

THE FACTORS OF IMPROVING ECONOMIC EFFICIENCY IN RICE FARMING

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Abstract

In this article are analyzed the factors of cost optimization and economic efficiency, which are carried out on the basis of the use of resource-saving technologies in rice farming.

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In a market economy, the issue of “food security” remains an urgent issue for many countries of the world. According to the United Nations Food and Agriculture Organization (FAO) and the World Health Organization, more than 840 million people in the world are malnourished. This means almost every eight inhabitants of the world. According to the U.S. Census Bureau, the world population increased to over 71 million people in 2024. According to experts, as of January 1, 2025, the world population is 8.09 billion people. This figure exceeds 9.8 billion according to preliminary forecast estimates by 2050, which leads to a significant increase in food demand¹.

Today, rice, among other agricultural products, is considered to be of great importance and role in ensuring food security. Because, rice and rice products have a special place in the foods necessary for the human body. The rice plant is considered one of the oldest food crops in the world and, according to Statistics, has been planted in Southeast Asia for seven thousand years. As of 2025, rice is grown in more than 115 countries of the world, and the area under which Rice is planted is a total of 155.5 million hectares.

In the world where rice is grown, the average yield of rice is 38.4 centners. From ancient rice-growing countries, rice is planted on 44.8 million hectares of land in India and 31.7 million hectares in China. Today, Rice is planted in Uzbekistan on an area of 100-110 thousand hectares, the average yield is 35-38 Senter per hectare, the gross yield is 395 thousand tons. This amount is only minimally satisfying the demand of the growing population of Uzbekistan for rice, which is one of the main food products. According to official data, in order to ensure the full population demand, the country imports around 55 thousand tons of rice annually.

On the basis of further development and economic efficiency of rice production in Uzbekistan, extensive introduction of innovations into the rice industry, measures are being implemented to improve the rice yield, improve the quantity and quality of rice grown at today's level of demand. In particular, on February 2, 2021, it was adopted the Decree of the President of the Republic of Uzbekistan “on

¹ <https://hordiq.uz/2019/07/22/top-10-aholisi-eng-kup-davlatlar/>

measures for the further development of rice production”.

This decision is significant in that it is aimed at improving the continuous and efficient system of rice production, storage, processing in the Republic, providing the domestic consumer market with rice products sustainably and increasing export potential, strengthening researches in this regard, and solving the most pressing problems in rice related to the widespread use of water-saving technologies in rice production. On August 15, 2024 it was adopted the Decree of the President of the Republic of Uzbekistan PD-290 “On additional measures to support the activities of rice growers”.

- from September 1, 2024, to fund the cost of rice cultivation and hariding farmers, dehkans and other produce growers preferential loans are allocated in the terms established by the Decree of the President of the Republic of Uzbekistan PD-52, dated December 15, 2021 “On measures for the state support of the fruit and vegetable sector, further development of cluster and cooperative system in the branch”. In this case, contracts for rice harid are concluded between rice clusters and farms through the “Agroplatforma” information system of the Ministry of Agriculture.
- in 2025-2026, 20 percent of the cost’s of new seed drills and equipment for planting sprouts, purchased for planting rice, and no more than a year after production, will be covered by allocating subsidies from the state budget;
- to support of the activities of agricultural enterprises producing rice in the Khorezm region the following additional subsidies are allocated to them from the state budget: 100% of fuel-lubricant costs spent on each hectare of laser leveled area for rice production, however, the total cost per hectare was not more than 1 million sums.

The state support of the above-mentioned rice system will serve to reduce the cost of products in rice, increase the volume and quality of products.

In the course of research on the topic of improving the economic efficiency of the development of rice production in Uzbekistan, rice production was studied and analyzed in the Andijan region, where it located on the 1 percent of the land area of Uzbekistan, but about 10 percent of the country's population lives (Table 1).

1-table. Information about the rice clusters operating in the districts of the Andijan region and the farms attached to them ²

№	Districts name	Name of rice cluster	The area of rice allocated to the cluster, hectare	Farms attached to the cluster		Total crop area hectare
				amount	hectare	
1	Andijon	"Baraka Agroklaster" LLC	61	18	190	251
		"Oltin vodiyy sahovati" LLC		4	79	79
2	Asaka	"Oltin vodiyy sahovati" LLC		19	104	104
3	Baliqchi	"Siza sholi klaster" LLC	15	12	20	35
4	Buloqboshi	"Buloqboshi agrosanoat" LLC		12	81	81
5	Jalaquduq	"Agro inovatsion klaster" LLC		86	424	424
6	Izboskan	"Zayxurmaks" LLC		38	256	256
7	Ulugnor	"Agrokafolat" LLC	14	14	56	70
8	Oltinkul	"Boymatov Muftoxiddin" LLC	5	13	54	59

² Information of the Department of Agriculture of Andijan region

9	Pakhtaabad	"Akromjon Ixtiyor" LLC	6	45	120	126
		"Paxtaobod Agrota'minot" LLC		56	150	150
		"Agronomist RISK" LLC	5	24	63	68
10	Qurgontepa	"Abduxalim yer bo'stoni" LLC	54	29	67	121
Total:		X	160	370	1664	1824

In 2024, a total of 46,978 tonnes of rice crop were grown by the existing rice-growing business entities in the province, with an average rice yield of 43.1 centners per hectare. Table data shows that today there are 13 rice-specialized agroclusters operating in a total of 10 districts of our region. The arable land under which agrocluster rice is grown is a total of 1,824 hectares, with 160 hectares of rice fields directly exposed to the agroclusters themselves. 370 farms are attached to these agroclusters, with an average of 4.5 hectares of arable land per farm specializing in single paddy cultivation, with a total of 1,664 hectares in 2024. In the rice fields that this agrocluster has owned, in recent years, the planting of rice seedlings in seed drills, increased productivity in rice farming using resource-saving technologies such as planting rice by beds, improved product quality and the main thing, optimized the cost of the product are considered to be agroclusters with good results in terms of.

2-table. Information on the expenses spent on the cultivation of "Alanga" variety rice in the 2024 season in the "Akramjon-Ixtiyor" cluster, which specializes in rice farming in Pakhtaabad district³

#	Indicators	Unit of measurement	thousand sums per 1 hektar	thousand sums per 1 tonna	Share
1	Arable land	hektar	1,0		
2	Yield	Centner/hektar	60		
3	Gross yield	tonna	6,00		
4	Total cost	thousand sums	27 355	4 559	100%
4.1	Salary, with deductions	thousand sums	3 360	560	12,3%
	From this, direct salary	thousand sums	3 000	500	
	12% allocation to social insurance	thousand sums	360	60	
4.2	Mineral fertilizers	thousand sums	5 500	917	20,1%
	amount of mineral fertilizers	kg	1 060	177	
	including: nitrogen price	thousand sums	3 200	533	
	quantity (physically)	kg	800	133	
	phosphoric value	thousand sums	2 120	353	
	quantity (physically)	kg	200	33	
	potassium value	thousand sums	180	30	
	quantity (physically)	kg	60	10	
4.3	Plant protection, defoliants, stimulants	thousand sums	1 340	223	4,9%
	Including: chemical agent value	thousand sums	780	130	
	biological agents (stimulants)	thousand sums	360	60	
	Services provided by agrochemical enterprises	thousand sums	200	33	
4.4	Seed value	thousand sums	2 560	427	9,4%
	quantity	kg	160	27	
4.5	Mechanization service cost	thousand sums	2 800	467	10,2%
4.6	SIU fees	thousand sums	360	60	1,3%

³ Data from the "Akramjon-Ikhtiyor" agrocluster in Pakhtaabad district.

4.7	Land tax fee	thousand sums	345	58	1,3%
4.8	Water tax	thousand sums	720	120	2,6%
4.9	Other costs	thousand sums	1 250	208	4,6%
4.10	Harvest	thousand sums	3 000	500	11,0%
4.11	VAT tax	thousand sums	6 120	1 020	22,4%
4.12	Total income	thousand sums	51 000	8 500	
4.13	Profit, loss (+,-)	thousand sums	23 645	3 941	
Profitability level		%	86,4	86,4	

3-table. Information on the expenses spent on the cultivation of rice in the seedling method (using a mechanism) in the 2024 season in the “Akramjon-Ixtiyor” cluster, which specializes in rice farming in Pakhtaabad district⁴

#	Indicators	Unit of measurement	thousand sums per 1 hektar	thousand sums per 1 tonna	Share
1	Arable land	hektar	1,0		
2	Yield	Centner/hektar	80		
3	Gross yield	tonna	8,00		
4	Total cost	thousand sums	23 367	2 921	100%
4.1	<i>Salary, with deductions</i>	thousand sums	2 688	336	11,5%
	From this, direct salary	thousand sums	2 400	300	
	12% allocation to social insurance	thousand sums	288	36	
4.2	Mineral fertilizers	thousand sums	3 234	404	13,8%
	amount of mineral fertilizers	kg	590	74	
	including: nitrogen price	thousand sums	1 600	200	
	quantity (physically)	kg	400	50	
	phosphoric value	thousand sums	1 484	186	
	quantity (physically)	kg	140	18	
	potassium value	thousand sums	150	19	
4.3	quantity (physically)	kg	50	6	
	Plant protection, defoliants, stimulants	thousand sums	710	89	3,0%
	Including: chemical agent value	thousand sums	390	49	
	biological agents (stimulants)	thousand sums	140	18	
4.4	Services provided by agrochemical enterprises	thousand sums	180	23	
	Seed value	thousand sums	1 200	150	5,1%
4.5	quantity	kg	75	9	
4.5	Mechanization service cost	thousand sums	3 000	375	12,8%
4.6	SIU fees	thousand sums	360	45	1,5%
4.7	Land tax fee	thousand sums	345	43	1,5%
4.8	Water tax	thousand sums	480	60	2,1%
4.9	Other costs	thousand sums	1 350	169	5,8%
4.10	Harvest	thousand sums	2 800	350	12,0%
4.11	VAT tax	thousand sums	7 200	900	30,8%

⁴ Data from the "Akramjon-Ikhtiyor" agrocluster in Pakhtaabad district.

4.12	Total income	thousand sums	60 000	7 500	
4.13	Profit, loss (+,-)	thousand sums	36 633	4 579	
Rentabellik darajasi		%	156,8	156,8	

In the countries of the world, mainly rice is planted in three different ways. The first is by sprinkling into the water, the second is the seedling method and the third is the dry ground bed method. The method, which is widely used today in the world experience, corresponds to the contribution of planting seedlings. Because rice paddy, planted in this way, is sold for 2-3 thousand rubles more expensive than straw. Because, the grain is large and the appearance is of good quality. From the data presented in Table 2 and 3, it can be seen that when sown and planted in the traditional way, the total costs are 27.355.000 sums per hectare and 4.559.000 sums per ton, while when sown (by Mechanism), the sown of rice is 23.367.000 sums per hectare and 2.921.00 sums per ton. Hence, the cost of the seedling method compared to the traditional method was 3.988.000 sums at the expense of 1 hectare and 1.638.000 sums less at the expense of 1 ton. This aspect of rice cultivation has its own advantages.

Including:

- modern technology plants seedlings on an area of 3-5 hectares in one day. With the help of mehanism, there is an opportunity to plant 3-4 seedlings in each hive with a depth of 1-2 cm;
- when using this technology, seed consumption is saved up to 50 percent, mineral fertilizer and water content consumption up to 30-40 percent;
- reduced labor consumption in rice production;
- the fact that there is an opportunity to quickly develop seedlings planted in sorting and increase the yield by 10-15 percent;
- based on this technology, it will be possible to achieve a decrease in the cost of products by up to 20-30 percent.

It is known that the influence of various factors on the development and economic efficiency of rice is different, depending on the peculiarities of the regions in the cultivation of rice.

Research in this area shows that today we believe that the influence of the following factors on the development and economic efficiency of rice production in agriculture is strong:

- on the basis of each agrotechnological process, the costs of growing rice are clearly planned, that is, the cost estimate is clearly established in advance and the same estimate is constantly followed;
- to establish the effective use of laser equipment in the preparation of rice planting land;
- increased attention to rice seed;
- extensive application of the most effective technologies in the provision of water to the rice and others.

The fact that the costs of rice production are clearly planned on the basis of each agrotechnological process, that is, the cost estimate is clearly defined and this estimate is always followed - this is one of the most fundamental factors for the development and economic efficiency of rice production. It is known that the process of rice cultivation agrotechnology involves several complex processes:

- direct connection of rice cultivation agrotechnology with natural-climatic conditions;
- the fact that the issues of development and economic efficiency of rice production in Uzbekistan are directly related to the supply of irrigated water to the network;
- the costs incurred in the process of agrotechnology of rice production i.e. the discrepancies between the prices of rice grown with purchase prices of technical service, fuel and lubricants, mineral fertilizers, resources related to transport service, etc.

Therefore, it is important to prepare a cost plan for agrotechnology, which is carried out on the basis of current assessments, which must be carried out before the start of agrotechnological processes in rice farming. Because this business plan provides an opportunity to always find an answer to the question of what period the rice grower had to spend and how much it cost. This makes it possible for a rice grower to manage the rice farming economy based on an approximate knowledge of the economic efficiency of the product he is growing in agrotechnological processes.

Establishing the effective use of laser equipment in the preparation of rice fields is the issue of the wide introduction of Agrotechnology into rice farming today in Uzbekistan as a separate task on the basis of a presidential decision, the implementation of this Agrotechnology ensures that water in the fields of rice cultivation lies evenly, that is, 5-7 cm. This resulting activity provides, firstly, the norm of seedling thickness in rice fields, and secondly, in agrotechnological processes, the possibility of supplying and feeding rice sprouts with water in one norm. In areas where the seedling thickness is in moderation, supplied with water in one norm, and fed, of course, the yield will be higher, the quality of the crop from which it is harvested. In turn, these conditions also have a positive effect on economic efficiency.

It is not for nothing that increased attention to rice seed - today this issue is considered as the most pressing issue in the rice industry of Uzbekistan. Because proper rice farming gives rice farmers the following advantages:

- in rice farming, various rice seeds are obtained by mixing (sortosmes). This has a very positive effect on the quality of the rice crop being harvested - that is, the quality of rice consumption improves;
- -the cultivation of rice offspring allows rice growers to plant the same seed in the second year as well. This saves rice farmers from seed costs based on the possibility of making seeds for themselves;
- improved product quality leads to an increase in the price of selling one unit of product on the market, which in turn serves to increase the income of rice growers.

The widespread use of the most effective technologies in the provision of rice water-the definition of a number of tasks for the widespread introduction of new agrotechnologies in the irrigation of rice-growing regions in Uzbekistan in conditions of a shortage of irrigation water, which is increasing from year to year, is of great importance not only in increasing rice production, but also in improving. On this basis, water supply in rice production is one of the factors that directly affect efficiency. Because rice is a plant that grows in water. Usually, water supply to rice fields during agrotechnology is carried out through a single waterway. This means that if we consider the average yield of areas in the rice field to be 0.15-0.20 hectares, then at least 0.05-0.07 hectares at the water entrance of the first area, the coldness of the water in the process of rice agrotechnology prevents the plant from developing and fully maturing in time, warming under the influence. Therefore, in these parts of the rice field, the rice crop ripens earlier than at the water entrance. As a result, the crop ripened in the rice field remains two types, that is, the ripening of the crop in places where water enters the field is lagged by 7-10 days. In this process, the mechanism of rotating (shifting) the water supply areas to the rice fields ensures that the rice crop matures in one measure. As a result, the crop in the area where the rice is planted ripens simultaneously and evenly. If the new information obtained from this information in rice agrotechnology comes from the same rice fields of 0.05-0.07 hectares at the expense of each hectare of rice, when the yield in these areas is calculated on average 40 centners/hectare ($0.07 \cdot (40 \text{ centner} = 4000\text{kg}) = 200\text{kg}$), there will be an opportunity to add an additional 200 kg of rice crop per account. This means that in Uzbekistan conditions ($200\text{kg} \cdot 60\% / 100 = 120$), 120 kg of rice and ($120 \cdot 14000 \text{ sums/kg} = 1680.000$) 1680000 sums of additional income. So it turns out that we can earn an additional 1,680,000 sums per hectare of rice area due to the application of the above-mentioned technology.

Based on the study and analysis of the issues of improving economic efficiency based on the optimization of rice production costs, we have come to the following points and considerations:

1. Efficient use of resource-saving technologies in optimizing rice production costs, including considering that the method of planting rice by seedlings can reduce costs per hectare by up to 30 percent when carried out using mechanization.
2. In rice-growing regions, we believe that it is advisable to clearly plan the costs based on each agrotechnological process, based on the specifics of each region, that is, to accurately determine the cost estimate ahead. Because, following the cost estimate established for the rice cultivation process and increasing revenues due to the efficient use of costs is a primary factor in the development and economic efficiency of the network in the organization of rice farming.
3. Studies show that establishing effective use of laser equipment in the preparation of rice fields for cultivation ensures that water is lying evenly in the fields where rice is planted. This makes it possible to ensure the norm of seedling thickness in planted areas and feed rice sprouts in one norm in agrotechnological processes. The result is an opportunity to increase economic efficiency based on high productivity in rice farming.
4. Proper rice farming prevents the mixing of rice seeds belonging to different varieties in rice production. This has a very positive effect on the quality of the rice crop being harvested-that is, the consumption quality of rice improves. And the improvement in product quality ensures that the product is sold on the market quickly and at an expensive price. This process in turn serves to increase the income of rice farmers.
5. The results of the study show that the mechanism of rotation of the places of water supply to the rice fields ensures that the rice crop matures in one norm. This provides an average of 1.5- 1.8 mln.sums in additional revenue from each acre of rice field.

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