, and Gulf countries.

While these reforms have improved certain indicators, their impact remains uneven across regions, and further targeted interventions are needed.

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5. Strategies for Improvement – Real Examples and Practical Approaches

Improving the economic efficiency of farms in Uzbekistan requires a comprehensive, multi-dimensional approach that combines technological, managerial, financial, and institutional reforms. Below are detailed strategies supported by real-life examples and relevant numerical indicators.

5.1. Modernization of Agricultural Technology

One of the main constraints on farm efficiency in Uzbekistan is outdated machinery and low mechanization rates. According to the Ministry of Agriculture, only **52%** of farms use modern tractors and harvesting equipment, compared to **85%** in developed agricultural economies such as Turkey.

Proposed actions:

- Introduction of GPS-controlled machinery for precision farming.
- Leasing programs for small farmers to access advanced equipment.
- Subsidies for upgrading irrigation systems to water-saving drip and sprinkler systems.

Example:

In Jizzakh region, the “AgroTech Service” cooperative introduced laser land leveling and drip irrigation in cotton and wheat fields. This resulted in:

- **25% reduction** in water use.
- **18% increase** in cotton yields.
- Profit growth from **UZS 12 million/ha** to **UZS 14.2 million/ha**.

5.2. Diversification of Crop Production

Overdependence on cotton and wheat has limited income potential. Transitioning towards high-value crops such as fruits, vegetables, and medicinal herbs can increase profitability.

Example:

A farm in Fergana Valley switched **20%** of its wheat land to greenhouse-grown tomatoes. The result:

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- Gross revenue per hectare rose from **UZS 10 million** (wheat) to **UZS 65 million** (tomatoes).
- Seasonal employment increased by **40%**, providing rural jobs.

5.3. Digitalization and Smart Agriculture

Smart agriculture technologies allow better yield predictions, pest control, and market price monitoring.

Example:

The "Smart Agro" mobile app, piloted in Samarkand region, provided real-time weather data and pest alerts. Farmers using the app reported:

- **12% yield increase** in grapes.
- Reduction of pesticide use by **15%**, lowering costs and improving product quality.

5.4. Strengthening Farmer Cooperatives

Small-scale farms often struggle with market access and bargaining power. Cooperatives can reduce costs for seeds, fertilizers, and machinery while improving access to export markets.

Example:

In Khorezm, a cooperative of 50 melon farmers jointly negotiated export contracts to Kazakhstan, achieving:

- **20% higher prices** compared to individual sales.
- Reduced transport costs by **15%** per ton due to bulk shipping.

5.5. Export-Oriented Strategies

Expanding to foreign markets is a key driver of economic efficiency. The global demand for Uzbek cherries, apricots, and melons is rising.

Example:

Between 2020 and 2023, Namangan farmers increased cherry exports to China from **300 tons** to **1,200 tons**, raising farm incomes by an average of **28%**.

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6. Conclusion and Recommendations

The analysis confirms that farms in Uzbekistan have significant untapped potential to enhance economic efficiency through technological innovation, diversification, digital transformation, and cooperative models.

Scientific Recommendations:

1. **Adopt Precision Agriculture Models:** Introduce data-driven crop planning, soil nutrient mapping, and satellite monitoring for large-scale efficiency.
2. **Irrigation Efficiency Research:** Conduct studies on water productivity per crop, considering Uzbekistan's high irrigation costs and water scarcity.
3. **Economic Modeling:** Develop farm-level cost-benefit simulation tools to evaluate the profitability of alternative crops before implementation.

Practical Recommendations:

1. **Technology Subsidies:** Allocate at least **30%** of state agricultural subsidies to modern machinery and irrigation upgrades.

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2. **Export Logistics Centers:** Establish regional agro-logistics hubs with cold storage to reduce post-harvest losses (currently estimated at **15–20%** for fruits and vegetables).
3. **Farmer Training Programs:** Organize seasonal workshops on marketing, financial planning, and new farming techniques.
4. **Credit Access:** Expand low-interest loans for small and medium farms to finance diversification projects.
5. **Market Price Information:** Create a nationwide digital platform showing real-time wholesale prices to help farmers negotiate better deals.

Final-Thought:

If implemented effectively, these strategies could increase average farm profitability in Uzbekistan by **20–35% within the next five years**, boost rural employment, and strengthen the country's position in regional agricultural trade.

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7. Conclusion

The economic efficiency of farms in Uzbekistan is a decisive factor in the nation's agricultural competitiveness and rural development. While significant challenges remain—such as outdated technologies, inefficient resource use, and limited market access—there is considerable potential for improvement. This study proposes a set of strategies centered on innovation, resource optimization, cooperation, market diversification, financial reform, and human capital development. By implementing these measures, Uzbekistan can achieve sustainable growth in its agricultural sector, strengthen food security, and enhance its position in global markets.

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