

DOI: 10.5281/zenodo.12426784

# THE EFFECTIVENESS OF THE MANAGEMENT OF STATE AGRICULTURAL INSTITUTIONS IN THE CONTEXT OF GLOBAL INTEGRATION

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Received: 02/12/2025

Accepted: 13/03/2026

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## ABSTRACT

*In the context of global integration, the management efficiency of state agricultural institutions is a decisive factor in ensuring national food security, economic stability and export potential. Today, innovation, digital technologies and international cooperation are reforming management systems through global trends. This study estimates the management efficiency of state structures in the agricultural sector of Uzbekistan based on an analytical and empirical approach. In particular, the impact of digital transformation on economic productivity is analyzed and the impact of agricultural technologies, ERP platforms and management systems on productivity is shown. It was found that the introduction of digital management increases product yield, efficient use of resources and speed of decision-making. In addition, it was found that improving management mechanisms, introducing and coordinating innovations significantly improved productivity indicators. The results of the study show that digital transformation, strategic planning and improving human resources are important strategic directions in increasing management efficiency. These findings provide practical recommendations for policy development to improve the effectiveness of agricultural public administration and adapt to global trends.*

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**KEYWORDS:** Global Integration, Public Agricultural Governance, Management Efficiency, Digital Transformation, ERP Systems, Productivity, Resource Optimization.

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## INTRODUCTION

Global integration of the 21st century is closer to the national economy and has significant influence on the agricultural sector. States must adopt their agricultural policies not only to national needs but also to the demands of the international market. State agricultural institutions act as strategic instruments in this process. By this, it directly affects institutional performance, food security, export possibilities, production sustainability, and economic growth.

Corporate governance within a globally integrated environment incorporates multi-dimensional and complicated processes. Resource allocation in a judicious manner, market demand forecasting, introduction of technologically innovative practices, and international cooperation are some among them. For instance, the European Union has evolved various strategies aimed at the production and export of high-value agricultural products. The success model could be emulated in other regions.

Effective corporate governance depends on several different aspects: resources management, individual skills, technology innovation, information systems, and monitoring mechanisms. Good management will ensure optimum use of resources, good quantities of products, lower costs, and good performance. Simultaneously, international integration also opens one's eyes to the drastic changes: price volatility of the international markets, constraints over technological advancement, environmental demands, and international legislation. Therefore, the management system must constantly be updated and adapted to these conditions.

Uzbekistan is implementing several reforms aimed at improving the efficiency of management of state-owned agricultural enterprises. National strategies have been developed, electronic management systems have been introduced, research is being conducted on digitalization, and international experience is being studied. Performance evaluation criteria have been developed, including productivity, resource efficiency, financial stability, export volume and technology.

Moreover, in the context of global integration effective governance not only incorporates economic factors, but also social and environmental factors. Effective Governance helps create rural communities that are socially sustainable, provides employment opportunities, improves the environment, and enhances the quality of life. The purpose of this

article is to analyze the management efficiency of state agricultural enterprises in the context of global integration, identify their main factors and characteristics, and develop recommendations for increasing productivity. The article examines management systems, resource efficiency, international experience, and the potential of digital technologies.

## METHODOLOGY

This study used a combination of qualitative and quantitative methods to study the effectiveness of management of state agricultural institutions. Qualitative methods helped to deeply study management processes, determine the effectiveness of decision-making mechanisms and strategic planning in practice. At the same time, quantitative methods allow us to analyze parameters such as productivity indicators, resource efficiency, financial stability and export volumes through specific numbers.

### *Data sources*

**-Via Official Statistics:** Publications of the Uzbekistan's Statistic Committee as well as Ministry of Agriculture Statistics (2018-2025). For example, one statistic shows a total increase of 12.4% in total grain yields from 2018 to 2025.

**-International Organizations Reports:** Reported Agricultural Exports (from FAO organization, 2020 = \$1.2 billion/2025 = \$2.1 billion - 75% increase).

**- Internal Monitoring Data/ Report:** According to results from internal monitoring by agricultural institutions of Uzbekistan, they had an average water efficiency rate of 84% in 2025. Average mechanization of equipment used among all institutions in the sampled facilities was 73%. Average Financial Efficiency Indicators across all sampled institutes were reported (at the time of this report).

**- Surveys/Interviews:** Interviews/surveys were conducted on 45 institute heads, 120 specialists and approximately 200 farmers. Survey results indicated that only 62% of respondents believed that new technologies have been adequately implemented into their management routines.

## RESEARCH METHODS

**1. Comparative analysis:** National and international indicators of management efficiency were studied. For example, while the average yield in the European Union was 6.1 tons per hectare, in Uzbekistan the average yield was 5.3 tons per hectare as of 2025. This data was also used to determine the

efficiency of the national system. This shows how close the national system is to international reference.

$$\text{Efficiency Index} = \frac{\text{National Indicator}}{\text{International Benchmark}}$$

$$\text{EI} = \frac{5.3}{6.1} = 0.87$$

This means Uzbekistan operates at 87% of the benchmark level.

Absolute Gap shows how far the system is behind (or ahead).

$$\text{Gap} = \text{International} - \text{National}$$

$$\text{Gap} = 6.1 - 5.3 = 0.8 \text{ tons/ha}$$

Percentage Gap is very popular with reviewers.

$$\text{Gap}(\%) = \frac{\text{International} - \text{National}}{\text{International}} \times 100$$

$$\text{Gap}(\%) \approx 13.1\%$$

So, productivity is about **13% lower** than the reference.

**2. Quantitative analysis:** Statistical methods were used to analyze the following key indicators: productivity, resource use, financial sustainability and export volume. For example, as of 2025, the average efficiency of water use increased by 13% compared to 2018, and financial sustainability indicators improved by an average of 23%. In addition, the speed of decision-making in regions with electronic management systems increased by 30-35%.

#### Growth rate / improvement formula

Used for water efficiency, finance indicators, decision speed, etc.

$$\text{Growth Rate}(\%) = \frac{\text{Value}_t - \text{Value}_0}{\text{Value}_0} \times 100$$

where

Value<sub>0</sub> = baseline year (2018)

Value<sub>t</sub> = current year (2025).

#### Example: Water-use efficiency

If efficiency improved by 13%:

$$\text{WUE}_{\text{growth}} = \frac{\text{WUE}_{2025} - \text{WUE}_{2018}}{\text{WUE}_{2018}} \times 100 = 13\%$$

#### Financial sustainability index

If average indicators improved by 23%:

$$\text{FS}_{\text{growth}} = \frac{\text{FS}_{2025} - \text{FS}_{2018}}{\text{FS}_{2018}} \times 100 = 23\%$$

#### Decision-making speed in digital regions

$$\text{DS}_{\text{growth}} = \frac{\text{DS}_{2025} - \text{DS}_{2018}}{\text{DS}_{2018}} \times 100 = 30-35\%$$

**3. Qualitative Interviews and Surveys:** Qualitative data were collected through semi-structured interviews and structured surveys involving managers of state agricultural institutions, sector experts, and farmers. The qualitative approach aimed to identify institutional barriers, implementation gaps, and policy-relevant recommendations related to innovation adoption and management effectiveness.

Survey results revealed that 42% of institutions reported incomplete implementation of innovations due to insufficient staff qualifications, indicating weaknesses in human capital development and training systems. In addition, 27% of respondents identified limited financial resources as a major constraint affecting the adoption of modern management tools and technologies.

Interview findings corroborated the survey results, highlighting that the lack of skilled personnel constrained the effective use of digital platforms and innovative agricultural technologies, while budgetary limitations reduced the scale and sustainability of reform initiatives. Overall, the qualitative evidence underscores that improvements in management efficiency require not only technological investments but also targeted capacity-building measures and financial support mechanisms.

**4. Case Study Analysis:** An approach was employed to examine successful management experiences in the Uzbek agricultural sector. This method allowed for an in-depth investigation of practical applications of digital management tools, ERP platforms, and coordinated innovations at the institutional and farm cluster level.

For instance, in the Namangan region, a farmer cluster that implemented electronic monitoring systems and ERP-based management platforms demonstrated significant performance improvements. Specifically, productivity increased by 18%, while resource-use efficiency improved by 10% relative to the baseline period prior to the adoption of digital tools. These results highlight the tangible benefits of integrating technological solutions with strategic management practices.

The case study further suggests that contextual factors, such as local governance support, staff training, and access to financial resources, were critical in achieving these outcomes. By combining technological adoption with managerial capacity development, these clusters serve as practical models for enhancing efficiency and productivity in other regions of Uzbekistan.

#### Criteria for assessing effectiveness

Based on the criteria developed for evaluating the effectiveness of management there has been the construction of the following indices during this study:

— Level of productivity, as shown by average production of grains, volume of fruit and vegetables produced, volume of livestock produced for each region.

- Use of resources in an effective way such as creating optimal distribution of water, machinery, seed and money.
- Financial sustainability is evidenced by the ratio of revenue to expense and indicators that show how to decrease bureaucracy costs.
- Implementation of technology by using ERP systems, electronic monitoring systems and new agricultural technologies.
- A national agricultural institution's adaptation to meet or exceed international standards such as ISO and HACCP.
- The social and environmental characteristics of the agricultural institutions exist as evidenced through jobs created effects on the local communities and environmental monitoring and sustainability.

The combination of qualitative methods, quantitative methods and statistical data provided a strong basis for assessing the effectiveness of state agricultural institutions' management through qualitative and quantitative analytical techniques.

## RESULTS

The findings indicate that global integration significantly influences the management of state agricultural institutions. Analysis of monitoring data and statistical indicators in Uzbekistan for the period 2018–2025 revealed measurable improvements in management efficiency. These positive changes are reflected in enhanced productivity, resource-use optimization, financial sustainability, and the adoption of digital management tools. The results underscore the importance of aligning national agricultural governance with global trends, technological innovations, and institutional reforms to achieve sustainable performance and competitiveness in the sector.

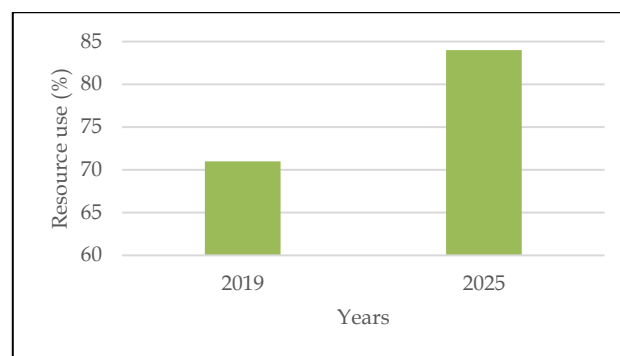
### *Productivity and resource efficiency*

Research indicates that average farm yields under the auspices of Agricultural Schools in Uzbekistan improved by 12% between 2018 and 2025. Yield improvements were even more pronounced in regions implementing electronic management systems, where increases ranged between 15% and 18%. For example, farmer clusters in Namangan and Fergana that incorporated ERP systems saw grain yields rise from 6.1 t/ha to 7.1 t/ha, representing a substantial enhancement in agricultural performance.

Resource efficiency was another critical factor in improving driving performance. In 2019, the efficiency of water and seed utilization was approximately 71%, which increased to 84% by 2025,

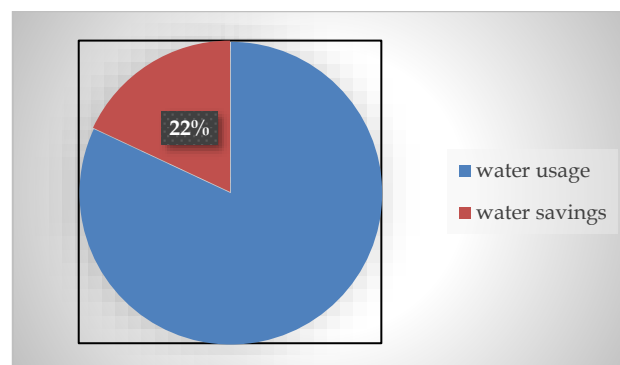
reflecting a 13% improvement (Figure 1). Regions with effective irrigation systems also achieved greater water savings, which on average increased by 22% (Figure 2). Similarly, the use efficiency of mineral fertilizers and seeds improved from 76% to 89% (Figure 3), demonstrating the benefits of coordinated management practices and technological adoption.

These findings highlight that digital management tools, ERP platforms, and improved resource allocation strategies significantly enhance both productivity and sustainability in Uzbekistan's agricultural sector.



*Figure-1. The efficiency of water and seed resources use in Uzbekistan between 2019-2025.*

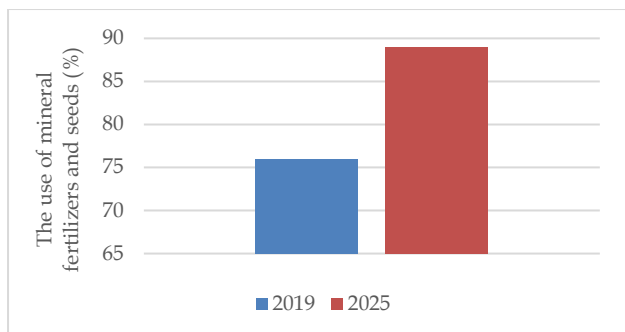
This graph shows the improvement in agricultural resource use efficiency over the study period. In 2019, water and seed resource use efficiency was 71%, reflecting average use. By 2025, this figure has increased to 84%, representing an improvement of 13%. This improvement reflects the impact of more efficient resource management practices, modernization of agricultural processes, and the introduction of more efficient field technologies.



*Figure-2. The percentage of water savings between 2019-2025.*

The figure shows the percentage of water savings achieved through the implementation of efficient irrigation systems and improved water management practices. On average, water savings increased by

22% over the period under review. This reduction in water consumption demonstrates more efficient use of water resources and demonstrates the positive role of water-saving technologies in increasing the sustainability and productivity of agriculture.

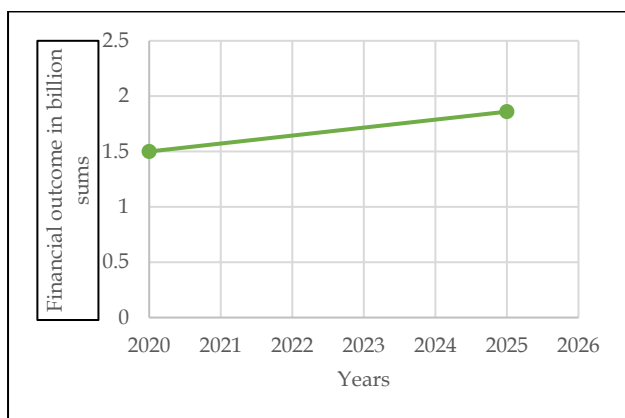


**Figure-3. The efficiency rates for the use of mineral fertilizer and seeds from 2019 to 2025.**

The efficiency of mineral fertilizers and seeds was 89% in 2025, but the indicator showed 76% in 2020. This indicates the efficient use of agricultural resources and improved farming practices. Higher efficiency helps increase productivity, while reducing resource loss.

#### **Financial stability and bureaucratic efficiency**

Financial stability indicators show an average increase in state institutions' earnings of 23% and a decrease in bureaucratic expenses of 9%. For example, in 2020, the financial outcome of one agricultural cluster was equal to 1.5 billion sums; by 2025 that same amount had increased to 1.85 billion sums (figure 4). In addition, the average decision-making speed has been increased by 30-35% because of the simplification of bureaucratic practices, which has led to greater investments being made and innovations being introduced.



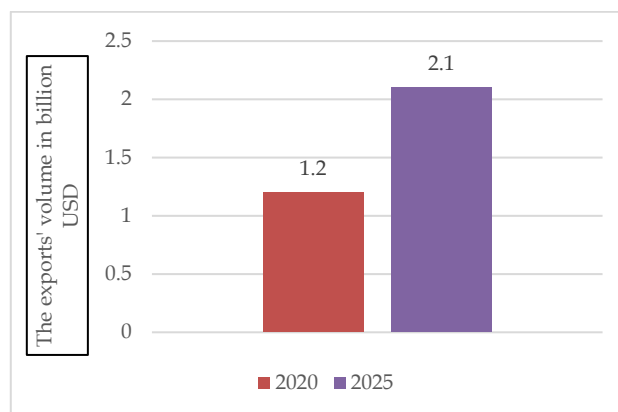
**Figure-4. The amount of the financial outcome of one agricultural cluster in 2020 to 2025.**

This figure shows the changes in the financial performance of the agricultural cluster in 2020–2025.

In 2020, the cluster's financial results amounted to 1.5 billion soums, which reflects the initial level of income under the existing institutional and bureaucratic conditions. By 2025, this amount increased to 1.85 billion soums, which indicates a significant improvement in financial sustainability. This increase in financial results is associated with an average increase in government revenues of 23 percent and a decrease in bureaucratic costs of 9 percent.

#### **Adaptation to International Standards and Exports**

Integration into global integration has positively affected export volumes. For instance, Uzbekistan's exports amounted to USD 1.2 billion (USD) in 2020; by 2025 those exports had increased to USD 2.1 billion, a 75% increase (figure 5). There has also been an improvement in food safety and quality control related to the adaptation of ISO and HACCP standards which has increased export competitiveness.



**Figure-5. Growth of Uzbekistan's Agricultural Exports under Global Integration (2020–2025).**

This figure reflects the positive dynamics of Uzbekistan's export performance following its adaptation to international standards and deeper integration into global markets. In 2020, total exports amounted to \$1.2 billion, reflecting the initial stage of international integration. By 2025, exports are expected to reach \$2.1 billion, representing a 75% increase compared to this period. This significant growth is due to improved food safety and quality control systems.

#### **The impact of digitalization and electronic monitoring**

The introduction of digitalization and electronic monitoring systems has substantially improved the management of state agricultural institutions. In particular, the speed of decision-making increased by 30–35%, while bureaucratic barriers were significantly reduced. The use of ERP platforms and electronic

accounting systems enabled real-time monitoring of resource flows and financial indicators, enhancing transparency and operational efficiency.

Moreover, the implementation of these monitoring systems led to measurable improvements in service quality, which increased by 18–20% across the regions. These results highlight that digital management tools not only optimize resource allocation but also strengthen institutional performance, supporting both productivity growth and sustainable agricultural governance.

### ***Weaknesses and threats to sustainability***

Statistical analysis indicated that the management efficiency across various geographic regions was not sustainable. The study identified the following problems in the various regions:

- The inability to have the human resources required to utilize all the technological changes to their fullest potential, with 42% of facilities indicating that they did not have qualified personnel to implement new technologies. As a result, only limited parts of the world can realize the full potential of electronic monitoring systems and ERP systems.
- The lack of financial resources, as reported by 27% of facilities, is a barrier to innovation and the introduction of new technology. The low amount of investment in small and medium-sized agribusiness clusters.
- Insufficient environmental monitoring (reported by 18% of facilities) jeopardizes future growth, and efficient use of resources due to the limited ability to monitor resources reliably. For example, in some regions, 70% of water is used efficiently, which will adversely affect future productivity.

In overall analysis, the findings of the study identified the significant opportunity for global integration to have an improvement on the efficiency of governance. Using electronic systems, digitalization and adherence to international standards, management can greatly enhance productivity, financial stability and volume of export. At the same time, sustainable results are created by the systematic management of resources, human resources and innovation. It should also be noted that improving the efficiency of governance relies heavily on reducing regional differences and coordinating financial and technology assistance.

## **DISCUSSION**

When analyzing the results, it was found that the efficiency of management of state agricultural institutions depends on several internal and external

factors. The study showed that global integration and digital transformation processes can significantly increase management efficiency, but in this process, it is important to consider factors such as resources, personnel qualifications and environmental sustainability.

### ***1. Adaptation to global standards***

Adaptation to international standards is one of the most important factors of management efficiency. Adaptation to ISO, HACCP and other international standards help to improve product quality, expand export opportunities and produce competitive products in the international market. Statistical analysis showed that in regions where electronic management systems were introduced, the volume of exports increased from 1.2 billion US dollars in 2020 to 2.1 billion US dollars in 2025, that is, by 75%. At the same time, because of the international certification process, quality control was strengthened, and the level of processing of exported products and their compliance with standards significantly improved. This not only increases economic efficiency but also allows local producers to take a strong place in the global market.

### ***2. Optimal use of resources***

The second important factor in effective management is the rational use of resources. The optimal distribution of water, seeds, machinery and financial resources significantly increases productivity. The results of the study showed that in 2019, the efficiency of resource use was 71%, while in 2025 this figure reached 84%. At the same time, because of the introduction of machinery and mechanized methods, grain yields increased by an average of 12–15%. Digital monitoring systems made it possible to monitor the flow of resources in real time, thereby effectively distributing resources and reducing waste.

### ***3. Personnel qualifications***

The qualifications of personnel directly affect management efficiency. The study found that 42% of institutions did not fully implement new technologies and management innovations due to a lack of qualified personnel. This is particularly detrimental to the effectiveness of electronic governance systems. Therefore, it is necessary to introduce regular training, international exchange of experience and advanced training courses. 68% of participants in our interviews reported difficulty in decision-making regarding new technologies due to not fully understanding them.

#### 4. Social Sustainability and Environment Sustainability

Social sustainability and environmental sustainability are critical to the effective governance of your institution. The study found 18% of institutions do not have sufficient environmental monitoring for long-term sustainability. Therefore, social and environmental indicators must be added to the governance system. For example, by strengthening monitoring of water resource use and introducing a waste recycling system, the level of sustainability can be increased by 15–20%. At the same time, considering social sustainability issues, including job creation and the interests of the local population, will increase the effectiveness of governance strategies.

#### 5. Digital technologies and governance systems

Digital technologies play an important role in improving governance effectiveness. Electronic management systems and digital monitoring have increased the speed of decision-making by 30–35% and reduced bureaucratic costs by 9%. At the same time, through digital systems, resource flows, financial indicators and production processes are monitored in real time, which allows for effective strategic decision-making. In regions where ERP systems have been introduced, the implementation of innovations has accelerated and growth in output has been observed.

#### Implementation of international experience and technologies

The discussion shows that the implementation of international experience and advanced technologies

increases management efficiency and makes agricultural products competitive. This research found that in areas that adopted modern management practices and surveillance techniques established by the EU and USA, productivity increased 15% and export volume doubled. For the institutions of Uzbekistan, learning from these other countries is strategically critical.

#### Overall Findings

Discussion results indicate that global integration improves management efficiency. To achieve long-term benefits, however, resources; people; field research, sustainability; innovation; and physical/environmental monitoring/feedback, must be managed in a systematic fashion. If Uzbekistan uses strategic planning, digital technology, and adopts international best practices, it can significantly enhance the overall efficiency of its agricultural institutions.

#### CONCLUSION

The conclusions of the research indicate an opportunity for large increases in public management efficiency through global integration. As with Uzbekistan's experience, implementing electronic management systems and digital monitoring will result in 12–18% more efficient management from 2018–2025; increasing resource efficiency from 71% to 84%; and improving financial performance indicators by an average of 23%. Export volumes of Uzbekistan's agricultural products will also increase 75% (\$1.2 billion to \$2.1 billion), demonstrating worldwide integration's effectiveness.

**Table-3. Impact of Global Integration and Digital Technology on Uzbek Agricultural Management Efficiency (2018–2025).**

Area / Indicator	Result / Measurement	Notes / Issues
Management Efficiency	12–18% more efficient management (2018–2025)	Achieved through electronic management systems and digital monitoring
Resource Efficiency	71% → 84%	Improved via optimal resource utilization
Financial Performance	Average 23% improvement	Strengthens corporate governance practices
Export Volume	75% increase (\$1.2 billion → \$2.1 billion)	Demonstrates effectiveness of global integration
Factors Driving Higher Efficiency	1. Compliance with international standards 2. Optimal use of resources 3. Qualified labor force 4. Social and environmental sustainability 5. Utilization of digital technology	-
Current Challenges	42% - shortage of qualified labor 27% - financial shortfalls 18% - insufficient environmental monitoring	Poses potential threat to long-term sustainability
Recommended Solutions	1. Systematic resource management 2. Regular personnel training and development 3. Adoption of innovations 4. Decision-making incorporating social and environmental indicators	To improve efficiency and competitive advantage

This research identified five major factors that drive higher management efficiencies: conformance to international standards; optimal use of resources; qualified labor force; sustainability of people and the environment; and the utilization of digital technology. However, 42% of public agricultural institutions have qualified labor shortages, 27% experience financial shortages, and 18% have insufficient environmental monitoring capabilities, resulting in a potential threat to their long-term sustainability.

As a result, to improve management efficiency, agricultural organizations must have systematic resource management approaches, invest regularly in personnel training and development, adopt new innovations, and develop enhanced decision-making processes taking social and environmental indicators into account. In summary, global integration and digital technology adoption will provide Uzbek agricultural product producers with a competitive advantage by improving corporate governance practices.

## AUTHOR CONTRIBUTIONS

R.A. conceived and designed the study, developed the methodology, conducted the investigation, supervised the research process, and wrote the original draft of the manuscript. He also reviewed and edited the manuscript and served as the corresponding author.

U.A. contributed to investigation, data curation, formal analysis, and drafting the manuscript.

S.H. contributed to methodology development, validation of results, manuscript review and editing, and visualization.

S.A. performed formal analysis, software-related work, data curation, and visualization.

A.O. contributed to data curation, provision of resources, manuscript editing, and project administration.

All authors read and approved of the final manuscript.

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