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Assessing the impact of digitalization on regions of Russia competitiveness

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Abstract. Current trends in the social-economic development of the regional economy are based on the application of advances in digitalization. The digital transformation of regions does not lose its relevance. It results by the emergence of new approaches and models of sustainable development based on information technology, which in turn leads to regional competitiveness. The purpose of constructing ratings of the subjects of the Russian Federation on the level of digital transformation and competitiveness is to assess and rank the regions based on indices. It includes certain indicators, which ultimately leads to the adoption of sound management decisions focused on increasing regional competition. Analysis of the region's competitiveness is one of the key characteristics of its comprehensive development. This issue has not been sufficiently studied in terms of quantitative analysis. The comparison of ratings in order to analyze the impact of digitalization on the competitiveness of Russian regions is a relevant issue of this study. The experience of Russian regions' application of digital technologies has considerable potential. The implementation of the strategic priorities of digital transformation directly depends on the development of digital transformation strategy and the sequence of its implementation by regional authorities. And the regional competition heavily depends on digital transformation.

Keywords: digitalization, digital transformation, competitiveness, rating, correlation.

JEL codes: R11, O11, R58

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Introduction

In recent years, digitalization became a fundamental trend in the development of the global economy. It changes its structure, and transfers it to a new qualitative state. Digitalization of the regional economy determines the trajectory of the country's development. It also demands the effective use of new digital technologies affects the competitiveness of individual companies and regions, as well as the state as a whole. Today, all of humanity depends on information and communication technology. The conditions for economic growth are provided by the creation of accessible high-tech services.

The peculiarities of the formation of the post-industrial economy and the prospects for its development in the regions of Russia are associated with the need for structural changes in the economy (Batrakova, 2021b). The main issue of Russia is to create conditions for the acceleration of scientific, technological and innovative levels, in order to ensure a balanced implementation of project activities in all 85 regions of the country. Therefore, these conditions in terms of the regional competition become relevant.

We should note that the analysis of regional competitiveness has not been sufficiently studied from both quantitative and theoretical perspectives. Nowadays, «regional competitiveness» as an economic category does not have a precise definition. The analysis of the factors forming the competitiveness of regions has different, sometimes contradictory, points of view (Batrakova, 2021a). The economic meaning of «competitiveness» is largely determined by the «competition» concept. Consequently, competitiveness is the property of an area to be more successful than others.

American scientist Michael Eugene Porter (born in 1947) wrote that only those territories that, having competitive advantages, hold them and, most importantly, create them, can be competitive. In the context of regional competitiveness, the work of L.N. Chaynikova «Methodological and Practical Aspects of Assessing Regional Competitiveness» should be noted. It gives a selection of «regional competitiveness» definitions, and

considers theoretical aspects of competitive advantages of the region, develops a methodology for assessing regional competitiveness (Chaynikova, 2008).

We follow the point of view of those authors who consider regional competitiveness as the ability of the region to realize its economic potential for stable socio-economic development of the region in order to ensure a high quality of life of its population (Vasilyeva, 2006). Assessing the competitiveness of a region is one of the key characteristics of its comprehensive development. It can be given based on the position of the area in the domestic and foreign markets, which can be determined by various factors: economic, social, political, etc. We can note that a area cannot be competitive in all sectors of the economy. It is important to identify the specialization of the area, and achieve a sustainable change in the factors that contribute to productivity growth. Economic, scientific, technical, and personnel potential is the basis of the region competitiveness forming. The competitive position of the region is created through the influence of various factors. Regions can compete with each other in such areas as the creation of modern infrastructure, the favorable environment for business, the use of information technology, the availability of skilled labor, etc. Also, the digitalization of the regions is an important area for studying.

Main Part

A comprehensive assessment of the regions ability to compete for resources and markets is the index of regional competitiveness (AV Regions Competitiveness Index – AV RCI), developed by the Leontief Center – AV Group Consortium. This index is composed of indicators representing the results of interregional competition in the following areas: Markets (products and economic complexes); Institutions (public, private and community); Human capital; Innovation and information; Natural resources and sustainable development; Space and real capital; Investment and financial capital.

Estimated values of competitiveness rating (AV RCI) from 0 to 5, by which all regions are grouped as follows:

- Group 1 includes the leading regions with a rating above 3.0, which form the centers of growth poles and play a major role in the Russian economy;
- Group 2 includes regions with a rating from 1.5 to 3.0;
- Group 3 includes regions with a rating of less than 1.5.

The results of the study are published at www.av-group.ru.

The top 20 regions of Russia according to the AV RCI-2022 rating are presented in Table 1.

Table 1– Regional Competitiveness Rating and Scores

Region	Regional competitiveness ranking AV RCI-2022	
	Rating	Score
Moscow	1	5
Saint Petersburg	2	4,15
Moscow region	3	3,94
Tatarstan Republic	4	3,58
Krasnodar Krai	5	3,16
Sverdlovsk region	6	3,07
Krasnoyarsk Krai	7	3,04
Novosibirsk region	8	2,08
Chelyabinsk region	9	2,78
Rostov region	10	2,77
Bashkortostan Republic	11	2,73
Samara region	12	2,68

Region	Regional competitiveness ranking AV RCI-2022	
	Rating	Score
Nizhny Novgorod Region	13	2,65
Khanty-Mansi Autonomous Okrug – Ugra	14	2,59
Yamalo-Nenets Autonomous Okrug	15	2,57
Irkutsk region	16	2,56
Perm Krai	17	2,53
Belgorod region	18	2,51
Sakha Republic (Yakutia)	19	2,41
Voronezh region	20	2,39
Karachay-Cherkess Republic	81	0,41
Republic of Altai	82	0,40
Tuva Republic	83	0,37
Republic of Ingushetia	84	0,37
Jewish Autonomous Oblast	85	0,00

Source: Annual Rating of regions on the achievement of national goals, 2022

The leading regions (Table 1) account for 48% of the total GRP of all Russian regions, 42% of all investments, 32% of the economically active population. The ranking and scores of the lagging regions are shown in Table 1.

According to Order No. 2816-r on 06.10.2021 by Government of the Russian Federation, the main direction of socio-economic development of the Russian Federation until 2030 is the digital transformation. It is a profound reorganization of business processes with extensive use of digital tools for their processing.

There are qualitative changes in the economic structure and the peculiarity of value added creation in the process of digital transformation. The theoretical foundations of these transformations were laid in the works of the classics of economic science as the systematic factors of their creation. In the digital economy value added is created by three components: technology, business task, and data. Digital transformation in the regions leads to the creation of new industries, radical growth of the market, the transition to a new technological and economic mode. These transformations have an impact on all the sectors of the economy (from creative to agriculture) (Batrakova, 2021b) and, as a result, lead to increased competitiveness.

The proliferation of digital technologies leading to digital transformation is one of the main trends in the development of the national economy. An important indicator of a region's digital development characterizing the degree and success of its digital transformation is the level of digital maturity.

The implementation of regions digital transformation is a fairly time-consuming process that requires significant financial costs. There is the federal support for digital innovation projects.

The regional experience of digitalization of the economy is quite extensive, so we will limit ourselves to some examples. Moscow is the leader in the national project implementation «Digital Economy»; the Republic of Tatarstan enhance the innovative development through digital technologies.

The first best practice of digitalization with the involvement of public-private partnership mechanisms was a unified digital platform for regional management in Murmansk region; Tomsk region developed a digital platform integrating data from all IT companies; Ulyanovsk region has great success in the application of digital technology in various areas of life. In the framework of the program «Innovative society and improving the quality of public and municipal services in the Kaluga region» citizens and organizations realized the use of ICT technologies (Panasenkova & Popova, 2020).

Also there is a project «Digital Professions» as part of the national project «Digital Economy». It aims

to provide citizens with the special IT education. For example, at Yaroslavl State Technical University the specialists from Yaroslavl branch of "Rosseti Center-Yarenergo" started an information course on the digital transformation program for the electric grid complex. There are similar practices in other regions.

The system of indicators of the regions rating digital transformation includes the following: Institutional Environment, Infrastructure and Access, Digital Transformation Potential. The total score is determined by summing up the scores of the indicators, the maximum value of which is 31. The top 20 regions in the digital transformation ranking at the end of the three quarters of 2022 are shown in Table 2. The ranking and scores of the lagging regions are shown in Table 2.

Table 2 – Rating of digital transformation of regions of Russia by the results of three quarters of 2022

Region	Rating of digital transformation of regions (the maximum possible total rating score for each region is 31)	
	Rating	Score
Lipetsk region	1	22,4
Khanty-Mansi Autonomous Okrug – Ugra	2	22
Chelyabinsk region	3	21,5
Kemerovo region - Kuzbass	4	21
Moscow region	5	20,6
Tula region	6	20,3
Tyumen Region (not including the Autonomous Oblast)	7	20,1
Kaluga region	8	20
Belgorod region	9	19,9
Kurgan region	10	19,7
Sakha Republic (Yakutia)	11	19,7
Yamalo-Nenets Autonomous Okrug	12	19,6
Chuvash Republic	13	19,5
Tomsk region	14	19,4
Tatarstan Republic	15	19,2
Orenburg region	16	19
Bashkortostan Republic	17	18,9
Sevastopol	18	18,8
Rostov region	19	18,6
Primorsky Krai	20	18,3
Astrakhan region	81	9,8
Tuva Republic	82	9,6
Tver region	83	9,1
Republic of Ingushetia	84	7,5
Kabardino-Balkarian Republic	85	6,9

Source: composed by author

In order to establish the impact of regions digitalization on competitiveness, we will conduct a comparative analysis of the digital transformation and regional competitiveness ratings. According to the

results, we compile a table (Table 3).

Table 3 – Summary data of the regional rankings

Region	Regional competitiveness ranking		Rating of digital transformation of regions	
	Rating	Score	Rating	Score
Lipetsk region	36	1,78	1	22,4
Khanty-Mansi Autonomous Okrug - Ugra	14	2,59	2	22
Chelyabinsk region	9	2,78	3	21,5
Kemerovo region	28	2,06	4	21
Moscow region	3	3,94	5	20,6
Tula region	30	1,94	6	20,3
Tyumen Region (not including the Autonomous Oblast)	22	2,30	7	20,1
Kaluga region	37	1,77	8	20
Belgorod region	18	2,51	9	19,9
Kurgan region	77	0,64	10	19,7
Sakha Republic (Yakutia)	19	2,41	11	19,7
Yamalo-Nenets Autonomous Okrug	15	2,57	12	19,6
Chuvash Republic	51	1,43	13	19,5
Tomsk region	38	1,76	14	19,4
Tatarstan Republic	4	3,58	15	19,2
Orenburg region	33	1,84	16	19
Bashkortostan Republic	11	2,73	17	18,9
Sevastopol	70	1,03	18	18,8
Rostov region	10	2,77	19	18,6
Primorsky Krai	25	2,15	20	18,3

Source: composed by author

Analyzing the data in Table 3, we can conclude that there is no correspondence between the ratings. Thus, the regions that rank first in digital transformation are far from being at the top of the list in terms of competitiveness. For example, Lipetsk region ranks 1st in digital transformation, but 38th in competitiveness; Tula region ranks 6th and 30th, respectively; Sevastopol ranks 18th and 70th, and Kurgan region ranks 10th and 77th, respectively.

The dependence of scores of regions competitiveness and digital transformation is depicted in the form of a point chart (Figure 1). By this chart we can see the linear relationship between the indicators.

In order to determine the degree of parallelism between two quantitative series of the attributes under study, the direction and evaluation of the closeness of the established connection, the calculation of the Spearman rank correlation coefficient was used (Eliseeva, 2023).

This coefficient belongs to the method of nonparametric analysis. It is not required to check for distribution normality. This criterion was developed and proposed in 1904 for correlation analysis by the English psychologist known for his work in statistics Professor Charles Edward Spearman (1863-1945). The ranks correspondence of digital transformation and competitiveness of 20 regions is presented in Table 4.

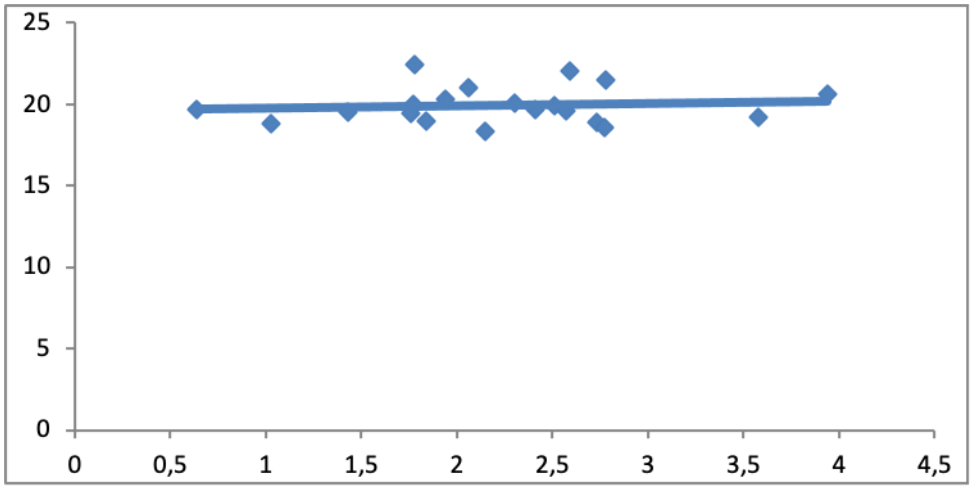

Figure 1. Correlation between regions digital transformation and competitiveness

Source: composed by author

Table 4 – Table of correspondence between the ranks of regional digital transformation and competitiveness

Rating rank of digital transformation of regions	Rating rank of the regional competitiveness
1	4
2	15
3	3
4	19
5	17
6	2
7	12
8	9
9	11
10	6
11	20
12	3
13	5
14	16
15	1
16	7
17	14
18	13
19	18
20	10

Source: composed by author

The Spearman rank correlation coefficient gave a result of 0.95. The statistical significance of the coefficient was tested using Student's t-test; the calculated value turned out to be 13.276; the tabulated value of the coefficient being 2.086. The calculated value of the t-criterion exceeds the table value for a given number of degrees of freedom. Therefore, the correlation is significantly different from 0 and is considered to be statistically significant. The Cheddock scale was used to check the closeness of the relationship, where the coefficient value of more than 0.9. It is assessed as very high, so we can conclude that the competitiveness

and digital transformation ratings are dough-related. It means that digitalization significantly affects the competitiveness of regions.

Conclusions

In conclusion, we can say that the experience of Russian regions' application of digital technologies has considerable potential. The implementation of the strategic priorities of digital transformation directly depends on the development of digital transformation strategy and the sequence of its implementation by regional authorities. And the regional competition heavily depends on digital transformation.

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