European Journal of Economics, Finance and Business Development
ISSN (E): 2938-3633
Volume 1, Issue 3, June 2023

Economic Analysis of Irrigation Expenditure Policies in Uzbekistan

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Abstract
This research paper aims to conduct an economic analysis of irrigation expenditure policies in Uzbekistan. The study investigates the budget allocation and effectiveness of irrigation expenditures, focusing on the impact of different policies on the agricultural sector, economic growth, and sustainable water resource management. By evaluating the current irrigation expenditure framework, the paper seeks to provide recommendations for optimizing resource allocation, improving cost-effectiveness, and enhancing the overall efficiency of irrigation investments. The findings of this research can inform policy decisions and contribute to the sustainable development of Uzbekistan's agricultural sector.

INTRODUCTION

Irrigation plays a vital role in sustaining agricultural production, ensuring food security, and supporting rural livelihoods in arid regions such as Uzbekistan. With its predominantly arid climate, the agricultural sector in Uzbekistan heavily relies on irrigation to maintain agricultural productivity. However, effective management of irrigation water resources and the allocation of budgetary resources for irrigation infrastructure development and maintenance pose significant challenges.

This research paper aims to conduct an economic analysis of irrigation expenditure policies in Uzbekistan, focusing on the efficiency and sustainability of resource allocation. By examining the allocation patterns and financial management practices, this study seeks to identify strengths, weaknesses, and potential areas of improvement in irrigation expenditure policies.

The analysis will be carried out within the framework of the government's overall strategy for agricultural development, which aims to enhance productivity, promote private sector investments, improve water resource management, and ensure long-term sustainability. The study will shed light on the impact of budgetary allocations on the performance of irrigation systems, the income of rural commodity producers, and the overall economic development of the agricultural sector.

To achieve the research objectives, a comprehensive assessment of budgetary expenditures related to irrigation water management will be conducted. This assessment will include an examination of the allocation patterns among various expenditure categories, such as operations and maintenance (O&M), capital investments in irrigation infrastructure, and drainage. The study will analyze the trends in budgetary allocations over the past two decades,

assess their alignment with international best practices, and evaluate their impact on irrigation efficiency and sustainability.

Moreover, the economic analysis will explore the cost-effectiveness of irrigation expenditure policies by examining the relationship between allocated resources and the outcomes achieved. This assessment will involve evaluating the efficiency of irrigation services, productivity gains, and the financial sustainability of the irrigation sector. The research will also examine the impact of electricity expenses on the budget, considering its substantial share in the overall irrigation expenditure.

The findings of this study will provide valuable insights for policymakers, water resource managers, and agricultural stakeholders involved in shaping irrigation expenditure policies in Uzbekistan. By identifying areas for improvement and proposing evidence-based recommendations, this research aims to contribute to the formulation of more effective and sustainable irrigation expenditure policies, ultimately fostering the development of a resilient and productive agricultural sector in Uzbekistan.

Overall, this research paper seeks to bridge the existing knowledge gap by conducting an in-depth economic analysis of irrigation expenditure policies in Uzbekistan. Through this analysis, we aim to provide a comprehensive understanding of the current budgetary allocations, their implications, and potential strategies for optimizing the allocation of resources in order to achieve greater efficiency and sustainability in irrigation water management.

Literature review

During the 1960s to 1980s, centralized governments in countries like the USSR and the People's Republic of China invested heavily in large-scale public irrigation schemes as part of their resource management and societal development efforts. However, it became evident in the mid-1980s that many of these investments, typical of developing countries, were not achieving the expected increase in productivity. Furthermore, due to insufficient funding for operation and maintenance and poor construction quality, these hydraulic infrastructures began to deteriorate.

Meinzen-Dick et al. (1994) pointed out that many projects lacked essential information about local conditions and needs, as they incorporated engineering interventions without adequate consultation with local users and project designers. With the significant governmental and political-economic changes that occurred in the late 1980s, transitioning from planned economies to market-oriented systems, the management and control structures for these hydraulic infrastructures became inefficient (Feike et al., 2013).

Structural adjustments were deemed necessary to improve the operation and maintenance (O&M) of irrigation schemes, shifting the control from state departments to local water users (Faggi, 1991). Allan (2003) emphasized the complexity of water management decentralization in developing countries with state-centralized governments still involved in the water sector. Over the past few decades, many countries undergoing political-economic transitions have reorganized and reformed their water sectors, focusing on decreasing subsidies, implementing price-fixing schemes, capacity building, and developing strategies and legal frameworks (Abdolvand et al., 2013a, b; Groll et al., 2013).

International donors and development banks supported these management changes and encouraged governments to involve local users in co-managing irrigation systems through an inclusive and participatory approach, known as the Irrigation Management Transfer (IMT) concept. This concept formed the basis of several development projects. According to Ghazouani et al. (2012), IMT involves transferring responsibilities and authority from central government entities to non-governmental agencies like Water Users Associations (WUAs) or private entities.

While many scholars believe that this process enhances participation and inclusion in water management, Yakubov and Ul-Hassan (2007) argued that participatory management can lead to discrepancies between marginalized and powerful groups, resulting in unequal distribution of reform benefits. Ghazouani et al. (2012) and Mollinga (2007) suggested that decentralization policies reflect a neo-liberal approach that reduces the role of the state in water resource management. Additionally, IMT was seen as a means to reduce government spending on irrigation system maintenance and benefit governmental budgets, especially for transitional countries facing financial crises (Wegerich, 2006).

The establishment of Water Users Associations has been a widespread example of IMT worldwide, particularly in developing countries. Salman (1997) defined Water Users Associations as non-profit organizations comprising groups of farmers responsible for managing either partial or whole irrigation systems within a hydraulic unit, command area, or irrigation district. According to Ghazouani et al. (2012), a well-structured WUA should encompass three domains of responsibility: water management, maintenance, and financial management.

Results and discussions

Due to the dry climate, irrigation plays a crucial role in agricultural production in Uzbekistan. The agricultural sector remains a significant contributor to the country's economy, accounting for 27 percent of both GDP and employment. Uzbekistan has successfully maintained its irrigation potential through the establishment of the Ministry of Water Resources (MoW) and the implementation of integrated water resources management policies, recognizing the social value of irrigation.

However, Uzbekistan is now confronted with increasing challenges in meeting future irrigation water demands. Climate change is projected to exacerbate seasonal and annual variations in precipitation and temperature, leading to potential water shortages across the country. The current state of irrigated lands and irrigation and drainage (I&D) systems hinders further growth in crop productivity and rural incomes. The lack of an integrated and systematic approach to land reclamation projects, inadequate financing sources, and limited engagement from water management organizations and water consumer associations (WCAs) have resulted in reduced scope of reclamation works, rising groundwater tables, and increased salinity in irrigated fields. The aging infrastructure of large-scale irrigation systems exacerbates these challenges, leading to inefficiencies and poor performance in irrigation services provided by public irrigation basin authorities and community-based WCAs.

Historically, the allocation and delivery of irrigation water were primarily focused on meeting state quotas for cotton and wheat production. The operations and maintenance (O&M) expenditures of Basin Administrations of Irrigation Systems (BAISs) in Uzbekistan are comparatively lower than the average in other countries, with electricity costs dominating due to the reliance on lift irrigation systems. Provinces relying on lift irrigation experience higher O&M expenditures and lower economic efficiency compared to those with gravity irrigation. Insufficient funding for repairs and maintenance has resulted in extensive infrastructure deterioration, shortening its lifespan and creating a pressing need for capital investments.

Although most farmers in Uzbekistan can afford the fees charged by WCAs, low fee collection rates can be attributed to issues of transparency, accountability, and non-participatory governance within WCAs. However, many farmers with low profitability struggle to cover irrigation service fees due to rising costs of resources and services, outpacing the increase in state-established purchase prices for cotton and wheat. Addressing the weak incentive framework for farmers, district BAISs, and WCAs to conserve water is crucial.

In summary, Uzbekistan's irrigation sector faces various challenges related to climate change, aging infrastructure, insufficient financing, and governance issues. Addressing these issues will require a comprehensive approach that promotes sustainable water management practices, infrastructure upgrades, improved governance mechanisms, and financial support for farmers.

In 2019, the Uzbekistan government introduced the Strategy for Agricultural Development for the period of 2020-2030. This strategy outlines an ambitious and transformative agenda aimed at transitioning away from state-led agricultural production, improving land tenure and security, enhancing transparency in land distribution, and redirecting agricultural financing towards private sector investments. The overarching vision is to foster a competitive, market-based, diversified, and export-oriented agri-food sector that boosts farm incomes, generates new employment opportunities, ensures food security, and promotes the sustainable utilization of natural resources, including irrigation water. The strategy focuses on nine key priorities: (1) enhancing food security for the population; (2) creating a favorable environment for agribusiness and value chains; (3) reducing state intervention in sector management and fostering investment attractiveness; (4) promoting the responsible use of natural resources and environmental protection; (5) developing modern public institutions; (6) diversifying state expenditures; (7) advancing research, education, and advisory services; (8) developing rural areas; and (9) establishing transparent statistics and information systems.

Furthermore, in 2020, Uzbekistan introduced its first-ever Concept of Development for the Water Management Sector for the period of 2020-2030[1]. This concept aligns with international best practices and encompasses various strategic areas, including: (1) promoting the rational use of water resources; (2) scaling up water-saving technologies; (3) ensuring the safe and efficient management of water infrastructure; (4) improving the condition of irrigated land; (5) adopting market principles in the water sector, including Public-Private Partnerships (PPPs); (6) enhancing governance in water resource management and service delivery; (7) improving transboundary water management; (8) integrating Information Communication Technologies

[1] 3 Presidential Decree #UP-6024, of July 10, 2020, “On Water Sector Development Concept of Uzbekistan for 2020-2030.”

(ICT) for water management, control, and accounting; and (9) strengthening capacity building and research for enhanced sector performance. The concept outlines a phased implementation plan based on Water Sector Development Strategies, which will be reviewed and approved every three years, prioritizing specific areas and setting target parameters and indicators for the respective period.

The budget allocated for irrigation water management in Uzbekistan is relatively low and insufficient to provide adequate services. From 2016 to 2019, the level of budget expenditures on irrigation water management averaged 1.1 percent of GDP and 4 percent of total budget expenditures. However, over the past 20 years, these expenditures have shown a declining trend when measured as a percentage of GDP, total budget expenditures, and total crop production (Figure 1). On the other hand, the total irrigation water spending per hectare of irrigated land has experienced an overall increase over the same period, rising from $49 per hectare in 2000 to $156 per hectare in 2019 (Figure 2). This upward trend can be attributed to higher per hectare expenses on operations and maintenance, capital investments in fixed assets, and drainage.

Despite these increases, the capital investments specifically targeted at irrigation and drainage have been inadequate. In 2018, the actual capital investment in the irrigation and drainage subsector amounted to UZS 1,238 billion (equivalent to $36 per hectare), and in 2019, it reached $56 per hectare, considering an irrigated area of 4.3 million hectares[2]. However, the requirement is to allocate at least an additional $250 per hectare per year for fixed capital investments in irrigation and drainage without considering modernization efforts. To ensure a reliable, sufficient, and adaptable water supply for irrigation, long-term capital investments would need to be increased to approximately $1,400 per hectare. Additionally, the modernization of the entire irrigation and drainage infrastructure between 2015 and 2030 is estimated to cost between $5.5 billion and $16 billion[3].

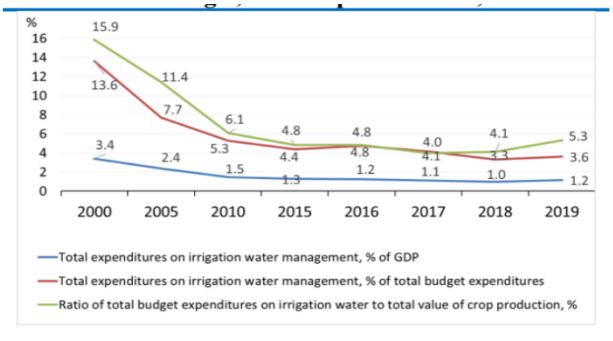


Figure 1. Trends in Budget Expenditures on Irrigation Water Management as a Share of GDP, Government Budget, and Crop Production, 2000–19

Source: World Bank staff calculations using data from Uzbekistan authorities.

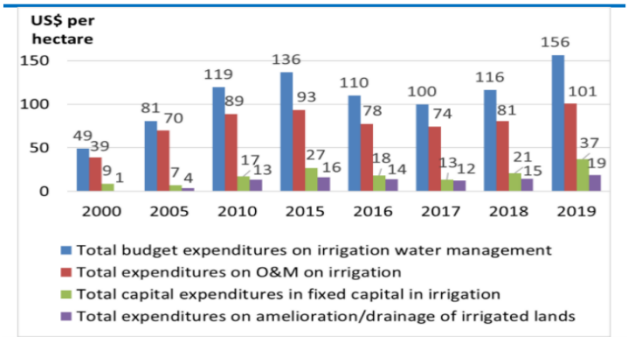


Figure 2. Trends in Budget Expenditures on Irrigation Water Management, US$ per Hectare, 2000–19

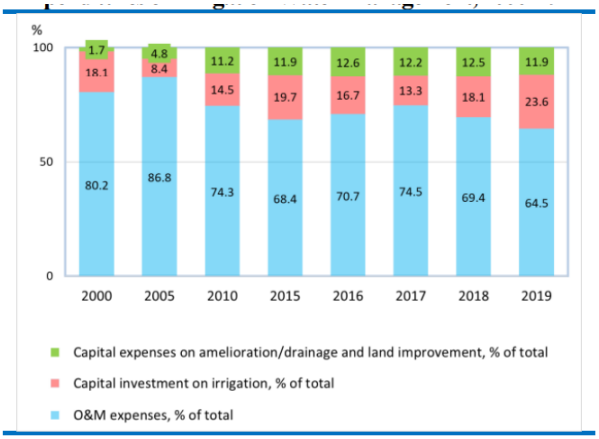
Source: World Bank staff calculations using data from Uzbekistan authorities. Note: O&M = operations and maintenance.

[2] While irrigation and drainage expenditure as a share of GDP was falling from 3.4 percent in 2000 to 1.1 percent in 2017 in terms of per ha, the expenditures were increasing. This is because the absolute GDP of Uzbekistan increased from US$13.5 billion in 2000 to US$62.1 billion in 2017, that is, 4.6-fold, while spending as a share of GDP declined 3-fold. Thus, the spending per ha increased about 2-fold (as irrigated land was broadly unchanged in this period).

[3] The 4.3 million ha includes secondary crops, while the arable land in recent years might be smaller.

European Journal of Economics, Finance and Business Development
ISSN (E): 2938-3633
Volume 1, Issue 3, June 2023

The budget allocation for irrigation water management in Uzbekistan is primarily focused on operations and maintenance (O&M) expenditures, accounting for approximately two-thirds of the budget in recent years. This is followed by capital investments in fixed assets for irrigation and expenditures on drainage (Figure 3). International experience highlights the importance of maintaining a well-balanced distribution of the irrigation and drainage (I&D) budget across various subcategories, including wages, repairs and maintenance, other non-wage recurrent expenditures, and capital investments, to ensure sustainability and effectiveness (Figure 4).



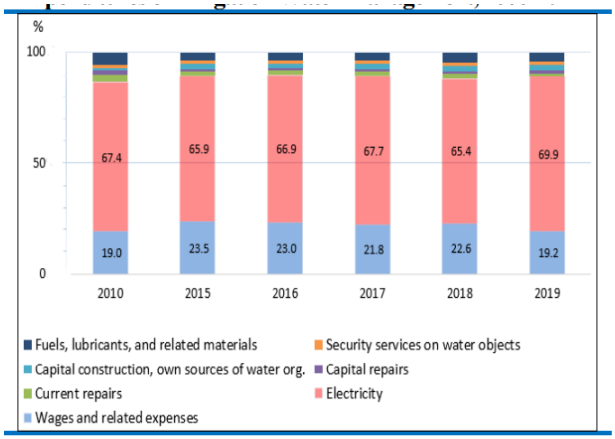


Figure 3. Trends in Main Structure of Budget Expenditures on Irrigation Water Management, 2000–19
Source: World Bank staff calculations using data from Uzbekistan authorities. Note: O&M = operations and maintenance

Figure 4. Trends in O&M Structure of Budget Expenditures on Irrigation Water Management, 2000–19
Source: World Bank staff calculations using data from Uzbekistan authorities.

It is worth noting that capital expenditures showed an increasing trend between 2000 and 2015, experienced a decline in 2016 and 2017, and then increased again in 2018 and 2019. On the other hand, O&M expenditures, constituting around 65 to 70 percent of the total expenditures, are divided into electricity expenses (comprising approximately 67 to 70 percent of total O&M), wages (around 20 percent of total O&M), and other expenses, such as canal and equipment repairs, fuel and lubricant costs, and security services for water facilities.

The dominance of electricity expenses, representing 70 percent of total O&M expenditures, leaves limited funds for current and capital repairs, which remain at a low level of 2.9 percent of total O&M expenditures. The agricultural sector in Uzbekistan heavily relies on electricity, particularly for lift irrigation, which is used to irrigate 56 percent of the total irrigated land using electrical pumps. The Ministry of Water Resources (MoW) operates 1,687 pumping stations with over 5,000 pumps, consuming 6 to 8 billion kilowatt-hours of electricity annually, accounting for 16 percent of the country's total electricity consumption. The electricity costs for irrigation and drainage pumps amount to nearly $350 million each year, constituting 60 percent of the MoW's annual O&M budget. The proportion of payments for grid electricity within the total O&M budget has significantly increased from 40 percent in 1995 to 70 percent in 2019. Additionally, more than 10,000 pumping units are operated by water consumer associations (WCAs) of farmers, and a portion of the rising electricity expenses is directly borne by the farmers themselves.

It is evident that there is a pressing need for increased funding for repairs and maintenance since the actual budget allocated (excluding electricity costs) was only $28 per hectare in 2018 and $30 per hectare in 2019, while the requirement stands at $80 per hectare (which is 2.6 times higher).

Conclusion:

In conclusion, the irrigation sector in Uzbekistan faces significant challenges that require immediate attention and strategic interventions. The country's dry climate and reliance on irrigation make it essential to address issues related to climate change, aging infrastructure, insufficient financing, and governance. Failure to do so could hamper agricultural productivity, rural incomes, and overall economic development.

The current state of irrigated lands and irrigation and drainage systems poses obstacles to further growth in crop productivity and rural incomes. Inadequate financing sources, limited engagement from water management organizations and water consumer associations, and the lack of an integrated approach to land reclamation projects have contributed to infrastructure deterioration, rising groundwater tables, and increased salinity in irrigated fields. These challenges highlight the urgent need for capital investments and improved maintenance practices to ensure the long-term sustainability of irrigation systems.

The allocation of budgetary resources for irrigation water management has predominantly focused on operations and maintenance (O&M) expenditures, with electricity costs consuming a significant portion of the budget. This leaves limited funding for current and capital repairs, hindering the sector's ability to address infrastructure deterioration effectively. The heavy reliance on electricity for lift irrigation further exacerbates the issue, with rising electricity expenses accounting for a substantial portion of the annual O&M budget.

Furthermore, issues related to transparency, accountability, and non-participatory governance within water consumer associations have led to low fee collection rates and weakened incentives for water conservation among farmers. The financial burden on farmers, particularly those with low profitability, further compounds the challenges faced in meeting irrigation service fees.

To address these challenges, a comprehensive approach is needed, encompassing sustainable water management practices, infrastructure upgrades, improved governance mechanisms, and financial support for farmers. The recent introduction of the Strategy for Agricultural Development and the Concept of Development for the Water Management Sector provides a promising framework for addressing these issues. These strategies emphasize private sector investments, market-based approaches, and responsible water resource management.

Increased budget allocations for irrigation water management are crucial to provide adequate services and support infrastructure improvements. While recent years have seen an upward trend in budget expenditures, additional investments are needed to meet the requirements for capital investments and repairs. The modernization of irrigation and drainage infrastructure, coupled with sustainable water management practices, is essential for ensuring reliable and sufficient water supply for irrigation.

In conclusion, a concerted effort is required from policymakers, water resource managers, and agricultural stakeholders to address the challenges faced by Uzbekistan's irrigation sector. By implementing the recommended strategies, fostering partnerships between public and private entities, and enhancing governance mechanisms, Uzbekistan can achieve a more efficient, sustainable, and productive irrigation system. This, in turn, will contribute to the country's agricultural development, rural livelihoods, and overall economic growth.

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