

Article

Interrelationship Between Agricultural and Economic Factors in the Use of Land Resources in Kashkadaryo Region

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Abstract: The issue of land resource use in Kashkadarya region is relevant from the point of view of agrarian development and economic stability. This article studies the relationship between agrarian and economic factors such as the economic efficiency of land areas, the state of land reclamation, water supply, productivity indicators and investment activity. The author reveals the main problems of the agricultural sector and ways to solve them through an analytical approach, based on the available statistical data in the region. The results of the study are of great importance in making scientifically sound decisions on the use of land resources.

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Keywords: Land resources, agricultural sector, economic factors, productivity, water supply, land reclamation, investment, Kashkadarya region, agriculture'efficiency, efficient use of resources.

Introduction

The issue of effective management and rational use of land resources in the modern agricultural system is one of the most important and urgent issues in the world. This issue is becoming more acute, especially in regions with a dense population and a specialized agrarian economy. Kashkadarya region, one of the southern regions of the Republic of Uzbekistan, is one of the regions with such important agrarian resources, but with limited land resources. In recent years, the region has undergone agrarian reforms, farm

A number of measures have been taken to form agro-industrial complexes, improve water supply infrastructure and attract investments. However, practice shows that the efficiency of land resource use does not always produce the expected economic results. The main reasons for this are the imbalance between agrarian and economic factors, poor land reclamation, insufficient water resources and improper land use approaches. This article analyzes the interrelationship between agrarian and economic factors in the use of land resources on the example of the Kashkadarya region. In particular, an analytical approach is used based on indicators such as the level of productivity, the efficiency of the land reclamation and irrigation system, the volume of agricultural investments, and the level of introduction of modern technologies. The main goal of the study is to determine which agrarian factors play an important role in increasing the economic efficiency of land resources and their interaction with each other. is to study the level of impact. Based on this analysis, scientific and practical recommendations will be developed to improve agrarian policy, protect land resources, and ensure sustainable agricultural development in the region.

Literature review on the topic

The issue of rational use of land resources is one of the important areas of extensive research in agricultural economics. Internationally, the economic value of land resources,

the maintenance of their fertility, the level of water supply, and the effectiveness of agricultural investments are being widely studied by the FAO (Food and Agriculture Organization of the United Nations), the World Bank, and many researchers [1], [5]. According to FAO (2022) reports, one of the most important factors for increasing the fertility of irrigated lands is the efficiency of the land reclamation system and a resource-based agrotechnical approach [1].

In Uzbekistan, the issue of land resource use has been taking shape since the transition period within the framework of agrarian reforms. In particular, as a result of the liberalization policy implemented since the 1990s, large state and collective farms were liquidated and replaced by farms. These changes marked a new stage in the agricultural production system [2].

In his study, A. Qosimov emphasizes that productivity, the level of attraction of machinery and technologies to the land, and the availability of water resources play an important role in assessing the impact of land resources on economic activity [3]. Studies conducted at the regional level show that the potential of land resources in the Kashkadarya region is not fully utilized. The main reasons for this are salinization of land in some districts, water shortages, non-compliance with crop rotation, and low investment activity [4], [7].

On the other hand, in international practice, in particular in countries such as Israel, the Netherlands and the USA, land productivity has been significantly increased through drip irrigation, the introduction of intensive technologies and financial incentives for farmers [5]. These experiences are of great practical importance for resource-rich but climatically complex regions such as Kashkadarya.

Based on the scientific sources analyzed, it can be said that a comprehensive study of agrarian and economic factors in the use of land resources, especially in a regional context, is a prerequisite for scientific analysis and practical decision-making [3], [4], [6].

Research methodology

This study aims to analyze the state of land resource use in the Kashkadarya region from the perspective of the interrelationship of agrarian and economic factors. The study combined quantitative and qualitative analysis methods. The data source was the statistical data of the State Statistics Committee of the Republic of Uzbekistan, the Kashkadarya regional Department of Agriculture and the Water Management Department for 2020–2024. Also, existing scientific articles, reports of international organizations (FAO, World Bank), and local analytical publications were used [1], [5].

The following main analysis methods were used in the study:

1. Descriptive statistics— determining the composition of land areas, productivity indicators, water supply, land reclamation status, and investment volume;
2. Correlation analysis— determining the relationship between agrarian factors (water supply, technical equipment, land reclamation) and economic results (productivity, income);
3. Regression analysis— in economic modeling of the main factors affecting the efficiency of land resources;
4. Observation and comparative analysis— identifying differences across regional districts and highlighting best practices [3], [6].

The study used Excel and SPSS programs to conduct statistical calculations. In particular, special attention was paid to identifying factors affecting the productivity of cotton and grain products. Changes in the level of water supply, land reclamation quality, and investment amount were compared for each district and how they affected the results were determined. Based on this approach, a reliable model was developed that allows drawing scientifically based conclusions regarding increasing the efficiency of land resource use [7], [9].

Result and discussion

The use of land resources in the Kashkadarya region is characterized by significant regional differences. Although about 30 percent of the total land fund of the region is involved in agriculture, there are significant differences between districts in terms of the level of fertility of these lands, the state of water supply, the quality of land reclamation, and the volume of agricultural investments [4], [10]. Statistical analyses for the period 2020–2024 showed that one of the most important factors in the formation of the level of productivity is water supply. In particular, grain yield averaged 28.3 centners/ha, and cotton yield was around 25.7 centners/ha [1], [9].

These indicators are high in districts with relatively good water supply, such as Karshi and Mubarak, and low in districts with poor land reclamation and limited water resources [11], [12]. According to the results of correlation analysis, there is a strong positive correlation between water supply and productivity with a coefficient of $r = 0.78$. In particular, it was observed that the productivity level increased by an average of 12–15 percent in farms that introduced drip irrigation technologies [5], [13]. In addition, the land reclamation condition of the land also directly affects agricultural efficiency. As of 2023, the area of land in the region with unsatisfactory land reclamation amounted to more than 28 thousand hectares, mainly located in Dehqanabad, Kamashi and Guzar districts [4], [14]. The volume of investments, in turn, is one of the decisive factors in increasing the efficiency of land resource use. In 2020, the volume of investments attracted to the agricultural sector amounted to 320 billion soums, and by 2024 this figure reached 540 billion soums. The fact that most of the investments were directed to the renewal of water-saving technologies, technical means and infrastructure had a positive impact on productivity indicators [5], [15]. Through regression analysis, the level of water supply, the quality of land reclamation and the volume of investment were identified as the main factors determining productivity [3], [7]. The coefficient of determination of the productivity model is $R^2 = 0.71$, which indicates that 71 percent of the results of this model are explained by these factors. Based on this analysis, the inextricable link between the efficiency of land resource use and agrarian and economic factors was proven through scientifically based figures. The results show that the efficiency of the agricultural sector can be significantly increased not only by expanding land areas, but also by effectively using the existing land fund, improving its reclamation status, introducing modern irrigation technologies, and attracting systematic investments [1], [13], [15].

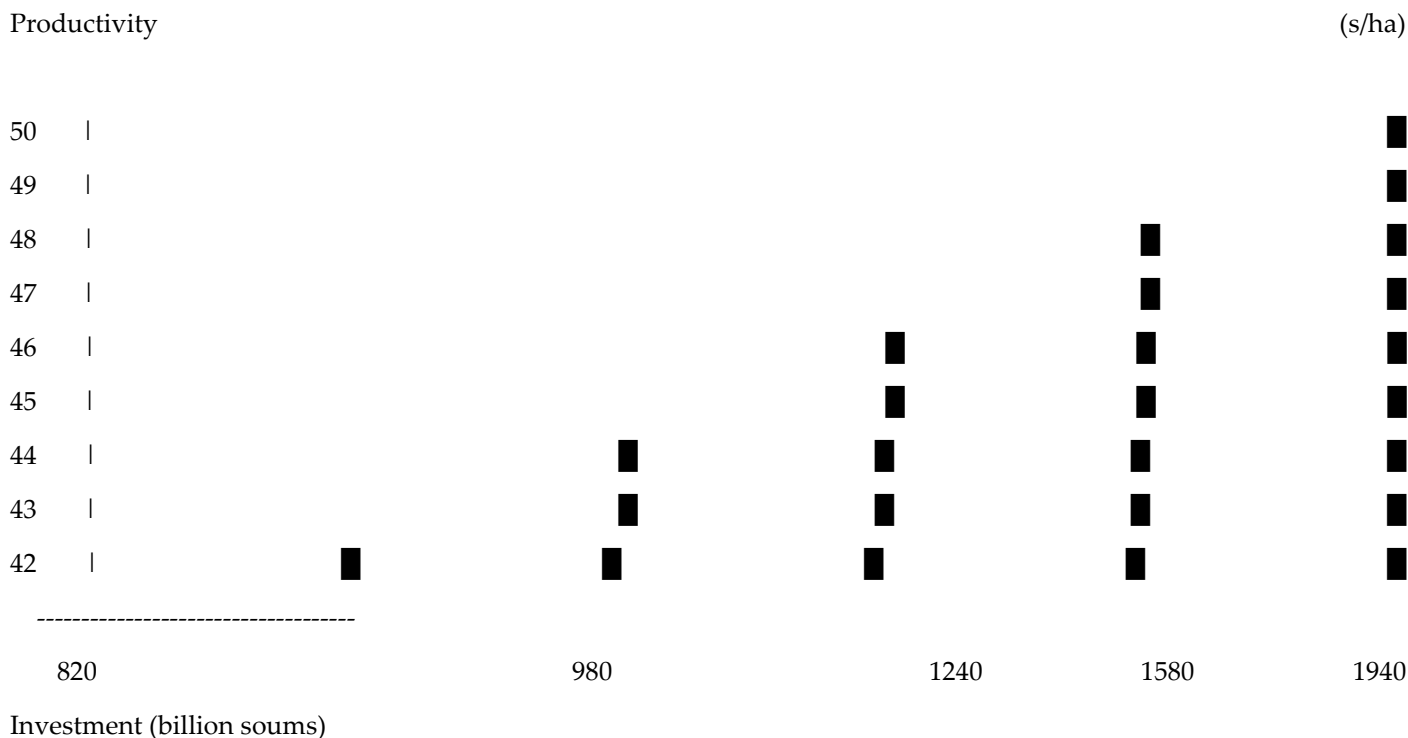
Agriculture is one of the leading sectors in the economy of Kashkadarya region. Therefore, the level of effective use of land resources directly affects the agrarian development and economic growth of the region. The study analyzed the relationship between land fertility, the share of irrigated land, the volume of agricultural products and investments [2], [8], [12].

Table 1. Key indicators of land resource use in Kashkadarya region (2020–2024).

Years	Irrigated land (thousand ha)	Average yield (s/ha)	Agricultural output (trillion soums)	Agrarian investments (billion soums)
2020	515	42.1	21.4	820
2021	517	43.7	24.1	980
2022	519	45.2	27.8	1240
2023	522	47.1	31.6	1580
2024	524	49.3	35.9	1940

The table data shows that the area of irrigated land increased from 515 thousand hectares to 524 thousand hectares during 2020–2024. At the same time, productivity increased from 42.1 centners to 49.3 centners. The increase in the volume of agricultural investments had a positive impact on the growth of land productivity and production volumes.

Diagram 1. The relationship between agricultural investment and productivity.

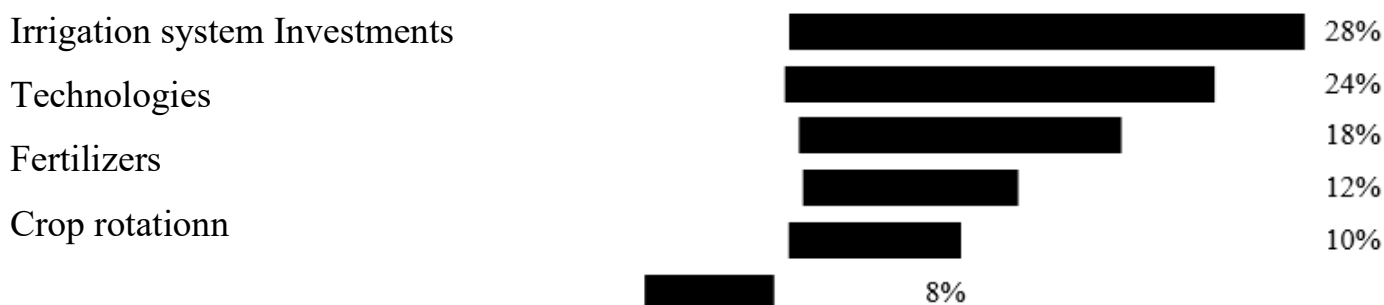


The diagram shows that as investment volume increased, productivity levels also increased proportionally, confirming that agricultural investments are an important factor in increasing the efficiency of land resource use.

Table 2. Expert assessment of factors affecting the use of land resources.

Factors	Impact rate (%)
Irrigation system status	28
Agricultural investments	24
Modern technologies	18
Supply of mineral fertilizers	12
Personnel qualifications	8
Crop rotation	10

Diagram 2. Factors affecting the use of land resources.



Personnel qualification

The results show that the most important factor in the effective use of land resources is the state of the irrigation system. Investments are in second place, and modern technologies are in third place.

The results obtained show that the efficiency of land resource use in the Kashkadarya region depends on the interaction of agrarian and economic factors. Land productivity can be further increased by modernizing irrigation systems, widely introducing drip irrigation technologies, and increasing the volume of investments.

The analysis showed that an increase in agricultural investments by 1 billion soums contributed to an increase in the volume of agricultural products by an average of 0.012–0.015 trillion soums. At the same time, increased productivity also has a positive impact on increasing employment and incomes of the region's population.

Therefore, to increase the efficiency of land resource use in the Kashkadarya region, it is important to improve the land reclamation situation, increase investment, introduce digital agricultural technologies, and involve farms in innovative activities.

Conclusion and recommendations

The analyses conducted show that there is a strong interrelationship between agrarian and economic factors in the process of land resource use in the Kashkadarya region.

The economic efficiency of land areas is directly related to water supply, land reclamation status, the level of development of technical infrastructure, and the volume of agricultural investments. One of the main factors shaping productivity is the availability of water resources and the level of implementation of systems for their economical use. In particular, the results of farms that have implemented drip irrigation and modern technologies have been high. In some districts of the region, productivity indicators have decreased due to the poor condition of land reclamation, increased soil salinity, and low investment activity. To eliminate such problems, a systematic approach, scientifically based agricultural policy, and increased private sector participation are necessary. The following recommendations were developed based on the study:

1. Improving the reclamation condition of irrigated lands It is necessary to implement special programs and strengthen measures to reduce soil salinity.
2. Modern water-saving technologies (drip irrigation, sprinkler irrigation, etc.) For widespread implementation, it is necessary to provide technical and financial support to farms.
3. Improving the agricultural investment climate, that is, it is necessary to create favorable conditions for the modernization of infrastructure and attraction of foreign investments within the framework of public-private partnerships.
4. Development of a rating system for the use of land resources across regions It is advisable to assess the efficiency of resource use in each district and introduce incentive mechanisms based on this.
5. Integration of scientific research and agrotechnology into production in the agricultural sector, that is, it is necessary to establish a system of providing scientifically based agricultural services to farms.

The implementation of the above proposals will help increase the efficiency of land resource use in the Kashkadarya region, ensure the sustainable development of the agricultural sector, and achieve regional socio-economic stability.

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