The Impact of Digitalization on the Balanced Development of the Territory

Irina Chistnikova

Abstract The article is devoted to testing the hypothesis about the impact of digitalization processes on the level of economic development of territories at the present stage, since in our country digital transformation is considered as a conceptual model for improving the activities of intra-regional economic units and the development of modern society, as well as a factor of economic and social breakthrough. A generalization of methodological approaches to the assessment of digital transformation in the region has been carried out. To assess the level of digital development of the territory, a scientific approach to designing a system of indicators characterizing the processes of digitalization is proposed. To test the approach, an analysis was made of the impact of the current state of digital development on the economic results of the territories. The analysis of the statistical dependence between the level of development and welfare of Russian regions and the parameters of their digitalization showed a low (moderate) relationship. This means that with the current volume of funding for digital transformation and the use of information technologies, devices and special software, it is impossible to ensure the breakthrough development of regional economic systems and their production complexes.

Keywords Regional economy · Digitalization · Digital transformation · Economic development of regions · Digital technologies · Digital economy · Costs of digital technologies · Special software

1 Introduction

Rethinking the vectors of movement of socio-economic systems, the need to improve the state and proportions of territorial complexes determines the value of searching for new spatial models of activity and new mechanisms of territorial administration. One of these vectors today is the widespread digital development [1, 2].

I. Chistnikova (✉)
Belgorod State National Research University, 85, Pobedy Street, Belgorod 308015, Russia
e-mail: chistnikova@bsu.edu.ru

K. S. Zokirjon ugli et al. (eds.), *Fundamental and Applied Scientific Research in the Development of Agriculture in the Far East (AFE-2022)*, Lecture Notes in Networks and Systems 733, https://doi.org/10.1007/978-3-031-37978-9_50

Currently, there is a theoretical and methodological problem of developing a paradigm for assessing the degree of influence of digital transformations on the performance of regional economies, the parameters of digital development of territories. It also increases the importance of studying the digital transformation of territories as a driving force for the development of the regional economy and the relevance of researching and measuring the scale of the dynamic process of consistent positive changes in regional socio-economic systems from digital transformation.

The purpose of the study is to substantiate and test the approach to assessing the impact of digital transformations on the economic development of regions at the present stage.

In the course of achieving the goal of the study, the following tasks were implemented:

- clarified indicators for assessing digital transformation in the region;
- an analysis of the impact of the current state of digital development on the economic results of the territories was carried out;
- theoretical conclusions are substantiated and a solution is proposed for the development of the region's economy based on digitalization.

The object of the study is the economic systems of Russian regions that have growth potential, the implementation of which is ensured in the context of digital development.

The evolution of regional policy and the needs of territorial strategizing require testing the hypothesis about the impact of digitalization processes on the level of economic development of regions at the present stage.

2 Literature Review

Today in Russia, research on the digital economy is given great attention both by scientists and at the government level. Despite the significant number of publications and government programs, the features of assessing the level of digital transformation and its impact on regional development require further in-depth study.

A number of scientists have proposed parameters for determining the digital development of territories (Vasilyeva Z. A., Musina D. R., Nasyrova S. I., Pravdina O. A., Rasskazova A. A., Ruyga I. R., Frolova N. N., Tatarnikova M. A., Yangirov A. V.), including integral and index methods of assessment (Grigorishchin A. V., Stepanova V. V., Ukhanova A. V., Yakhyaev D. B.), researchers from the Moscow School of Management Skolkovo and EY presented a joint report "Digital Life in Russian Regions 2020" [3–6].

It is customary to apply a set of indicators for measuring the digital development of a territory, which can be grouped into seven blocks: infrastructure (digitalization of the media, cash payments, platform solutions for business), population (degree of ownership and use of information and communication technologies by citizens),

security (parameters for ensuring information security in different areas), organizations (use of digital technologies by companies), the state (coverage of public services by the digital form of provision), economic growth (the contribution of the digitalization segment to the level of well-being) and others (development of "smart" systems and the number of employees in the IT sector).

In their studies of the digital development of territories, scientists from the Moscow School of Management Skolkovo analyze indicators of the use of digital technologies in seven areas: transport, finance, trade, healthcare, education, media and public administration.

Musina D. R., Yangirov A. V., Nasyrova S. I. propose to use a system of 11 indicators for assessing digital regionalization according to the criteria: the availability of information and communication technologies, the level of their use and skills in the IT field [3].

A team of authors consisting of V. V. Stepanova, A. V. Ukhanova, A. V. Grigorishchina, and D. B. Yahyaeva developed a methodological apparatus for assessing the digital ecosystems of Russian regions. Using this technique, it is possible to differentiate the subjects of the Russian Federation both in terms of the level of activity of the subjects of digitalization, and in terms of the degree of favorable conditions for its development. For these purposes, two indices were proposed: the Index of the activity of the subjects of digitalization of the region, which determines the digital activity of the subjects of the ecosystem, and the Index of the conditions of digitalization of the region. Thus, these two indices make it possible to assess the level of development of regional digital ecosystems as a whole [4].

Of interest is the methodological approach of ranking regions by the level of digitalization of Sadyrtdinov R. R., which implies a comparison of territories in terms of the degree of digital mobility, digital equality, the results of the digital economy and digital interaction [7].

The existence of these methods indicates the possibility of an objective assessment of the digitalization of territories and its impact on the economy, as well as identifying possible impulses for the further development of regional systems and complexes. As disadvantages of these approaches, one can indicate the laboriousness of the analytical procedures of these approaches as a result of the complexity of the complex of estimated parameters and the use of static data.

According to Lapidus L. V., the applied methods and guidelines for digital development require regular revision due to the high mobility of digital reality and the changing environment in the regions [8].

In the context of the ongoing coordination of the basic terms of the digital economy and the development of methods for assessing information and communication development, it is necessary to carefully monitor the dynamics of ongoing changes in the economy of the regions from digitalization in order to timely adjust government decisions in the field of digital regionalism.

The specifics of the processes for measuring the digitalization of the regional economy is the need to take into account the level of maturity and diversity of the objects under study, the dynamics of changes in the main indicators in the

process of digital transformation, as well as the features of the social and economic consequences of digitalization [9, 10].

3 Theory and Methods

To assess the level of digital development of the territory, a scientific approach to designing a system of indicators characterizing the processes of digitalization is proposed. To determine the impact of digital transformation trends on the economic situation of the region, it is advisable to use regression models. By applying one of the most general laws of the objective world—the law of universal interconnection between phenomena, it is possible to identify the level of dependence of the parameters of territorial development on the ongoing digital transformation. Correlation analysis makes it possible to establish the impact of the current state of the digital transformation of regions on their socio-economic system, identify such dependencies and give their quantitative characteristics.

The systematization of Rosstat data made it possible to determine the parameters for assessing the development of the regional economy based on digitalization. The entire existing system of characteristics of regional digitalization, formed by statistical authorities, seems to be divided into two complexes—parameters characterizing the supporting sector of the digital economy, and indicators of the use of information and communication technologies.

4 Results

To analyze the impact of digitalization on the current level of economic development, it is proposed to abstract from the indicators of the system for its provision, since it is quite balanced developed in the regions of our country. At the same time, the impact of digital transformations on regional development should be considered on the basis of measuring the systematic use of ICT in the activities of companies and the costs of digitalization.

Consequently, the following parameters were established as the determining factors of the relationship between the state of regional economies and digital activity:

- costs of implementation and use of digital technologies;
- share of organizations using special software;
- share of organizations using digital technologies and devices (personal computers, servers, local area networks, “cloud” services).

In our opinion, it is these indicators in their trinity that determine modern digital transformation processes in the industrial complexes of the regions.

The degree of achievement of economic results due to digital transformations will be determined on the basis of establishing the influence of the proposed parameters

for assessing digitalization on the result of the economic activity of the region in the form of an indicator of gross regional product per capita. The values of indicators of the system for assessing the impact of digitalization on the economic development of Russian regions in 2020 are presented in Table 1.

Table 1 Indicators of the system for assessing the impact of digitalization on the economic development of Russian regions in 2020.

Consideration of the data in the table does not reflect the convergence or interconnected development of information technology development parameters and economic outcome. Let's carry out a more detailed correlation analysis.

The dependence of GRP and the costs of introducing and using digital technologies in the regions of Russia in 2020, graphically presented in Fig. 1, is expressed by the model:

$$y = 0.1148x - 34010 \quad (1)$$

The correlation coefficient between GRP and the costs of introducing and using digital technologies in the regions of Russia in 2020 was 0.298, therefore, the variability of the two variables under consideration is not proportional enough and there is a weak relationship between them.

This means that the current volume of funding for the implementation and use of digital technologies does not have a significant impact on the regional economy. The need to transform territorial complexes requires an increase in the level of financial support for digital transformations.

The dependence of GRP and the share of organizations using special software in 2020, graphically presented in Fig. 2, is expressed by the model:

$$y = 0.0000006x + 62.493 \quad (2)$$

The correlation coefficient was 0.324, which states a moderate relationship between GRP per capita and the share of organizations using special software in 2020.

According to official statistics, special software in the regions of Russia in 2020 was used by an average of 65.4% of organizations, which is insufficient for the development of the economy, it is necessary to increase the degree of their penetration into the activities of companies.

The dependence of GRP per capita and the share of organizations in the regions of Russia using digital technologies and devices, graphically presented in Fig. 3, is expressed by the model:

$$y = 0.000005x + 48.603 \quad (3)$$

The correlation between GRP per capita and the share of organizations in Russian regions using digital technologies and devices (personal computers, servers, local area networks, cloud services) is moderate at a coefficient level of 0.359.

Table 1 Indicators of the system for assessing the impact of digitalization on the economic development of Russian regions in 2020

Indicators							
GRP per capita, rubles		Expenses for the implementation and use of digital technologies, million rubles		Share of organizations using special software, %		Share of organizations in Russian regions using digital technologies and devices, %	
Top 5 highest scores							
Chukotka Autonomous Okrug	2,404,271.2	Moscow city	1,522,663.8	Belgorod region	84.7	Belgorod region	62.9
Sakhalin region	2,059,206.5	City of St. Petersburg	119,342.2	Altai Republic	75.1	Magadan region	61.3
Magadan region	2,035,007	Moscow region	77,507.2	Chukotka Autonomous Okrug	74.6	Novgorod region	60.5
Tyumen region	1,934,463.9	Tyumen region	56,887.3	Novgorod region	74.5	Tomsk region	60.1
Moscow city	1,567,644.8	Samara region	43,643.5	Vladimir region	73.8	Vladimir region	60.1
Average regional value of the indicator							
…	558,980.6	…	30,153.6	…	448.5	…	51.5
Top 5 lowest scores							
Republic of Dagestan	239,640.7	Republic of Altai	903.0	Volgograd region	54.9	Republic of Crimea	42.8
Kabardino-Balkarian Republic	210,674.1	Republic of Tyva	750.7	City of Sevastopol	53.5	Volgograd region	42.3
Karachay-Cherkess Republic	207,471.5	Karachay-Cherkess Republic	738.1	Chechen Republic	53.5	City of Sevastopol	41.6

(continued)

Table 1 (continued)

Indicators							
GRP per capita, rubles		Expenses for the implementation and use of digital technologies, million rubles		Share of organizations using special software, %		Share of organizations in Russian regions using digital technologies and devices, %	
Chechen Republic	171,029.5	Jewish autonomous region	640.7	Republic of Tyva	52.5	Republic of Tyva	37.6
Republic of Ingushetia	142,199.7	Republic of Kalmykia	536.6	Republic of Dagestan	29.4	Republic of Dagestan	23.1

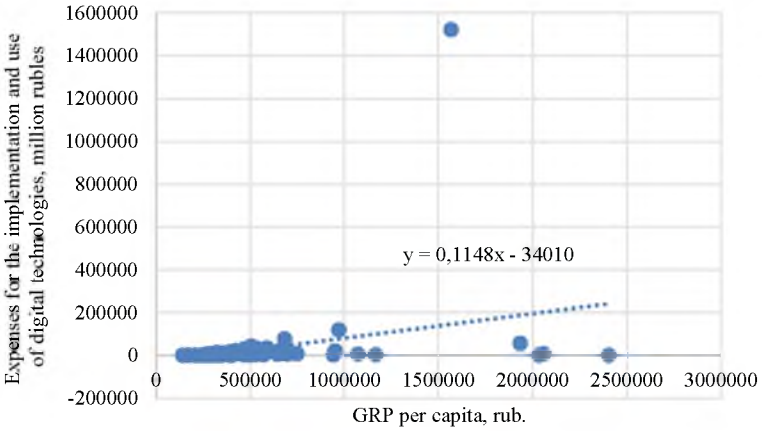

Fig. 1 Scatter diagram of the dependence of GRP per capita and the costs of introducing and using digital technologies in the regions of Russia in 2020

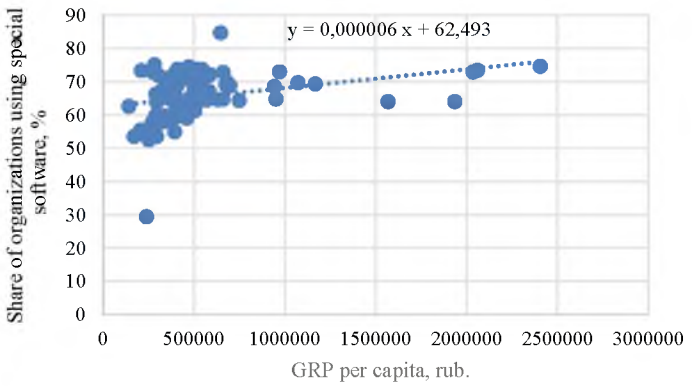

Fig. 2 Scatterplot of the dependence of GRP per capita and the share of organizations using special software in Russia in 2020

It can be said that the potential of digitalization and technologization of territories has not been disclosed, which results in insufficiently high growth rates and living standards in the regions.

5 Conclusion

In Russia, digitalization is considered as a conceptual model for improving the activities of intra-regional economic units and the development of modern society, as well as a factor in economic and social breakthrough.

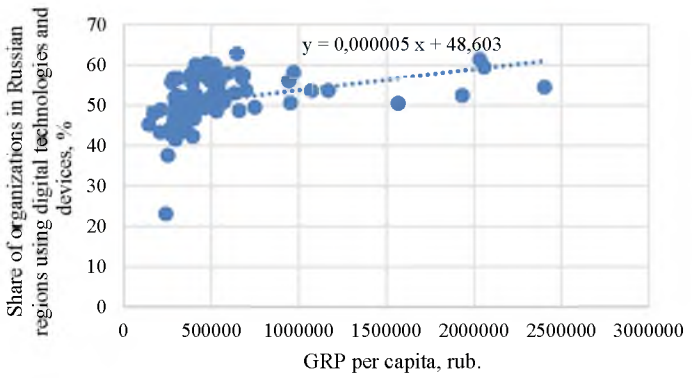

Fig. 3 Scatterplot of the dependence of GRP per capita and the share of organizations in Russian regions using digital technologies and devices in 2020

The analysis of the statistical dependence between the level of development and welfare of Russian regions and the parameters of their digitalization showed a low (moderate) relationship. This means that with the current volume of funding for digital transformation and the use of information technologies, devices and special software, it is impossible to ensure the breakthrough development of regional economic systems and their production complexes. A more significant innovation wave is needed for the digital revolution of territorial economies.

References

1. Wilson KB, Karg A, Ghaderi H (2021) Prospecting non-fungible tokens in the digital economy: stakeholders and ecosystem, risk and opportunity. Bus Horiz. https://doi.org/10.1016/j.bushor.2021.10.007
2. Groshev IV, Krasnoslobodtsev AA (2020) Digitalization and creativity of Russian regions. Sociol Res 5:66–78. https://doi.org/10.31857/S013216250009390-2
3. Musina DR, Yangirov AV, Nasyrova SI (2020) Digitalization of regions: assessment methods. Vestnik UGNTU. Sci Educ Econ Ser Econ 1(31):32–38. https://doi.org/10.17122/2541-8904-2020-1-31-32-38
4. Stepanova VV, Ukhanova AV, Grigorishchin AV, Yakhyaev DB (2019) Assessment of digital ecosystems of Russian regions. Econ Soc Changes Facts Trends Forecast 12(2):73–90. https://doi.org/10.15838/esc.2019.2.62.4
5. Ruyga IR, Vasilyeva ZA (2021) Assessing the impact of digitalization processes on the innovative development of the region. Digit Econ Smart Innov Technol 223–225. https://doi.org/10.18720/IEP/2021.1/68
6. Frolova NN, Tatarnikova MA, Rasskazova AA, Pravdina OA (2020) Digitalization as a basis for sustainable socio-economic development of the region. Econ Yesterday Today Tomorrow 10(6–1):82–93. https://doi.org/10.34670/AR.2021.55.27.036
7. Sadyrtdinov RR (2020) The level of digitalization of Russian regions. Bull Chelyabinsk State Univ 10(444):230–235. https://doi.org/10.47475/1994-2796-2020-11029

8. Lapidus LV (2022) Role of technological innovations in business development and digital transformation in Eurasian economic union countries. Publ Admin Electron Bull 95:223–239. https://doi.org/10.24412/2070-1381-2022-95-223-239
9. Williams LD (2021) Concepts of digital economy and Industry 4.0 in intelligent and information systems. Int J Intel Netw 2:122–129
10. Pan W, Xie T, Wang Z, Ma L (2022) Digital economy: an innovation driver for total factor productivity. J Bus Res 139:303–311