METHODS FOR THE EFFICIENT USE OF WATER RESOURCES

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https://doi.org/10.5281/zenodo.14942517

Annotation:

This article analyzes the economic methodology for the efficient use of water resources. It provides an in-depth discussion of the importance of water supply in drinking water, agriculture, and industrial sectors, modern approaches to water resource management, the profitability potential of the water business, and ways to enhance economic efficiency. Using the "WATER LIFE MINERAL" LLC project as a case study, the article examines the economic aspects of water production, investment opportunities, and revenue forecasts, while also offering practical recommendations for the development of water infrastructure. Additionally, issues related to water waste, water tariffs, and infrastructure costs are analyzed, and possible solutions to these challenges are proposed.

Keywords: Water resources, economic efficiency, investments, water business, water infrastructure, water tariffs, drinking water, agriculture, industry, energy efficiency.

Rational use of water resources holds strategic importance for various sectors of the economy. Water supply for drinking, agriculture, and industry is one of the key factors in a country's economic development. However, water scarcity, energy costs, and water waste can impact economic efficiency. This article explores the economic methodology for the efficient use of water resources and the development of a sustainable water business model.

The water economy and resource management are fundamental components of any country's economic structure. Their efficient management not only ensures the rational use of natural resources but also directly influences the sustainability of economic growth. The utilization of water resources plays a crucial role across various sectors of the economy. It is essential for drinking water supply, agriculture, industry and manufacturing, as well as the energy sector, where it serves as a key factor in operational efficiency and sustainability.

In the **Decree No. PF-6024** of the **President of the Republic of Uzbekistan**, dated **July 10, 2020**, the importance of developing the water management sector is emphasized. This document explains the significance of water resources for various economic sectors as follows: "The primary goal of the **Concept for the Development of Water Management in the Republic of Uzbekistan** is to create the necessary conditions to meet the continuously growing water needs of the population, economic sectors, and the environment..." (**lex.uz**) This decree confirms that water resources are not only essential for the well-being of the population but also serve as a key factor in ensuring the **sustainable development of economic sectors**.

Drinking Water Supply is closely linked to the **social sector of the economy**, as ensuring a stable and high-quality water supply directly impacts **public health, sanitation, and urbanization processes**. The development of drinking water infrastructure not only improves the standard of living but also transforms water supply services into a **significant**

sector of economic activity by expanding the domestic market. The **efficient organization of drinking water supply** holds **strategic importance**, particularly for **large cities and industrial centers**, as it contributes to **job creation, the growth of the utility services market, and the attraction of investments.**

L. Ibragimov expresses the following view on this matter: **"Water is a vital and limited resource, and the control over its sources has already become a crucial factor in geopolitics, increasingly turning into one of the causes of global tensions and conflicts."** (researchgate.net)

Based on this perspective, it can be concluded that **drinking water supply** is not only a **socio-economic issue** but also a **critical global concern**.

Another key area is the **use of water resources in agriculture**, which directly affects **food security** and the **efficiency of the agricultural sector**. The development of **irrigation systems** contributes to increasing **agricultural productivity**, improving **soil fertility**, and supporting the **economic growth of rural areas**.

The implementation of water-saving technologies, particularly drip irrigation and automated water supply systems, can significantly optimize water consumption. This approach not only prevents water wastage but also reduces production costs and enhances the profitability of farms.

The **role of water resources in the industrial and manufacturing sectors** is equally significant. Industrial enterprises and production complexes rely on water for various **technological processes**. From **the food and pharmaceutical industries**, where high-quality drinking water is essential, to **the chemical and metallurgical sectors**, nearly all manufacturing industries require a **stable water supply** to operate efficiently.

In **modern industry, water recycling and wastewater treatment technologies** play a crucial role in **reducing production costs, ensuring environmental safety, and enhancing economic efficiency**. The use of **recirculating water supply systems** in manufacturing processes is particularly beneficial, as it promotes the **efficient utilization of water resources** and helps **industrial enterprises lower their expenses**.

Another critical aspect is the **role of water resources in the energy sector**, as **hydropower** is directly dependent on water availability. **Hydroelectric power plants** constitute a significant part of a country's **energy balance** and represent one of the **primary sources of renewable energy**. **Efficient utilization of water resources** can contribute to **increasing hydropower generation**, **reducing energy costs**, and **promoting the development of environmentally friendly energy sources**.

Furthermore, **thermal power plants (TPPs) and nuclear power plants (NPPs)** consume large volumes of water for their **cooling systems**, making the **reliable water supply for energy infrastructure a critical issue**. If **water resources are managed efficiently**, this can lead to **accelerated economic growth, increased investment inflows, and improved production efficiency**. By developing an **optimal system for water resource management and distribution**, it is possible to ensure not only the **sustainable development of the national economy** but also to **guarantee environmental safety**.

For this reason, the rational management of water resources across various economic sectors and the implementation of innovative technologies remain a strategic priority for both the public and private sectors.

Economic Challenges in Water Resource Utilization. Ensuring the efficient use and economically sound management of water resources is a strategic task for every country. However, various economic challenges arise in the process of water utilization. These challenges are not only related to the limited availability of water resources but also stem from mismanagement, wastefulness, unclear tariff structures, and high infrastructure costs. Addressing these issues is crucial for achieving economic efficiency and maintaining a sustainable water supply.

One of the major obstacles to the efficient use of water resources is water wastage and losses. Due to poor management, outdated infrastructure, and technical failures in water distribution networks, large volumes of water are lost. In particular, aging pipelines, technological deficiencies, and improper water flow distribution reduce the efficiency of drinking and irrigation water sources, leading to significant resource losses.

According to the World Bank's 2021 estimates, water losses in distribution systems account for 25-30% of total water supply in developing countries. This directly impacts the economy, leading to higher water prices, resource inefficiencies in production sectors, and additional financial burdens on the national budget.

A similar situation can be observed in Uzbekistan, where significant water losses occur. In Presidential Decree No. PF-6024, dated July 10, 2020, the President of the Republic of Uzbekistan emphasized: "More than 60% of the existing irrigation networks are in need of repair, resulting in water losses amounting to millions of cubic meters annually." (lex.uz). This highlights the urgent need for infrastructure modernization to reduce water losses and improve water management efficiency in the country.

This situation leads to significant economic losses in both agriculture and drinking water supply. To prevent water wastage, the following measures are essential: Technological Modernization – Replacing outdated pipelines and implementing modern water metering systems to enhance efficiency. Implementation of Monitoring and Control Systems – Using smart sensor technologies to monitor water flows and reduce wastage. Water Recycling and Reuse – Introducing wastewater treatment in industrial enterprises and water-saving technologies in irrigation systems to optimize consumption. These strategic initiatives can help minimize water losses, improve resource management, and enhance economic efficiency in key sectors.

Incorrect Water Pricing – A Key Economic Challenge. One of the most significant economic issues in water resource management is the improper pricing of water. When water tariffs and pricing mechanisms are not economically justified, it leads to inefficient water use, excessive wastage, and financial uncertainties. A poorly structured pricing system can result in: Overconsumption due to artificially low prices. Financial losses for water supply companies. Limited investments in infrastructure improvements. Establishing a rational and transparent water pricing policy is essential for ensuring efficient water management, economic sustainability, and resource conservation.

If water prices are set too low, economic entities have little incentive to use water efficiently, leading to increased wastage. On the other hand, if water tariffs are artificially raised, it can result in: Higher production costs for industrial and agricultural enterprises, potentially reducing output levels. Increased water costs for consumers, making drinking water less affordable. Thus, a balanced and economically justified water pricing policy is crucial to ensure both resource efficiency and financial sustainability in the water sector.

L. Ibragimov highlights the challenges of water pricing with the following statement: "Water is a vital and limited resource, and its economic value must be accurately determined. Excessively low prices lead to wastefulness, while excessively high prices can harm the stability of production sectors." (researchgate.net).

Recommendations for Structuring Water Tariffs Based on Economic Efficiency. To ensure that water tariffs align with economic efficiency, the following measures are recommended: Implementing a Differential Tariff System – Establishing separate pricing structures for households, agriculture, and industry to reflect their specific consumption patterns and economic impact. Introducing Subsidies and Tax Incentives – Developing support mechanisms to ease the financial burden of farmers and manufacturers, making water more affordable for essential sectors. Expanding Private Sector Participation – Encouraging private investment in water supply services to foster market-driven efficiency and infrastructure development. These measures can help create a balanced water pricing policy, ensuring fair access to water resources, sustainable consumption, and economic stability across different sectors.

Water Infrastructure Development and Supply Costs. The construction of water infrastructure, including drilling new wells, water transportation, and the expansion of purification systems, requires significant investments. Due to high infrastructure costs, many countries face delays or stagnation in modernizing their water supply systems, often due to financial constraints. According to the World Bank's 2022 report, the investment needs for water infrastructure development are steadily increasing, with trillions of dollars required globally to ensure sustainable water supply systems. This underscores the urgent need for efficient funding strategies and public-private partnerships to bridge the infrastructure gap.

This issue is also highly relevant in Uzbekistan, where modernizing drinking water systems and developing new water infrastructure in rural areas require significant investments. Given the high costs, it is essential to develop financing mechanisms based on public-private partnerships (PPP) to attract private investment and ensure the sustainable expansion of water supply infrastructure. By implementing efficient funding strategies, Uzbekistan can enhance water accessibility, improve resource management, and support long-term economic growth in both urban and rural areas.

Key Measures for Addressing Water Infrastructure Challenges. To effectively develop water infrastructure and ensure sustainable water supply, the following measures are crucial:

- Attracting International Investments – Securing funding from organizations such as the World Bank, Asian Development Bank, and other global financial institutions to support water infrastructure projects.

- Enhancing Private Sector Participation – Expanding opportunities for private enterprises to manage water supply and treatment services, fostering efficiency and innovation in the sector.

- Implementing Innovative Technologies in Water Infrastructure – Utilizing advanced purification, recycling, and distribution technologies to reduce costs and enhance efficiency in water management. By adopting these strategic approaches, Uzbekistan can modernize its water systems, reduce water scarcity risks, and create a more resilient and sustainable water infrastructure.

Effective Management of Economic Challenges in Water Resource Utilization. Addressing economic challenges in water resource management requires efficient

governance. The key issues include: Water wastage and losses due to outdated infrastructure and inefficient distribution. Incorrect water pricing, leading to either overuse or financial burdens on industries and consumers. High costs of water infrastructure development and maintenance, delaying modernization efforts.

By resolving these challenges, it is possible to ensure the efficient use of water resources, enhance economic stability, and develop more sustainable water supply systems. In the future, these problems can be minimized through: Technological innovations in water conservation and recycling. Improved economic mechanisms, such as differentiated tariff systems and investment incentives. Expanding public-private partnerships (PPP) to attract funding and enhance efficiency in water management. A comprehensive approach integrating technology, economic policy, and strategic partnerships will help strengthen water security and drive sustainable development.

Analysis of Efficient Water Resource Utilization within the "WATER LIFE MINERAL" Project. The water resource study and well-drilling project carried out by "WATER LIFE MINERAL" LLC has played a key role in enhancing the economic efficiency of the drinking water production business. As part of this initiative, hydrogeological research and water quality assessments were conducted. The findings revealed that efficient management of water resources can lead to: Increased drinking water production capacity, Higher business profitability, Sustainable resource utilization. By implementing scientific research and strategic planning, the project has demonstrated that rational water management can significantly improve both economic performance and long-term sustainability in the water industry.

Key Findings of the Analysis. The analysis results indicate that the water extracted from the wells meets international quality standards, creating favorable conditions for increasing the profitability of the drinking water production business. As part of the project, Well CHST44 was drilled, and its hydrogeological properties, chemical composition, and filtration technologies were thoroughly examined. These findings enable the company to: Optimize water resource management for sustainable use. Implement modern technologies in the production process. Ensure high-quality drinking water supply, enhancing market competitiveness. By integrating advanced filtration and resource management strategies, "WATER LIFE MINERAL" LLC is positioned to strengthen its production capacity and long-term business sustainability.

Economic Impact of the "WATER LIFE MINERAL" Project. The economic calculations conducted within this project demonstrate that optimal utilization of water wells leads to increased production capacity, ensuring greater competitiveness in the drinking water market. By implementing water purification and filtration technologies, the company benefits from: Reduced production costs, lowering the overall cost of water supply services. Increased profitability, driven by efficient resource use. Stronger market positioning, due to the high demand for quality drinking water. Given the strong market demand, the company has a significant opportunity to attract investments, further ensuring the sustainability of its business model. Additionally, the efficient use of wells and the integration of automated management systems contribute to minimizing water waste, providing extra economic benefits. Beyond economic advantages, rational water resource management plays a crucial role in promoting environmental sustainability. The project results confirm that: Proper water management and economic optimization enhance business profitability and investment

attractiveness. High-quality well operation, advanced technological equipment, and process optimization create a stable and highly profitable drinking water production business. By combining economic efficiency with sustainable practices, the "WATER LIFE MINERAL" project serves as a model for responsible and profitable water resource utilization.

Conclusion. The experience of the "WATER LIFE MINERAL" project demonstrates that efficient utilization of water wells, the implementation of advanced technologies, and optimal water resource management can lead to sustainable development and high profitability in the drinking water production business. This approach not only benefits the company but also serves as a practical example of how to apply economically sound water resource management principles. By ensuring efficient, sustainable, and profitable water usage, this project contributes to the broader goal of responsible water resource utilization at both the business and national levels.

Economic methodology for efficient water resource utilization. Efficient use and economic management of water resources play a crucial role in the development of the water business and the enhancement of economic efficiency. By optimizing costs in water production and supply, increasing water usage efficiency, and attracting investments, it is possible to maximize the potential of water resources. One of the key strategies for ensuring economic benefits in water production and supply is the implementation of advanced water monitoring and control systems. The use of smart meters and automated monitoring technologies allows for: Reducing water losses through real-time monitoring of water flow and consumption. Preventing wastage, ensuring cost efficiency in operations. Lowering production costs, ultimately increasing profitability. Additionally, modernizing pumping and filtration systems can significantly enhance energy efficiency, leading to substantial economic benefits. By utilizing energy-saving technologies, companies can reduce operational costs in water production and distribution, further improving business sustainability. Another critical factor in ensuring the long-term stability of the water business is investment in water supply infrastructure through public-private partnerships (PPP). Key investment priorities include: Drilling new wells to expand water sources. Modernizing water purification systems to improve quality and efficiency. Enhancing water transportation networks to minimize distribution losses and improve supply chain reliability. By integrating advanced technologies, efficient financial strategies, and strong collaboration between public and private sectors, the economic sustainability of water resources can be significantly improved, ensuring long-term growth and stability in the water industry.

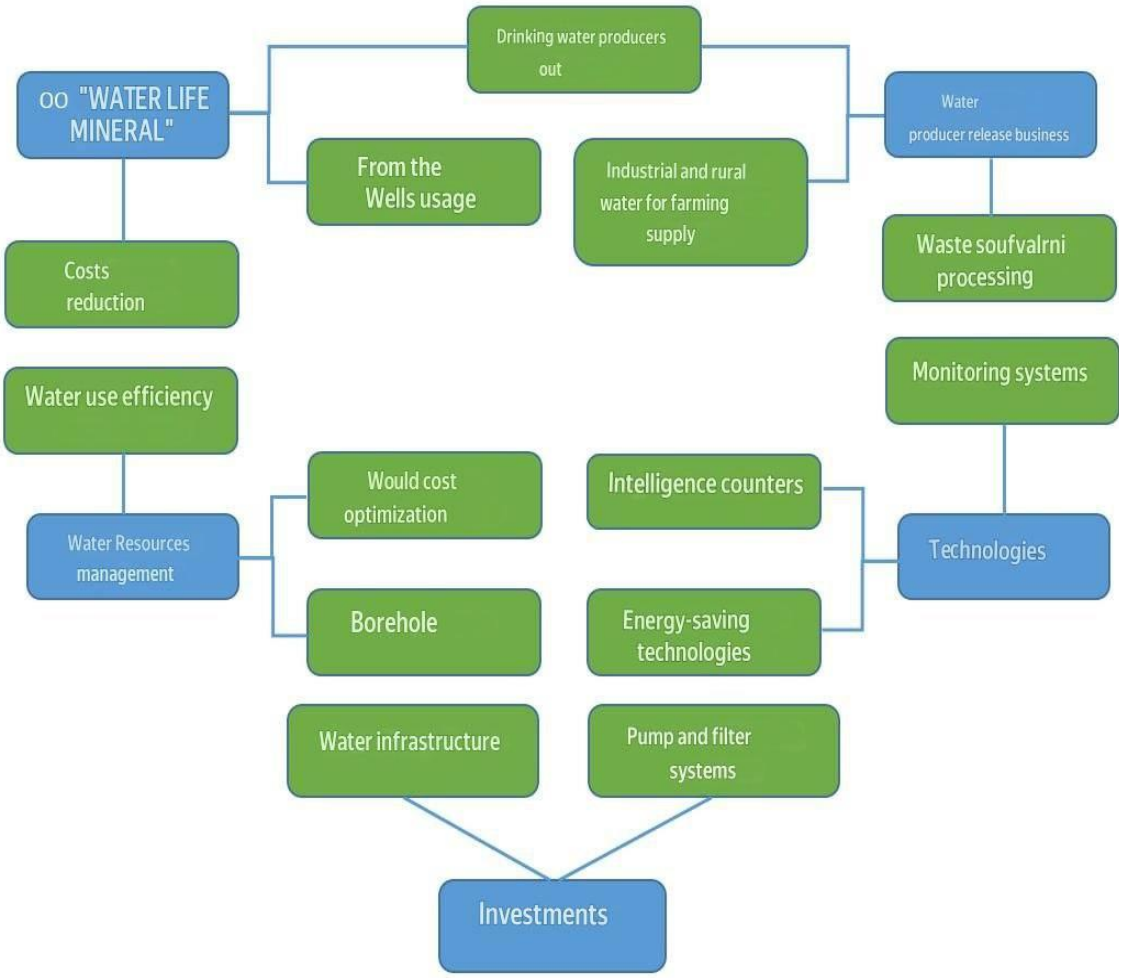
There are various business models in the economy of water resources, among which production and sale of drinking water is the most common activity. Taking water from wells, cleaning it and selling it through packaging is one of the main directions of the water business, and it is constantly in high demand. At the same time, water supply for industry and agriculture is also one of the important directions, and it is possible to get a stable income by offering technical water supply services to large companies and farms. In addition, wastewater treatment and processing for technical needs is also one of the economically profitable business models. Through water processing, while ensuring environmental safety, it is possible to reduce production costs and use resources efficiently. There are various business models in the water resources economy, with the production and sale of drinking water being the most widespread activity. Extracting water from wells, purifying it, and packaging it for sale is one of the main directions of the water business, consistently

maintaining high demand. At the same time, supplying water for industrial and agricultural purposes is also an important direction, as providing technical water supply services to large companies and farming enterprises can generate stable revenue. Additionally, wastewater treatment and recycling for technical needs are among the economically beneficial business models. Through water recycling, it is possible to ensure environmental safety while also reducing production costs and enabling the efficient use of resources.

The company LLC “WATER LIFE MINERAL” can achieve a stable source of income by efficiently utilizing its existing wells for the production and sale of drinking water. By optimizing the processes of extracting water from wells, purifying it, and delivering it to consumers, production efficiency can be increased while reducing costs. To assess the economic efficiency of the water production business, attention must be given to investment and revenue calculations. Investing in the water supply and production sector enhances the economic profitability of the business. Establishing a stable source of income through drinking water production, reducing production costs, and ensuring environmental sustainability are among the key strategic goals of the water business.

According to the economic analysis of the water production business, the average investment amount may reach 1 billion UZS, which is allocated for well drilling, purchasing filtration systems, and pumps. The daily water production volume can reach 900 cubic meters, and if the average water price is 1,000 UZS per liter, the daily revenue will amount to 900 million UZS. These calculations indicate that investments can be recovered in a short period, and the water business can generate high profits. Such results confirm the economic efficiency of the water production sector and create opportunities for further business development.

Reducing production costs through the rational use of water resources, implementing water-saving technologies, and attracting investments are key factors in ensuring the sustainability of the water business. The case of LLC “WATER LIFE MINERAL” demonstrates that the efficient use of water resources is essential not only from an ecological but also from an economic perspective. Proper management of water resources and the integration of innovative technologies can contribute to the development of both industry and entrepreneurship.



Efficient management and rational use of water resources hold strategic importance for the sustainable development of the economy. Increasing water use efficiency and ensuring its economic profitability require comprehensive approaches. First and foremost, the development of the water business can help establish sustainable sources of income. The production of drinking water and the supply of technical water to industrial enterprises are among the key directions of this sector. Expanding these activities can contribute to economic diversification, strengthening the stability and resilience of the business.

Additionally, reducing and optimizing water production costs plays a crucial role. This process can be improved by implementing energy-efficient technologies, utilizing modern management systems, and optimizing production processes, enabling resource-efficient utilization. Technological innovations play a key role in lowering the overall cost of water production and enhancing economic efficiency. By integrating advanced solutions, businesses can increase profitability, minimize waste, and ensure sustainable operations in the water sector.

The implementation of water-saving technologies and the attraction of investments contribute to the development of water infrastructure, thereby enhancing economic efficiency. Establishing modern water supply systems and modernizing existing infrastructure through public-private partnerships ensures the sustainability of water resource utilization. This approach not only helps preserve environmental stability but also increases economic benefits, making water resource management more efficient and profitable in the long run.

The case of LLC “WATER LIFE MINERAL” demonstrates that efficient water utilization is a crucial factor not only from an environmental perspective but also from an economic standpoint. Proper water resource management, the implementation of innovative technologies, and economically efficient operations can directly contribute to the development of industry and entrepreneurship. Therefore, in the future, applying effective approaches in the water economy sector will be one of the key strategic decisions to enhance economic stability and ensure the growth of the water business.

List of References:

1.O‘zbekiston Respublikasi Prezidenti. “O‘zbekiston Respublikasi suv xo‘jaligini rivojlantirish Konsepsiyasi to‘g‘risida” 2020. PF-6024-sonli Farmon. Rasmiy hujjat. O‘zbekiston Respublikasi Qonun hujjatlari ma’lumotlar bazasi. .” (lex.uz)
2.Ibragimov, L. “Suv resurslaridan foydalanishning iqtisodiy jihatlari”. ResearchGate ilmiy maqolalar bazasi. Pp 164- 196
3.Jahon banki. “Suv resurslarini boshqarish va suv iqtisodiyoti bo‘yicha global hisobot”. World Bank Reports. https://www.worldbank.org/en/topic/watersupply
4.Osiyo taraqqiyot banki. (2022). “Markaziy Osiyoda suv infratuzilmasini rivojlantirish strategiyalari”. ADB Water Sector Reports. https://www.google.com/search?q=Osiyo+taraqqiyot+banki.+(2022
5.O‘zbekiston Respublikasi Innovatsion rivojlanish vazirligi. (2023). "Qishloq xo‘jaligida suv tejovchi texnologiyalar va ularning iqtisodiy samaradorligi"..
6.O‘zbekiston Respublikasi Statistika agentligi. (2022). "Suv ta’minoti va foydalanish bo‘yicha statistik ma’lumotlar". Rasmiy statistika. https://nsdg.stat.uz/uz/goal/9
7.Jahon iqtisodiy forumi. (2021). "Global suv inqirozi va iqtisodiyotga ta’siri". World Economic Forum Reports. Manba. https://uz.wikipedia.org/wiki/Jahon_iqtisodiy_forumi
8.FAO (BMT Oziq-ovqat va qishloq xo‘jaligi tashkiloti). (2021). "Suv resurslarini qishloq xo‘jaligida samarali boshqarish bo‘yicha xalqaro tajribalar". FAO Water Reports. https://www.fao.org/water/en/