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## INNOVATIVE FACTORS FOR IMPROVING THE ECONOMIC EFFICIENCY OF RICE CULTIVATION

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### Abstract

This article examines the innovative factors for enhancing the economic efficiency of rice cultivation in the Andijan region. The analysis is based on open official data related to agriculture at both the national and regional levels, as well as materials from the Ministry of Agriculture of Uzbekistan and state development programs. The study evaluates the impact of resource-saving technologies, laser land leveling, transplanting methods, digitalization, and cluster systems on economic efficiency in rice production. Furthermore, existing challenges are identified, and recommendations for improving efficiency are proposed.

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### Introduction

In the Republic of Uzbekistan, the modernization of agriculture and ensuring food security are among the highest priorities of state policy. Rice is an essential component of the national diet, and increasing its domestic production can significantly reduce dependence on imports.

The Andijan region is one of the most densely populated and economically active regions of Uzbekistan. As of January 1, 2024, the population of the region reached 3,394.4 thousand people, representing a 2.2% increase compared to the previous year (Andstat.uz, 2024). At the same time, agriculture remains one of the principal sectors of employment for the population.

In 2023, the gross regional product of the Andijan region increased by 5.1%, while agricultural output grew by 4% (Senate of the Oliy Majlis of Uzbekistan, 2024). However, the potential for increasing productivity and reducing production costs in rice cultivation has not yet been fully utilized.

The objective of this study is to identify the innovative factors influencing the economic efficiency of rice cultivation in the Andijan region and to assess the economic outcomes of their implementation.

### Literature review and methodolog

This study is based on data obtained from the Ministry of Agriculture of the Republic of Uzbekistan ([agro.uz](http://agro.uz)), the State Statistics Committee ([stat.uz](http://stat.uz)), the Andijan Regional Statistics Department ([andstat.uz](http://andstat.uz)), as well as presidential decrees and resolutions concerning agricultural development

The application of innovative technologies in rice cultivation has been extensively examined in international literature. According to data from the Food and Agriculture Organization (FAO), the System of Rice Intensification (SRI) can increase yields by 20–40% while reducing water consumption by 30–50%. Empirical evidence from Uzbekistan also supports these findings.

The study employs comparative and statistical methods, as well as economic analysis based on official documents and relevant scientific literature.

Rice cultivation in the andijan region: current status. The Andijan region has favorable climatic conditions for rice cultivation. Currently, 9 rice production clusters operate in the region, with a total production capacity of 22,268 tons. According to 2020 data, farms operating within these clusters are distributed across 82,067 hectares of agricultural land (agro.uz).

According to official sources, 2,409 hectares of land have been allocated for rice cultivation in the Andijan region (agro.uz). In Uzbekistan, rice is primarily cultivated in the Republic of Karakalpakstan and the regions of Khorezm, Namangan, Andijan, Jizzakh, Fergana, Surkhandarya, Syrdarya, and Tashkent.

**Table 1.** Rice production indicators in the Republic (based on data from the Ministry of Agriculture)

Indicator	2021-year	2022-year	2023-year	2024-year (planned/achieved)
Total sown area (thousand ha)	90	100	117,7	111
Main crop area (thousand ha)	—	—	57,1	40,3
Double-cropped area (thousand ha)	—	—	60,6	70,9
Expected yield (thousand t)	430	430	485	578
Average yield (centners/ha)	43	46	49,1 (planned)	65-70*
Rice production (thousand t)	—	—	347	—

\* For areas where resource-efficient technologies have been implemented.

Source: Compiled based on data from the Ministry of Agriculture of the Republic of Uzbekistan (agro.uz, 2022) and the State Statistics Committee.

**Laser Land Leveling Technology.** Laser land leveling is a key agronomic practice for increasing rice yields. A uniformly leveled field ensures even water distribution and prevents heterogeneous crop growth. In accordance with a presidential resolution of the Republic of Uzbekistan, laser land leveling was introduced on 50% of rice fields in 2021, with further expansion planned in subsequent years.

According to a 2024 resolution (Lex.uz, PQ-290), 100% of fuel and lubricant costs associated with laser-leveled fields in the Khorezm region are covered through state subsidies. This policy experience is also of practical relevance for other regions, including Andijan.

**Transplanting and Modern Seeding Technologies.** In 2021, at least 20% of rice fields nationwide were cultivated using transplanting methods, while 30% were sown using modern seed drills. The transplanting method significantly increases yield, enhances crop resistance to diseases, and improves water-use efficiency.

According to a government resolution for 2025–2026, 20% of the cost of modern seed drills and transplanting equipment used in rice cultivation will be subsidized by the state (Lex.uz, 2024). These measures create economic incentives for the adoption of innovative agricultural technologies.

**Provision of Certified Seeds.** Beginning in 2023, a nationwide transition to the use of fully certified seeds has been planned. Scientific evidence shows that high-generation certified seeds can increase yields by 10–20%. This factor is particularly important in regions with favorable agro-climatic conditions, such as Andijan.

**Cluster System and Cooperation.** As of 2020, nine rice production clusters were operating in the Andijan region, with a total production capacity of 22,268 tons. Within the cluster system, farms are collectively provided with machinery, seeds, and essential material and technical inputs. This integrated approach reduces production costs by approximately 15–25% compared to independent farming.

Furthermore, since 2024, rice procurement contracts have been concluded through the “Agroplatforma” information system of the Ministry of Agriculture. This digital mechanism enhances transparency and ensures a more reliable and guaranteed market for farmers.

**Digitalization and GPS Monitoring.** According to new regulations introduced in 2024, the volume of harvested rice in the Khorezm region is determined using GPS devices installed on harvesting combines. This technology minimizes disputes between farmers and clusters and enables objective monitoring of actual yield levels.

Agro-climatic sensors, remote sensing technologies (GIS/RS), and drone-based monitoring are increasingly being adopted in Uzbekistan as key components of modern digital agriculture.

**Economic analysis and comparative indicators.** What is the impact of innovative technologies on economic efficiency? The table below presents a comparative analysis of traditional and innovative rice cultivation methods.

**Table 2.** Comparative economic indicators of traditional and innovative technologies

Indicator	Traditional Method	Innovative Method	Difference / Increase
Average yield (centners/ha)	40-45	65-70	+25-30 s/ga (50%)
Water consumption (m <sup>3</sup> /ha)	12 000-15 000	8 000-10 000	30-40% savings
Seed rate (kg/ha)	200-250	80-120 (transplanting)	50% savings
Herbicide costs	High	Reduced	10-20% decrease
Grain quality (output %)	60-65%	68-72%	3-7 pp improvement
Cost per ton of rice	Relatively high	Reduced	15-25% savings

Source: Systematized by the author based on data from agro.uz, FAO, and Lex.uz resolutions

Nationwide, in areas where resource-efficient technologies have been implemented, rice yields reached 65–70 centners per hectare. This represents a 50% higher productivity compared to the average yield of 40–45 centners per hectare achieved with traditional methods.

Furthermore, in 2022, rice production in the republic exceeded the planned volume by 485 thousand tons (55 thousand tons more than the previous year). This indicates that when innovations are combined with supportive policies, the economic benefits of technological improvements manifest rapidly.

**Table 3.** Overall indicators of rice clusters in the Andijan region

Indicator	Data
Number of active rice production clusters	9 (as of 2020)
Total production capacity	22 268 tons
Number of farms within clusters	4,279 (out of 39 clusters)
Area allocated for rice cultivation	2 409 ha
Total land allocated to all clusters in the region	99 704 ha
Land allocated per cluster	17 763 ha
Farm area within clusters	82 067 ha

Source: Based on data from the Ministry of Agriculture of the Republic of Uzbekistan (agro.uz) and the Andijan Regional Statistical Handbook.

Existing problems and barriers. Despite the positive trends outlined above, several significant challenges remain:

- Insufficient availability and affordability of laser leveling equipment. Access to advanced machinery is financially burdensome, particularly for small and medium-sized farms.
- Water resource efficiency issues. Rice is a water-intensive crop, and the outdated irrigation infrastructure in the Fergana Valley leads to significant water losses.
- Limited knowledge and skills in innovative technologies. Transplanting and modern agronomic practices require specialized knowledge and practical experience that many farmers currently lack.
- Constraints in rice processing capacity. The existing nine rice production clusters in the region, with a combined capacity of 22,268 tons, may be insufficient to process the potential harvest.
- Incomplete digital infrastructure. GPS-based monitoring and the “Agroplatforma” system have not yet been fully implemented across all farms.

## Recommendations

To enhance the economic efficiency of rice cultivation in the Andijan region, the following measures are recommended:

**Table 4.** Recommended innovative measures and expected outcomes

Measure	Implementation period	Expected outcome
Expand laser land leveling coverage to 70%	2025-2026	Yield increase of 10–15 centners/ha
Implement transplanting on 40% of fields	2025-2027	30% water savings, +15% yield
Increase the capacity of rice production clusters	2026-2028	15–20% reduction in production cost
Connect all farmers to the “Agroplatforma” system	2025-2026	Improved transparency and accounting efficiency
Train farmers in transplanting techniques	Continuous	Faster adoption of technology
Achieve 100% provision of certified seeds	2024-2025	10–20% yield increase

## Conclusion

The analysis indicates that the main innovative factors contributing to the improvement of economic efficiency in rice cultivation in the Andijan region are:

1. Laser land leveling technology,
2. Transplanting methods,
3. Provision of certified seeds,
4. Expansion of the cluster system, and
5. Digitalization.

Nationwide, in areas where resource-efficient technologies have been implemented, yields reached 65–70 centners per hectare, demonstrating that innovative methods can increase productivity by approximately 50% compared to traditional practices. In 2022, rice production exceeded the previous year’s output by 485 thousand tons (55 thousand tons more), providing strong evidence of the practical effectiveness of these policies.

Moreover, in 2023, the agricultural sector in the Andijan region grew by 4%, indicating the sustained development of the agrarian economy. State subsidies, the “Agroplatforma” information system, and support for farmers through clusters all contribute to further enhancing economic efficiency.

In the future, by expanding water-saving technologies, strengthening digital monitoring, and improving farmers’ knowledge and skills, the Andijan region has the potential to become one of the leading centers of rice production in Uzbekistan.

## References

- [1] Gorb O.A., Yasnolob I.A., Protsiuk N.Y. Organizational-economic mechanism of management of food industry enterprises competitiveness. *Annals of agrarian science* 14 (2016) 191-195.

Kielce: Laboratorium Wiedzy Artur Borcuch



- [2] Мазлоев В.З. и др. Государственное регулирование формирования рыночных отношений в региональном аграрно-промышленном комплексе. – М.: РУДН, 2000. – 219 с.
- [3] Райзберг Б.А. и др. Современный экономический словарь. – 6-е изд., перераб. и доп. – М.: ИНФРА-М, 2011. – 479 с.
- [4] Куркина Н.Р. Совершенствование организационно-экономического механизма развития системы продовольственного обеспечения. - Автореферат диссертации. – М.: 2010. – 24 с.
- [5] Shermatov O., Nosirov B., Imomov R., Qobulova M. Problems of effective usage of lands in agriculture for ensuring food security. // South Asian Journal of Marketing & Management Research (SAJMMR). ISSN: 2249-877X Vol. 10, Issue 4, April Spl Issue 2020, Impact Factor: SJIF 2020= 7.11,
- [6] [www.fao.org](http://www.fao.org) – Озиқ-овқат ва қишлоқ хўжалиги халқаро ташкилотининг расмий сайти маълумотлари.
- [7] Shermatov O., Imomov R. Economic efficiency in agriculture and factors affecting it. //Актуальная наука. Международный научный журнал. ISSN: 2587-9022 , №10(29) 2019 21-22 стр.
- [8] Shermatov O., Kabulova M. Criteria and indicators of evaluation of economic efficiency in agriculture // Актуальная наука. Международный научный журнал. ISSN: 2587-9022, №10(29) 2019 24-25 стр
- [9] Shermatov O. A., Olimjonova G. M. Factors affecting the efficiency of agricultural production //Актуальная наука. – 2021. – №. 1. – С. 34-37.
- [10] Шерматов О. А., Имомов Р. Д., Эргашев А. А. Вопросы повышения экономической эффективности в плодоовощной системе //Life Sciences and Agriculture. – 2021. – №. 1 (5). – С. 1-5.