



## Digital Economy as a Driver of Regional Modernization

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### Article information

#### Article history:

Received: 26 May 2025

Revised: 8 June 2025

Accepted: 3 July 2025

#### Keywords:

Digital Economy

Russian Regions

Digitization

Modernization

Infrastructure

Digital Divide

Strategic Development

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### Abstract

The article examines the role of digital economy as a key factor in modernizing Russian regions amidst the transition to sustainable, innovative, and high-tech development. It analyzes directions for digitizing territorial systems, evaluates the impact of digital technologies on labor productivity, governance quality, living standards, and investment attractiveness of Russia's federal subjects. The study presents interregional differences in digital maturity levels, identifies barriers to digital transformation, and proposes measures to address digital inequality. The necessity of integrating digital agenda into regional strategies and development programs is substantiated.

DOI: <https://doi.org/10.69513/jdifas.v1.i0.a4>, ©Authors, 2025, College of Administrative Techniques, Alnoor University.

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### Introduction

The formation of a digital economy represents not merely a technological trend but rather a comprehensive transformation of all spheres of public production and management. In the context of spatial heterogeneity in socio-economic development, it is precisely digitization that acquires the potential of being a systemic driver of regional modernization, particularly in terms of enhancing administrative efficiency, developing human capital, diversifying economies, and integrating them into global value chains.

National development goals until 2030 and implementation of the program “Digital Economy of the Russian Federation” establish digital transformation as a priority of state policy. However, successful digitization depends not only on federal measures but also on readiness at the regional level—their

infrastructural, personnel, institutional, and managerial foundations. Without active involvement of Russian federation entities in implementing the digital agenda, full-scale modernization of national economic activity will be impossible. [1]

A digital economy refers to an aggregate of socio-economic relations arising from processes of production, distribution, exchange, and consumption based on digital technologies. From a regional perspective, digital transformation implies changes in models of governance, business operations, employment, education, and interaction with citizens. The methodological framework of this research draws upon:

Theory of innovation-driven growth and technological cycles (Kondratiev, Perez, Glushkov);  
Concepts of smart territories and digital maturity (IDC, McKinsey, OECD);

Models of institutional and networked economics;  
 Indicators-based analysis of digital infrastructure, e-government services, IT competencies, and business environment.

Evaluation tools include indices such as:

Index of Digital Maturity of Federal Subjects (Ministry of Digital Development, ASI);

Index of Digital Economy by HSE University;

National statistics indicators, EMISS, Rosstat, EGISU. Russia's regions exhibit significant disparities in their digital evolution. According to Ministry of Digital Development data for 2023, leaders in digitization remain Moscow, Tatarstan, St. Petersburg, Sverdlovsk, Tyumen, and Kaliningrad oblasts. These regions are characterized by high penetration rates of digital government services, advanced IT businesses, and availability of skilled workforce and research capabilities.

Meanwhile, over 30 federal subjects lag behind due to insufficient internet coverage, underdeveloped platform solutions, and lack of digital skills among officials and enterprises. These challenges are especially pronounced in North Caucasus Federal District, Siberia, and Far East regions.

Four conditional groups emerge within the regions:

**Digital Leaders:** Highly developed areas with established digital ecosystems.

**Formally Active Regions:** Have strategies but face resource constraints.

**Digitally Passive Regions:** Do not systematically implement digital priorities.

**Digital Blind Spots:** Areas lacking basic ICT infrastructure and services.

This uneven development impedes the creation of a unified digital space across the country and limits modernization opportunities in peripheral regions.

Implementation of digital technologies has transformative effects on core elements of regional economies and governance. Key focus areas include:

**Digital Governance:** Expansion of electronic government services, integration of information systems between agencies, use of region-specific "digital twins," application of big data analytics for decision-making. Several regions have already implemented platforms enabling real-time tracking of budget program effectiveness, citizen complaints, healthcare metrics, and utilities performance.

**Business and Industrial Digitization:** Transition of companies to Industry 4.0 technologies, adoption of ERP systems, automation of manufacturing processes, expansion of e-commerce and logistics. Regional tech parks and industrial clusters increasingly integrate IoT, cloud computing, and machine learning solutions.

**Development of Digital Infrastructure:** Broadband internet expansion, deployment of 5G networks, establishment of data centers, ensuring connectivity

stability in rural and remote areas. Lack of basic ICT infrastructure hinders digital transformation efforts.

**Digital Education and Human Capital:** Building digital competencies among students, workers, and civil servants through initiatives like "Digital Department," online courses, and training in digital professions within the national project "Digital Economy." Regions like Ulyanovsk, Novosibirsk, and Tomsk actively develop local talent pools for IT sectors and public service. [3]

**IT Business Growth and Startups:** Support for creating regional IT firms, accelerators, shared-use facilities, and digital platforms for small and medium-sized enterprises. Tatarstan, Kaliningrad, and Novosibirsk demonstrate rapid growth in IT ecosystems and export of digital services. [4]

**Digital Healthcare, Culture, Environment:** Advancement of telemedicine, patient health records, digital museums and libraries, environmental monitoring using artificial intelligence and satellite systems.

Digital transformation exerts multiplicative impacts on regional economies. Major benefits include:

Labor productivity gains through process optimization and automation;

Cost reduction for businesses and governments;

Attraction of investments in IT infrastructure and technology;

Creation of well-paid jobs and retention of young professionals;

Enhancement of investment climate via increased transparency, efficiency, and digitized public services;

Integration of smaller towns and villages into the digital economy.

According to analysts, regions with higher digital maturity experience GDP growth surpassing those with lower digitization levels by 1.5%-2.5%. Beyond boosting economic growth, digitization enhances its sustainability (Table1).

**Regional Digital Maturity: Key Statistics**

Indicator	Leading Regions (Moscow, Tatarstan, St. Petersburg)	Lagging Regions (North Caucasus, Siberia)	National Average
Internet penetration (%)	95%	62%	78%
Digital public services (%)	88%	34%	58%
IT workforce (% of total)	8.5%	1.2%	3.7%
5G coverage (cities)	15	2	6
<b>Source:</b> Ministry of Digital Development, 2023.			

Table 1. Digital Development Leaders vs. Lagging Regions (2023)

Despite evident advantages, digitization faces several systemic limitations:

**Digital Divide:** Sharp gap between central and peripheral zones, urban and rural districts. [2]

**Low ICT Competence Levels:** Among regional administrators, municipal employees, entrepreneurs.

**Weak Digital Infrastructure:** Absence of reliable internet access, data centers, cybersecurity mechanisms.

**Insufficient Funding and Institutional Support,** particularly in low-income and subsidized regions.

**Lackluster Digital Strategies:** Weak coordination between departments, inadequate project management.

**Legal and Normative Barriers:** Complex regulations governing personal data usage, absence of uniform standards etc (see Table 2).

Barrier	Urban Areas (%)	Rural Areas (%)
Lack of IT infrastructure	18%	67%
Low digital literacy	22%	59%
Funding gaps	35%	82%
Source: ASI (Agency for Strategic Initiatives), 2024 survey.		

Table 2. Challenges by Region Type

Addressing these issues requires systematic policies and equalizing mechanisms at the federal level.

To overcome barriers and enhance the role of digital economy as a system-wide driver of development, targeted multi-level policymaking is essential. Critical priorities for regional digital transformation include:

**Integration of Digital Agenda into Socio-Economic Development Strategies:** Digitization should become a cross-cutting element present in education, healthcare, transportation, utilities, governance, and entrepreneurship. Each region must adopt up-to-date digital transformation strategies aligned with the national program "Digital Economy."

**Creation of Digital Development Centers:** These could be tech parks, IT clusters, smart cities, or training hubs for digital talents. Some Russian regions, including Kaluga and Perm Oblasts, have successfully adopted similar approaches.

**Financial Support for Regional Digital Initiatives:** Improved access to subsidies, grants, co-financing schemes at the federal level, including competitive bids managed by Mincomsvyaz, MINECONOMRAZVITYIA, and development institutions (Skolkovo, VEB, FRI).

**Interregional Cooperation and Knowledge Sharing:** Establishment of horizontal collaboration platforms among Russian regions to share best practices and avoid duplication of expenditures.

**Promotion of Digital Literacy and Public Awareness:** Raising awareness about digital literacy, making online courses accessible, teaching basics of cybersecurity—key steps toward engaging broader segments of society in the digital realm.

**Several regions have demonstrated successful models of digital development:**

**Tatarstan:** Comprehensive "Digital Tatarstan" program, e-governance, smart schools, digital construction control.

**Tyumen Region:** Digitalization of healthcare, geoinformation systems for land management, digital territory passports.

**Kaliningrad Region:** Development of IT parks, offshore programming, export of IT services, digital tourism.

**Moscow:** Global leader in digital public services, e-medicine, AI technologies in city administration.

**Sverdlovsk Region:** Project "Regional Digital Twin," utilization of big data in regional planning.

These examples illustrate how even limited resources can facilitate digitization when combined with political will, competent leadership, and engagement of stakeholders. Regions with high digital maturity show 2.5× higher GDP growth than passive regions. Every 1% increase in digital infrastructure investment correlates with 0.4% higher labor productivity (OECD, 2023) (Table 3).

**Economic Impact of Digitization**

Region Group	Average GDP Growth (2020–2023)	Digital Investment (% of budget)
Digital Leaders	+3.2%	12%
Formally Active Regions	+1.8%	6%
Digitally Passive Regions	+0.7%	2.5%
Source: Rosstat, HSE Digital Economy Index.		

Table 3. GDP Growth vs. Digital Maturity.

The digital economy forms an integral part of contemporary regional development models. It ensures: Enhanced administrative efficiency and transparent public services;

Boosted labor productivity and investment appeal; Engagement of marginalized territories in economic activities;

Development of human capital and IT expertise; Acceleration of transformation in traditional industries.

However, digitization is not automatic; it necessitates strategic planning, sustained funding, institutional reforms, and participation from various governmental levels and societal actors.

One of the most successful regions of Russia that has made significant progress is the Republic of Tatarstan (see Table 4).

9. World Bank. (2023). *Russia's digital transformation*. <https://www.worldbank.org/en/country/russia/publication/digital-transformation>

**Case Study: Successful Models**

Initiative	Result
"Digital Tatarstan" program	94% of public services digitized
Smart schools	80% coverage in urban areas
IT exports	\$1.2 billion (2023)
<b>Source:</b> Republic of Tatarstan Government Report.	

Table 4. Tatarstan's Digital Progress (2024)

Scientific and practical potential of the digital economy as a driver of regional modernization is vast. But realization hinges on addressing digital inequalities, improving infrastructure, providing adequate staffing, and embedding digital solutions into daily life and governance. Under these conditions, digital transformation may serve not just as a growth factor but also as a foundation for transitioning towards qualitatively new types of spatial development in Russia. [6]

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