GREEN FINANCING AND REGIONAL DEVELOPMENT DISPARITIES: EMPIRICAL EVIDENCE FROM UZBEKISTAN

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Abstract. *This article examines the role of green financing in addressing regional development disparities, using empirical evidence from Uzbekistan. The study is based on a comparative analysis of regional indicators that reflect differences in infrastructure development, investment activity, and efficiency levels across territories. The findings reveal significant interregional disparities, with higher performance concentrated in economically advanced regions, while less developed areas demonstrate comparatively lower indicators.*

The research highlights that green financing instruments, including investments in renewable energy, energy-efficient technologies, and sustainable infrastructure, can serve as an effective mechanism for reducing territorial imbalances. The results indicate that regions with greater access to green financial resources tend to achieve higher efficiency and sustainability outcomes. Consequently, the study emphasizes the importance of targeted green financing policies aimed at enhancing regional inclusiveness, strengthening environmental sustainability, and supporting balanced economic growth. The conclusions provide practical implications for policymakers and financial institutions in designing region-specific green financing strategies.

Keywords: *Green financing; regional development; regional disparities; sustainable growth; renewable energy; Uzbekistan.*

In order to further intensify the ongoing measures to provide consumers of the republic with clean and high-quality drinking water and improve wastewater services, increase the coverage of drinking water supply and wastewater services, accelerate the transformation process of the sector, and strengthen the financial and economic condition of enterprises, it is necessary to expand cooperation with international financial institutions, activate the participation of the private sector, introduce "green financing" mechanisms, use resource-saving technologies, and use modern assessment methods to determine the effectiveness of projects. In this regard, world experience shows that the success of investments in water infrastructure largely depends on institutional reforms, transparency of tariff policies, modernization of enterprise management mechanisms, and continuous improvement of the quality of service provision. In this sense, the gradual introduction of corporate governance principles in Uzbekistan, automation of asset management, accounting systems, and the use of mechanisms to reduce water losses in Uzsuvtaminot JSC and its affiliated regional enterprises will serve to increase the return on investments in the sector and the level of financial stability.

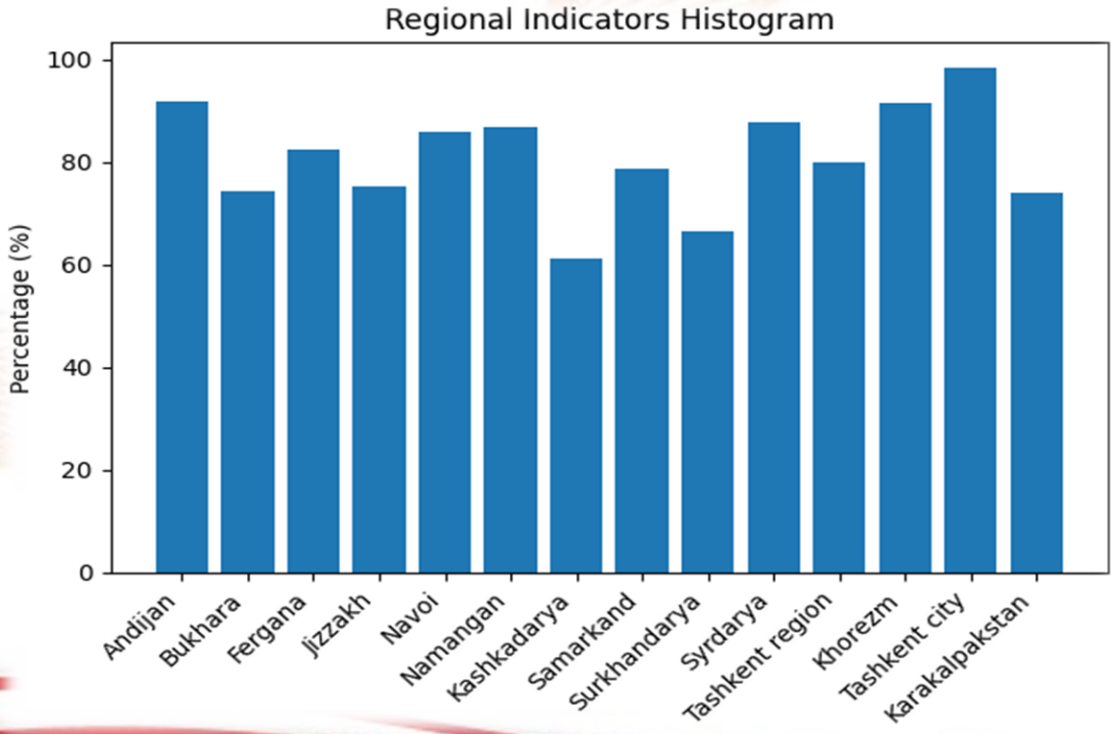

Figure 1. Regional Distribution of Indicators, %[1]

Figure 1 illustrates the regional distribution of percentage indicators across Uzbekistan, revealing notable territorial disparities. The highest value is observed in Tashkent city (98.4%), which reflects the concentration of developed infrastructure, higher investment activity, and advanced technological capacity. Similarly, Andijan (92.0%) and Khorezm (91.6%) regions demonstrate relatively strong performance, indicating effective implementation of modernization and efficiency-oriented measures.

A group of regions, including Namangan (87.0%), Syrdarya (87.7%), Navoi (85.8%), and Fergana (82.5%), show stable and moderately high indicators. This suggests a balanced level of development supported by gradual adoption of energy-efficient technologies and improved resource management practices.

In contrast, comparatively lower indicators are recorded in Kashkadarya (61.2%), Surkhandarya (66.5%), and the Republic of Karakalpakstan (74.2%). These differences may be associated with infrastructural constraints, limited investment inflows, and slower diffusion of modern technologies. Overall, the figure highlights the necessity of targeted regional policies aimed at reducing interregional disparities and enhancing sustainable development outcomes.

The introduction of solar photovoltaic panels in drinking water supply and wastewater treatment facilities is one of the most relevant areas of increasing energy efficiency in the sector. As a result of the use of these technologies, the need for enterprises to connect to the power grid is significantly reduced, since a significant part of the energy consumed is obtained from renewable sources. Calculations show that the installed solar panels can fully recoup the initial investment in an average of 5-8 years, and

[1] Author's calculations based on regional statistical data

the service life of the panels is 25-30 years. This allows for almost cost-free electricity generation for 15-20 years after the return on investment.

At the same time, the ability to sell excess energy produced to the general electricity grid becomes an additional source of income for the enterprise. These revenues allow strengthening financial stability, increasing the wage bill of employees, improving working conditions and expanding modernization processes. As a result, the enterprise's labor productivity increases, innovative technologies are introduced, and the quality of service improves.

The expansion of renewable energy infrastructure will significantly reduce the environmental burden. In particular, the demand for traditional fuel sources in electricity generation will be reduced, reducing atmospheric emissions and reducing the carbon footprint. This is consistent with Uzbekistan's strategy for transition to a "green economy", national goals for increasing the share of renewable energy by 2030, and commitments under the Paris Agreement. In general, the introduction of solar panels in water supply and wastewater infrastructure is a strategic project that provides high economic benefits in terms of increasing energy efficiency, optimizing costs, strengthening the financial stability of enterprises, and protecting the environment. Therefore, attracting private investors to this area, expanding cooperation with international financial institutions, and using "green" loans and subsidies remain an important priority. It is also worth noting that the implementation of comprehensive measures to improve the energy efficiency of water infrastructure, introduce pumping stations powered by renewable energy sources, build treatment facilities that meet environmental safety requirements, and improve the water consumption culture of the population are important future priorities for the modernization of the sector. In this regard, the attraction of "green bonds", public-private partnership (PPP) agreements, international grants, and credit lines to expand investment flows is one of the important factors in the development of market mechanisms.

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