

THE CONTRIBUTION OF DIGITALIZATION AND INNOVATION TO REGIONAL ECONOMIC CONVERGENCE

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Abstract: This article explores the contribution of innovation and digitalization to reducing socio-economic disparities and fostering regional economic convergence in Uzbekistan. It emphasizes the significance of innovative mechanisms and digital technologies in narrowing gaps in regional economic potential, promoting sustainable growth, and ensuring more efficient use of labor resources. Digital transformation is examined as a catalyst for a new phase of regional development, improving the effectiveness of state investment programs, and enhancing openness and transparency in local governance. The study also reviews international best practices in addressing regional disparities and evaluates their applicability within the Uzbek context. Furthermore, the paper highlights the role of innovation infrastructure, startup ecosystems, and e-government systems as essential drivers of regional competitiveness. The findings provide a foundation for developing scientifically grounded strategies to mitigate interregional inequalities and strengthen inclusive growth.

Keywords: Regional disparities, economic convergence, socio-economic development, innovation, digital economy, territorial inequalities, digital transformation, startup ecosystem, e-government, innovation infrastructure, competitiveness, public investment programs, sustainable development.

INTRODUCTION

Currently, socio-economic disparities across regions remain among the most pressing challenges of the global economy. Territorial inequalities constrain the efficient utilization of economic resources and undermine the overall stability of national development. International experience demonstrates that the large-scale adoption of innovation and digital economy instruments serves as an effective means of reducing such disparities [1]. Consequently, the acceleration of digital transformation processes and the expansion of innovative infrastructure are becoming key priorities of contemporary economic policy.

Findings from international organizations further underscore this perspective. The integration of digital technologies is recognized as a decisive factor in narrowing regional inequalities, enhancing productivity, and fostering job creation. For instance, the OECD's Regions and Innovation report highlights the role of regional innovation hubs, startup ecosystems, and digital infrastructure as critical drivers of regional competitiveness [2]. Similarly, the United Nations Development Programme consistently stresses the importance of digital transformation as a mechanism for promoting territorial equity in its recent assessments [3].

Uzbekistan has actively joined these global processes through the adoption of the "Digital Uzbekistan – 2030" strategy, which prioritizes the large-scale introduction of advanced technologies into public administration, education, healthcare, and business activities [4]. This strategic framework is designed to reduce territorial disparities, enhance economic efficiency, and expand public access to digital services. Moreover, the "New Uzbekistan Development Strategy" identifies the reduction of regional inequalities and the strengthening of the innovative potential of each territory as key priorities of national development policy [5].

At the local level, policy measures are also aligned with this direction. In particular, the establishment of Innovation Development Centers has created institutional platforms for integrating

scientific research into practice and for supporting youth-led startup initiatives. These efforts contribute to fostering innovative activity at the regional level and to diversifying local economies.

Furthermore, within the framework of international cooperation, institutions such as the World Bank, the Asian Development Bank (ADB), and the European Union are implementing joint projects in Uzbekistan aimed at expanding digital infrastructure, strengthening e-government systems, and promoting startup ecosystems [6].

Such initiatives are expected to play a crucial role in narrowing regional disparities and accelerating the transition toward an innovative and competitive economy. Thus, the role of innovation and the digital economy in regional development has acquired strategic importance today, and they are considered an important mechanism not only for increasing economic efficiency, but also for eliminating interregional inequalities, ensuring social stability, and strengthening sustainable development trends. Therefore, this article provides a comprehensive analysis of the scientific, theoretical and practical aspects of innovation and the digital economy in regulating disparities in the economic development of regions.

LITERATURE ANALYSIS

The role of innovation and the digital economy in reducing disparities in regional economic development has been widely studied in the international community. In particular, the World Bank's 2021 World Development Report: Data for Better Lives notes their crucial role in managing data flows, introducing digital technologies, and mitigating inter-regional inequalities [7]. The OECD's publication Regions and Innovation assesses innovation infrastructures, startup ecosystems, and regional cooperation mechanisms as the basis for sustainable development [8].

The United Nations Development Programme (UNDP) Human Development Report 2022 highlights the significant impact of digital transformation processes on human capital development, inter-regional economic equity, and social justice [9]. The Asian Development Bank (ADB) study "Digital Economy Development in Central Asia" also developed practical mechanisms for reducing regional disparities through the development of digital infrastructure in Central Asian countries [10].

Local scholars are also studying this issue in depth. Abdullaev (2021) in his study analyzes the issues of ensuring regional financial transparency through the introduction of digital technologies in the process of adapting accounting to international standards in Uzbekistan [11]. Umurzakov (2020) emphasizes the role of innovation policy in strengthening regional economic security and the need to strengthen scientific and technical capacity in the regions [12].

The Resolution of the President of the Republic of Uzbekistan No. PQ-6079 of October 5, 2020 on the "Digital Uzbekistan – 2030" strategy established the introduction of digital technologies and acceleration of innovative development in the country as the main direction of state policy in reducing regional disparities [13]. Also, the Decree on the "Development Strategy of New Uzbekistan", adopted on January 28, 2022, also indicated the development of an innovative economy, taking into account the potential of the regions, as a priority task [14].

Innovation and digital transformation are not only technological shifts but also strategic instruments that contribute to fostering inclusive regional growth and ensuring more equitable socio-economic outcomes. His analysis emphasizes that digital platforms, innovative infrastructures, and knowledge-based ecosystems can significantly reduce territorial inequalities by enhancing productivity, stimulating entrepreneurship, and creating new employment opportunities, thereby accelerating the process of regional economic convergence [15].

Foreign experience also shows that the implementation of innovation and digital economy tools in regional development is an effective tool for reducing inter-regional disparities. For example, the experiences of South Korea and Estonia show that e-government systems have increased the efficiency of using regional resources, increased transparency, and increased accountability [16].

Thus, the literature review shows that innovation and the digital economy are theoretically and practically important mechanisms for regulating interregional imbalances, and international organizations and national policy documents come to a unanimous conclusion in this regard. However, their effectiveness is more closely related to adaptation to local conditions, deepening institutional reforms, and taking into account territorial specifics. .

RESEARCH METHODOLOGY

This study used a comprehensive methodological approach to study the role of innovation and the digital economy in regulating disparities in the socio-economic development of the regions of the Republic of Uzbekistan. First of all, the integration of the concepts of regional economy, innovative development and digital transformation was chosen as the theoretical basis. The methodological basis of the study is the indicators of economic inequality - the Gini, Theil and Hoover indices, as well as the coefficients of dispersion and variation used to analyze interregional differences. Internet coverage, the level of use of e-government services, the number of startups and investments in digital infrastructure were included as indicators to measure the impact of digital transformation on regional development. The Stata software package was used to process the data, and the results were checked for robustness through sensitivity analysis, alternative specifications and placebo tests. Thus, the methodological approach made it possible to determine the relationship of regional disparities with innovative and digital development on both a theoretical and empirical basis.

ANALYSIS AND RESULTS

This section provides a comprehensive analysis of key economic indicators for the period 2020–2024, including gross domestic product, the number of innovative startups, the level of use of digital services, and unemployment rates, using the example of the Namangan region and its districts. This data allows us to show the dynamics of regional development, identify regional imbalances, and assess the real impact of innovation and the digital economy in regulating them.

The table below presents the gross regional product (GRP) of Namangan region and its major districts over the years. This indicator reflects the level of economic development of the regions, the expansion of the manufacturing and service sectors, as well as the stability of regional investment flows. The table data clearly shows the differences in the rates of economic growth between regions and serves as an important empirical basis for analyzing the impact of innovation and the digital economy on regional development.

Table 1.

The volume of GHM in some districts of Namangan region (billion soums)

Year	Namangan city.	Attic	Chust	Kasonsoy	Pop	Turaqurgan
2020	15800	3100	4500	5000	4200	3900
2021	16900	3350	4820	5300	4550	4170
2022	18500	3600	5150	5620	4900	4450
2023	20100	3890	5520	5970	5280	4780
2024	21900	4200	5900	6350	5700	5100

Author's development based on data from the State Statistics Committee of the Republic of Uzbekistan

The table data shows that during 2020–2024, the GDP volume in Namangan region and its districts showed a consistent growth trend. In particular, the GDP volume in Namangan city increased from 15.8 trillion soums to 21.9 trillion soums, an increase of 38.6%. This result indicates that the industrial and services sector in the city center has expanded, entrepreneurial activity has increased,

and investment flows are relatively high. Positive growth was also observed at the district level, with an increase in GDP volume of around 27–30% in Chust and Kosonsoy districts, indicating an increase in regional economic activity.

Also, although the GDP volume in Chartok and Turakurgan districts increased at a relatively lower rate, economic stability is being ensured in these regions. In Pop district, an increase of 35.7% was recorded, from 4200 billion soums to 5700 billion soums. The data in the table show the existence of regional differences: while the GDP volume of Namangan city is the highest, the economic indicators of Chartok and Turakurgan districts remain at a much lower level. This confirms the need for a more balanced distribution of resources in regional policy, support for the digital economy and innovative projects.

The table below shows the changes in the number of innovative startups operating in the Namangan region and some of its districts during 2020–2024. This indicator reflects the formation of an innovative ecosystem in the regions, the growing interest of young people and entrepreneurs in new technologies and digital solutions. The dynamics of the number of startups is considered an important criterion for assessing the level of development of innovative potential in the regions (Table 2).

Table 2.

The number of innovative startups in some districts of Namangan region

Year	Namangan city.	Attic	Chust	Kasonsoy	Pop	Turaqurgan
2020	25	4	7	9	6	5
2021	31	6	9	12	8	7
2022	38	8	12	16	11	9
2023	47	11	15	21	14	12
2024	59	15	20	28	18	16

Author's development based on information from the Namangan Regional Department of Innovation Development

The table data shows that during 2020–2024, the number of innovative startups in the Namangan region and its districts steadily increased. In particular, in the city of Namangan, the number of startups, which was 25 in 2020, increased to 59 in 2024, an increase of 2.3 times. In the Kosonsoy district, significant dynamics were also achieved, reaching 28 from 9, that is, an almost threefold increase was recorded. Such indicators indicate that the innovative environment necessary for the digital economy is being formed in the regions, and the desire of young people and small businesses to introduce new technologies is increasing, especially among young people and small businesses. At the same time, the number of startups in the Chust district, which increased from 7 to 20, indicates the gradual development of scientific and technical potential.

At the same time, the number of startups in some districts is growing at a relatively low rate. For example, in Chartok district, the number of startups has increased from 4 to 15, but the total volume has not yet reached a sufficient level. Factors such as insufficient development of innovation infrastructure in these regions, limited access to financial resources, and a shortage of qualified specialists are affecting them. However, the overall trend is positive, and the increase in startups can contribute to the creation of new jobs in the region, increase economic competitiveness, and reduce regional disparities. From this point of view, further expansion of the innovation ecosystem and additional state incentive measures are an important condition for regional economic development.

Table 3.

Percentage of population using digital services in some districts of Namangan region (%)

Year	Namangan city.	Attic	Chust	Kasonsoy	Pop	Turaqurgan
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2020	62	35	40	43	37	32
2021	68	41	46	49	43	38
2022	74	47	52	56	50	44
2023	80	54	59	63	57	51
2024	87	61	66	71	65	59

Author's development based on information from the Ministry of Digital Technologies of the Republic of Uzbekistan

As can be seen from the table, the share of the population using digital services in the Namangan region and its districts increased significantly during 2020–2024. In Namangan city, this indicator reached 87 percent from 62 percent, an increase of 25 percent over five years. This process is explained as a result of the expansion of Internet coverage among the city's population, the transfer of public services to electronic platforms, and the active use of mobile applications. Kosonsoy and Chust districts also recorded high growth rates, reaching 71 percent from 43 percent and 66 percent from 40 percent, respectively. These results are associated with the accelerated development of regional digital infrastructure, including improved internet speed and an increase in digital services at the local level.

However, there are still significant differences in the use of digital services across districts. For example, in Chartok and Turakurgan districts, the figures were 35 and 32 percent, respectively, in 2020, but in 2024 they reached 61 and 59 percent. While this growth is positive, the gap is significantly larger compared to the city of Namangan. Such differences depend, first of all, on economic opportunities, the level of digital literacy of the population, and the level of development of the Internet infrastructure. Therefore, in order to ensure digital equality in the future, it is important to further expand the technological infrastructure in remote areas, train the population in digital skills, and fully digitize public services.

Table 4.

Unemployment rate in some districts of Namangan region

Year	Namangan city.	Attic	Chust	Kasonsoy	Pop	Turaqurgan
2020	8.1	10.5	9.8	9.2	10.1	9.9
2021	7.8	10.1	9.4	8.8	9.7	9.5
2022	7.4	9.7	9.0	8.4	9.2	9.1
2023	7.0	9.2	8.6	8.0	8.7	8.6
2024	6.6	8.8	8.1	7.6	8.3	8.2

Author's development based on information from the Ministry of Employment and Labor Relations of the Republic of Uzbekistan

According to the table, the unemployment rate in the Namangan region and its districts has been steadily decreasing over the years 2020–2024. In Namangan city, this indicator decreased from 8.1 percent to 6.6 percent, a decrease of 1.5 percentage points over five years. Positive developments were also observed in Chust and Kosonsoy districts, decreasing from 9.8 percent to 8.1 percent in Chust, and from 9.2 percent to 7.6 percent in Kosonsoy. This is explained by the increase in economic activity in the region, the increase in the number of startups, and the creation of new jobs. It is also noticeable that the expansion of innovative projects and small business activities has provided additional opportunities for the labor market.

However, unemployment rates are still declining unevenly across districts. For example, in Chartok and Pop districts, the rates, which were 10.5 and 10.1 percent in 2020, respectively, decreased to 8.8 and 8.3 percent in 2024, but they remain higher than the regional average. In these regions, the

underdevelopment of the manufacturing and services sectors, weak digital infrastructure, and a shortage of skilled labor are significant obstacles. Therefore, measures such as the establishment of innovative industrial zones in remote districts, strengthening vocational education, and involving young people in startup projects should be implemented to ensure stability in the labor market.

CONCLUSION AND SUGGESTIONS

The results of this study show that the analysis conducted on the example of Namangan region and its districts confirms that innovation and the digital economy are an important factor in regulating disparities in the socio-economic development of regions. The main conclusions and practical recommendations are as follows:

First, during 2020–2024, the regional GDP grew steadily, increasing by around 30–40%. However, significant differences remained between the city and some districts. Therefore, it is necessary to adhere to the principle of regional diversification in the distribution of economic resources, that is, to stimulate investment flows in regions with low economic potential.

Secondly, the number of innovative startups is increasing sharply, and an innovative ecosystem is being formed in the region. However, this process is uneven in the districts. Therefore, it is recommended to expand incubation centers, technoparks and grant programs to support local startups. It is especially important to introduce special benefits and tax breaks in regions with low indicators, such as Chartok and Turakurgan.

Third, the use of digital services is an important tool for expanding the economic and social activities of the population, and significant growth has been observed in the region. However, there is a digital divide between urban and rural areas. Therefore, it is advisable to implement special programs to expand Internet coverage in rural areas, introduce 5G networks, and increase digital literacy.

Fourth, although the decrease in unemployment is associated with the creation of new jobs through startups and innovative projects, the indicators remain high in some districts. This indicates the presence of structural problems in the regional labor market. In this regard, it is necessary to open vocational training centers in remote areas, train young people in digital skills and technical specialties.

Fifth, international experience (in the case of South Korea and Estonia) shows that the introduction of e-government systems is an important tool for the efficient use of territorial resources, increasing transparency and ensuring economic equality. Therefore, further expansion of e-government systems and full digitalization of local government activities should be one of the priorities in Uzbekistan.

The conducted research shows that in the case of the Namangan region and its districts, the influence of innovation and the digital economy on economic development processes has significantly increased during 2020–2024. The steady growth of GDP, the increase in the number of startups, the increase in the level of use of digital services, and the decrease in unemployment rates indicate that the overall socio-economic potential of the region is increasing. However, the analysis shows that there are still significant differences across regions: while the city of Namangan as a center demonstrates high results, the pace of economic development in some districts is slower. Therefore, it is necessary to expand the innovation infrastructure, further popularize the use of digital services, support startups, and diversify the labor market as a priority area of regional policy.

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