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Empirical Study of Water Resource Use Efficiency in the Regions of Uzbekistan

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Abstract. *The author studied the issues of empirical research of the efficiency of water resources use in the regions of our country.*

Key words: *water resources, econometric analysis, GDP, regression, efficiency of water resources use.*

As a result of global climate change, the area of glaciers in Central Asia has decreased by about 30 percent over the past 50-60 years. According to forecasts, by 2050, the shortage of fresh water could lead to an 11 percent decrease in GDP in the region.

Due to global climate change, population growth in Uzbekistan, rapid development of various sectors of the national economy and their demand for water, the shortage of water resources in the republic is increasing year by year. The risk of water scarcity and drought is increasing significantly in Uzbekistan due to the reduction of available fresh water.

Today, the problem of transition to market relations in the formation of water tariffs is very relevant.

The market can be the strongest motivation for people to save water. Practice shows that the rational use of water by the population largely depends on the personal interest of each consumer in reducing fees. Since the beginning of 2023 alone, the damage caused by water supply violations amounted to 67.7 billion soums. [1]

In Uzbekistan, the water management complex is an important component of the national wealth. The gap between the centralized financing of the complex and the ability of water users to pay for water services requires alternative options for the rational use of water resources.

The variety of forms of production organization in the agricultural sector of Uzbekistan has a serious impact on the nature of the economic relations of water management organizations. Improper organization of economic relations between them,

as well as with the financial-credit system, does not allow the full realization of the advantages of irrigated agriculture, even when the issues arising in the process of water distribution and use are relatively easily resolved. Therefore, it is important to improve the efficiency of water use in the face of global warming.

During the analysis of the literature on increasing the efficiency of water resources management in the regions, it was found that there are many scientific works on the subject in modern scientific databases such as Scopus, Web of science, and Google scholar.

In particular, Xiaojun Xiang, one of the foreign authors, conducted research on urban water resources management for sustainable environmental planning using artificial intelligence methods[2].

And Zhaoyang Yang developed a comprehensive assessment and scenario simulation model of water resources transportation possibilities in Xi'an, China. [3]

Ciriacy-Wantrup SV[4], Briscoe S.[5], Jones W.[6], Renu S. in the scientific research works of others, the issues of optimal use of water resources in agriculture and global water partnership were considered.

Russian researcher-biologist E.N. Kostomakhina studied the ecological and economic parameters of drinking water use and tried to prove the effect of drinking water quality on the average life expectancy of the population. Also, he proposed to evaluate the efficiency of the water supply system in relation to the net income provided for the treatment of river waters in the regions.[7]

Umarov D.M. in his scientific work, he studied the reduction of losses in land irrigation and the economic efficiency of water management structures in Tajikistan. According to current scientific results, a macro-level water use efficiency formula is proposed by comparing the basic and annual differences of the gross agricultural yield in irrigated lands to the sum of water payments, budget funds spent on land, and irrigation costs.[8]

Another researcher Sultanov N.M. Conducting scientific research on improving the efficiency of irrigation systems in Tajikistan, the economic efficiency of bringing water supply tariffs to the free market price is based on scientific research. Also, the author developed recommendations for improving the information-analytical system in water management.[9]

Local scientist Akhmedov S.N. and suggested using the Diamond model when using sub-resulrs. Also, in his views, he made a comparative analysis of the effectiveness of the use of water resources in agriculture in the countries of Central Asia.[10]

Our local scientists Umurzakov U.P., Abdurakhimov I.L. improved the theoretical foundations of water management. Also, economist Amirov L. mechanisms of water resources use were researched by

However, in the context of global climate change, there is a need to explore new paradigms of regional water use management.

The market economy imposes its demands on defining a rapidly flexible system of mutual economic relations. It should ensure efficient allocation of water resources, high adaptability to changing conditions, common interest in achieving high final results. Therefore, the problem of forming an effective mechanism of regulation and management of these relations is important.

Among the economists and specialists of the republican water management

network, there are different opinions about the assessment of the efficiency of water use. according to some economists, when calculating the payment for the services of water management organizations, it is necessary to take into account not the actual amount of annual expenses for providing water for irrigation, but the real amount that is actually necessary for the normal operation of water management organizations. This methodology takes into account the differentiation of tariffs depending on the complexity of water supply. In fact, accounting for the real amount can go a long way in solving the problem of network financing and rational use of water in irrigated agriculture. Depending on the complexity of the water supply (cascade), differentiation of water used for irrigation can affect the reduction of the irrigated land area in zones located at an altitude of 100 meters and above. Water users may choose not to grow crops in these zones in view of the high tariffs.

Water tariffs often negate the economic incentives to use water wisely and sparingly, and the economic costs of wasteful use of water in land damage.

In determining the limits of water consumption, the accepted tariffs take into account only the norms of biological irrigation of agricultural crops and do not take into account their impact on water erosion of the soil, deterioration of land reclamation, and loss of humus. In this regard, it is important to choose a criterion that determines the level of payment for water. Ensuring the profitability of irrigation and the need to grow agricultural products in a certain zone based on regional and republican interests should be such a criterion. Taking into account the criterion of profitability of irrigation allows to determine the required level of payment. This ensures the independence of meliorative irrigation systems. The criterion of the necessity of production should be based on the reimbursement of a part of the costs of meliorative irrigation systems due to the fact that a part of the water user's payment for water is compensated by the state.

Compensation payments can be paid in the form of partial or complete exemption of agricultural producers from paying a single tax amount or exemption from any other mandatory payments made by water users. In this case, the total amount received from the payment of water fees and the compensation payments of the state should ensure the financial stability of the meliorational irrigation systems. The introduction of compensation payments by the state is important in regulating the issue of setting tariffs depending on the complexity of water supply and the characteristics of irrigation systems. Allocation of subsidy to compensate payment for water supply services should cover expenses for electricity of irrigation systems and other costs related to the peculiarity of supplying water to consumers in a cascade manner.

Improvement of economic methods of water management depends to a large extent on the method of determining the payment tariff for water, taking into account the technical and economic necessity of water supply to agriculture. Technically, the water supply system is characterized by the complexity of the system itself, which includes many inter-farm and intra-farm canals, district and inter-district reclamation systems. The allocation of intra-farm irrigation canals to water user associations and other forms of agricultural network management appears to have a transitory nature of ownership relations, and a system for regulating these relations between water users and irrigation systems has not yet been developed.

Currently, in practice, two types of payment tariffs for water are used: one-rate and two-rate tariffs.

The one-pot tariff applies to non-irrigation-related production and utility needs. The tariff is set to 1m3 at the water supply point. The two-rate tariff provides for the determination of payment for water on the basis of water supply based on hectare and cubic meter rates.

In the conditions of Uzbekistan, it is necessary to use a two-rate tariff that takes into account all the costs of irrigation systems, encourages water users to use water efficiently, and most importantly, ensures a constant flow of funds.

In our study, an econometric model was proposed that expresses the relationship between the growth rate of the gross regional product and the amount of water in Uzbekistan. Data from 2004-2021 were used in the development of the model and implemented using the Stata14 computer program.

Based on the regression equation, if other factors remain unchanged, a 1% increase in the volume of water used in economic sectors in Uzbekistan will lead to an increase in the rate of growth of the gross regional product in Uzbekistan by 0.029%, while an increase in the volume of water consumed per 1 hectare in Uzbekistan will have the opposite effect. In turn, it shows that the efficiency of water use in some sectors is not high, because the projects implemented on drip irrigation in agriculture are bearing fruit, but in most sectors, it shows that more large-scale work on water conservation should be carried out.

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