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PROBLEMS OF UNEVEN DEVELOPMENT OF THE DIGITAL ECONOMY IN THE RUSSIAN REGIONS

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Abstract

The article analyses the digitalization of the Russian economy in terms of changes in the digitalization index, as well as construction of trends in the development of the Russian regions from each digitalization group. The development of the Russian economy is impossible without the development of digital technologies in the regions. Not only the companies should develop the digitalization. The regional authorities also should do it. The regions included in the AIRR (Association of Investment Regions of Russia) show the active contribution to this development. However, there are just sixteen regions which show the contribution, but the rest ones are either developing according to their own program, or are slowing down their development. The governors must be personally interested in the developing of the digital economy in their regions. It means that the criterion “development of the region’s digitalization” must be included to KPI of the regional leader. In the methodological part, an assessment of the digitalization index of the Russian regions was conducted. The analysis showed the growth of the index by region in general, and especially by the regions included in the AIRR. Also, the trends in the dynamics of the digitalization index of the regions was built and it demonstrated a steady growth. The study can open a new discussion on the development of the digitalization in Russia as well as overseas market.

Keywords: Digitalization, digital economy, Russian economy, Russian regions.

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1. Introduction

The development of digitalization in the global space is currently characterized by an active transformation, which is due to the influence of many factors, including such as the activation of digital companies in the market, the creation of jobs for completely new specialties in the market and the elimination of those jobs whose demand for specialties is already absent, etc. The digital economy has a major impact on the labour market, which creates new jobs and new professions (Ivanova, Poltarykhin, Szromnik, & Anichkina, 2019; Andreeva, Badalyanz, Bogatyreva, Boroday, & Dudkina, 2018). However, in Russia indicators characterizing the digitalization of the economy have not changed since 2013. So the share of the digital economy in GDP in 2013 and in 2014 amounted to 2%, in 2015 there was a slight decrease to 1.9%, and in 2016. The indicator reached 2% again (HSE, 2017).Currently, in terms of digitalization, Russia is inferior to a number of developed countries, ranked in the third ten countries. But experts agree that Russia has necessary potential for digitalization (Minakova, Parkhomchuk, & Bukreeva, 2019). Numerous studies have proved the significant impact of the use of digital technologies on the innovative development of territories, ensuring their socio-economic development and competitiveness (Grachev & Donichev, 2019).

2. Problem Statement

Digitalization of the country will not take place if the regions are not achieved the corresponding successes. Currently the elements of the Digital economy are mainly limited by the development of social and communication services (Internet, mobile communications, utility bills, banking, online ticketing, etc.) (Gasheva, 2018). But the penetration of the digital economy into the business and to the manufacturing of the region is still not deep enough. Moreover, we must take into consideration the heterogeneity of regional economies, their poor resource provision, the lack of methodological developments and regulatory documents on the digital transformation of regional economies. If we consider that the digitalization of the Russian economy must achieve certain indicators, we must find ways to align the development of the digital economy in the regions. It is necessary to find the main problems and the limitations in the development of the digitalization. According to Aisen Nikolaev, the head of the Republic of Sakha (Yakutia), there is no point in pulling fibre-optic communication lines to inaccessible villages, to the Arctic territory, where villages are not even hundreds, and sometimes thousands of kilometres away (Nikolaev, 2019). In the coming decades, this will most likely be covered by satellite.

For the people's quality of life there were the following attributed specified: availability of digital goods for people, digital skills, quality of social sphere and services in conditions of digitalization, state electronic services for people and people informational activities safety (Litvintseva, Shmakov, Stukalenko, & Petrov 2019).

3. Research Questions

First of all, the digital economy attracts the subjects of the economic system, with its wide opportunities. So, various ideas and initiatives constantly arise and they are need in the active support of the state. At the same time, the Russian Federation can use the experience of countries leading in

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digitalization (Singapore, Germany, USA, etc.) and developing digital economies (China, UAE, etc.). Analyzing the experience of these countries, BCG identified four tools for digitalizing the economy:

1. Digital privatization is based on the will of the state, which announces a kind of auction to close inefficient areas and open effective ones.

The Russian Federation can use the digitalization of privatization in such industries as transport, utilities, education, and healthcare.

2. The digital leap is applied in case of rapid growth of innovative technologies and the emergence of new types of business. Thus, these tools can be implemented by many subjects of a market economy - the state, investors, various research and educational institutions, start-ups.

3. The self-digitization of the state forms a simplified environment for the interaction of business and the state by maximizing the digitalization of the state and state-owned companies. With this approach, the state plays an active role in the person of state bodies and state companies.

4. Digital reinvestment, which implies a significant role of the state as an investor, forming a further foundation for the development of the country's digital economy. At the same time, the state reinvests business in such areas as education, healthcare and infrastructure. Thus, the main participants are the state itself, large business and social institutions (Banke et al., 2017).

The digitalization of the economy is becoming a powerful tool for the economic growth of the country as a whole. HSE experts suggest that the contribution of digitalization to GDP growth will be about 4% by 2030, and about 30% for individual sectors of the economy (HSE, 2017).

4. Purpose of the Study

The main objective of this study is to identify trends in the development of digitalization of the Russian regions, to determine variations in the deviation of the development of the digital economy of the region from the average, and also to determine ways to increase digitalization in the regions of the Russian Federation. Various studies show that there is a significant differentiation between regions depending on the level of development of digital ecosystems (Stepanova, Ukhanova, Grigorishchin, & Yakhyaev, 2019; Tikhonova, Melnikova, & Vishnevskaya, 2018).

5. Research Methods

Calculate the average data on the rating of the regions of the Russian Federation by the level of digitalization, using the arithmetic average. Then evaluate the reliability and typicality of the average value, using the indicators of variation:

1. Dispersion is the average of the squares of deviations of the options for the values of the data on the rating of the regions of the Russian Federation in terms of digitalization from their average value.

$$\sigma^2 = \frac{\sum(x_i - \bar{x})^2}{n} \quad (1)$$

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2. The root-mean-square deviation is the square root of the variance and shows how much on average the individual values of the rating of the regions of the Russian Federation deviate from their average value.

$$\sigma = \sqrt{\sigma^2} \ (2)$$

3. The coefficient of variation characterizes the fluctuation of the data on the rating of the regions of the Russian Federation and allows us to compare the degree of variation of the characteristic. With a variation coefficient of less than 35%, the studied set is considered homogeneous, and the average level of digitalization in the region is reliable and typical.

$$\nu = \frac{\sigma}{\bar{x}} * 100 \ (3)$$

In Table 01 the coefficient of variation of the digitalization level of the Russian regions is presented.

Table 01. The coefficient of variation of the digitalization level

Ranking	Region	Average index of digitalization ($\bar{X}$)	σ^2	σ	ν	Group
1	Saint Petersburg	0,69	0,00016	0,012649	1,83	Strong innovators
2	Republic of Tatarstan	0,63	0,002944	0,054259	8,67	
3	Moscow	0,69	0,000704	0,026533	3,87	
4	Tomsk region	0,58	0,003064	0,055353	9,61	
5	Moscow region	0,55	0,00108	0,032863	5,98	
6	Novosibirsk region	0,54	0,001984	0,044542	8,19	
7	Kaluga region	0,55	0,000616	0,024819	4,53	
8	Nizhny Novgorod Region	0,54	0,000296	0,017205	3,17	
9	Ulyanovsk region	0,51	0,001	0,031623	6,20	Medium Stromg innoators
10	Samara Region	0,52	0,001864	0,043174	8,37	
11	Tyumen region	0,44	0,003784	0,061514	13,85	
12	Republic of Bashkortostan	0,50	0,002136	0,046217	9,21	
13	The Republic of Mordovia	0,49	0,001744	0,041761	8,59	
14	Sverdlovsk region	0,51	0,000104	0,010198	1,98	
15	Tula region	0,49	0,0014	0,037417	7,64	
16	Yaroslavskaya oblast	0,49	0,000144	0,012	2,43	
17	Voronezh region	0,49	0,0001	0,009798	2,01	
18	Perm region	0,50	0,000144	0,012	2,42	
19	Chuvash Republic	0,46	0,000296	0,017205	3,72	
20	Krasnoyarsk region	0,48	0,001144	0,033823	6,99	
21	Lipetsk region	0,45	0,001264	0,035553	7,97	
22	Chelyabinsk region	0,46	0,0001	0,008	1,72	
23	Belgorod region	0,41	0,00068	0,026077	6,36	
24	Novgorod region	0,43	0,000656	0,025612	5,98	
25	Khabarovsk region	0,43	0,000104	0,010198	2,39	
26	Ryazan Oblast	0,42	0,000216	0,014697	3,52	
27	Rostov region	0,43	0,0008	0,028284	6,58	
28	Omsk region	0,41	0,0001	0,009798	2,38	

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29	Udmurt republic	0,40	0,000224	0,014967	3,70	
30	Altai region	0,39	0,001504	0,038781	10,05	
31	Penza region	0,44	0,0001	0,009798	2,24	
32	Vladimir region	0,43	0,000344	0,018547	4,27	
33	Stavropol region	0,40	0,000504	0,02245	5,67	
34	Kirov region	0,37	0,00064	0,025298	6,84	
35	Tambov Region	0,37	0,000776	0,027857	7,49	
36	Leningrad region	0,39	0,00044	0,020976	5,38	
37	Arkhangelsk region	0,36	0,000824	0,028705	7,89	
38	Krasnodar region	0,37	0,000816	0,028566	7,76	
39	Saratov region	0,40	0,000216	0,014697	3,69	
40	Kursk region	0,37	0,000776	0,027857	7,57	
41	Mari El Republic	0,39	0,000304	0,017436	4,52	
42	Irkutsk region	0,41	0,000104	0,010198	2,51	
43	Tver region	0,40	0,000496	0,022271	5,60	
44	Smolensk region	0,37	0,0002	0,014142	3,82	
45	The Republic of Sakha (Yakutia)	0,34	0,001096	0,033106	9,79	
46	Kaliningrad region	0,38	0,000176	0,013266	3,51	
47	Vologodskaya Oblast	0,36	0,000376	0,019391	5,36	
48	Astrakhan region	0,36	0,000664	0,025768	7,24	
49	The Republic of Buryatia	0,34	0,000424	0,020591	6,13	
50	Ivanovo region	0,39	0,000224	0,014967	3,88	
51	Oryol Region	0,35	0,000184	0,013565	3,92	
52	Kurgan region	0,33	0,001056	0,032496	9,91	
53	Primorsky Krai	0,36	0,000104	0,010198	2,80	
54	Khanty-Mansi Autonomous Okrug – Ugra	0,30	0,000624	0,02498	8,22	
55	Komi Republic	0,34	0,000736	0,027129	7,93	
56	Kemerovo region	0,33	0,00004	0,006325	1,92	
57	Bryansk region	0,34	0,000456	0,021354	6,32	
58	Volgograd region	0,34	0,00004	0,006325	1,86	
59	Murmansk region	0,36	0,00044	0,020976	5,83	
60	Republic of Karelia	0,32	0,0001	0,008944	2,80	
61	Orenburg region	0,32	0,000264	0,016248	5,01	
62	G. Sevastopol	0,20	0,00084	0,028983	8,78	
63	Republic of Crimea	0,18	0,000173	0,013166	4,49	
64	Kostroma region	0,32	0,00016	0,012649	3,95	
65	Pskov region	0,30	0,000216	0,014697	4,93	
66	Kamchatka Krai	0,33	0,00064	0,025298	7,67	
67	Sakhalin Oblast	0,31	0,000664	0,025768	8,42	
68	Kabardino-Balkarian Republic	0,28	0,000984	0,031369	11,05	
69	Magadan Region	0,34	0,004984	0,070597	20,52	
70	Yamal-Nenets Autonomous Okrug	0,24	0,000376	0,019391	8,15	
71	Republic of North Ossetia – Alania	0,27	0,000184	0,013565	4,95	
72	The Republic of Khakassia	0,26	0,000216	0,014697	5,70	
73	Transbaikal region	0,27	5,6E-05	0,007483	2,79	
74	Republic of Kalmykia	0,25	0,000576	0,024	9,68	
75	Republic of Adygea	0,31	0,00176	0,041952	13,53	
76	Altai Republic	0,25	0,00028	0,016733	6,69	

Medium Innovators

Medium weak innovators

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77	Jewish Autonomous Region	0,22	0,000496	0,022271	10,22	
78	The Republic of Dagestan	0,26	0,000944	0,030725	12,00	
79	Amurskaya Oblast	0,26	0,000456	0,021354	8,28	
80	Chechen Republic	0,19	0,001336	0,036551	19,44	Weak innovators
81	Karachay-Cherkess Republic	0,21	0,000104	0,010198	4,77	
82	Tyva Republic	0,20	0,000096	0,009798	4,85	
83	Nenets Autonomous Okrug	0,18	0,000176	0,013266	7,29	
84	Chukotka Autonomous Okrug	0,22	0,00208	0,045607	20,73	
85	The Republic of Ingushetia	0,17	0,00044	0,020976	12,34	

Source: authors based on (Association of Innovative Regions of Russia, 2019).

The group of "strong innovators" includes eight regions, the index of total innovative development of which exceeds 140%. Kirov, Kurgan, Kursk regions and the Khanty-Mansi Autonomous Okrug (Khanty-Mansi Autonomous Okrug) increased their innovation indicators by 12 points, almost reaching the group of "mediume innovators", while regions such as the Stavropol Territory and the Leningrad Region increased their indicators by 14 positions. The most stable region in the formation of positive dynamics was the Tyumen region, which from 46th place in 2013 reached 11th place in 2018, which indicates the effective experience of digitalization of the regions. This area is part of the association of subjects of the Russian Federation AIRR, which was created in 2010 to support the promotion of innovative projects. This association includes fourteen regions of Russia, of which Tatarstan and the Tyumen region have become the most successful in the direction of innovative development. All regions included in this organization are either in the "strong innovators" group, or in the "medium-strong innovators" group, or in the "medium innovators" group. At the same time, most regions of this association showed active growth in 2016-2017, and a decrease or stabilization in 2018.

Such regions as the Krasnoyarsk Territory, Ivanovo, Tver, Astrakhan, Kaliningrad, Bryansk, Irkutsk Regions and Primorsky Territory showed negative dynamics by more than four positions, and the city of Sevostopol reduced its position by 23 points to 62 places, which is due, first of all, to ensuring quality collection of statistical information. In fact, the same situation has developed with the Republic of Crimea, which occupies 63rd place. The table 02 shows two regions from each group that have stable positive dynamics in the development of digitalization.

Table 02. The dynamics of the digitalization index of the regions of the Russian Federation for 2014-2018

Region	2014	*2015*	*2016*	*2017*	*2018*	Total	a_0	a_1
1. Tomsk region	0,50	0,52	0,60	0,63	0,63	2,88	0,58	0,037
2. Moscow	0,51	0,52	0,57	0,55	0,60	2,75	0,55	0,021
3. Tyumen region	0,38	0,38	0,43	0,50	0,53	2,22	0,44	0,042
4. Chuvash Republic	0,44	0,45	0,46	0,47	0,49	2,31	0,46	0,012
5. Altai region	0,34	0,34	0,42	0,40	0,43	1,93	0,39	0,024
6. Tambov Region	0,34	0,35	0,37	0,38	0,42	1,86	0,37	0,019
7. Republic of Crimea	-	-	0,27	0,30	0,31	0,88	0,18	0,092
8. Yamal-Nenets Autonomous Okrug	0,22	0,22	0,23	0,25	0,27	1,19	0,24	0,013
9. Chechen Republic	0,14	0,15	0,22	0,20	0,23	0,94	0,19	0,023
10. Nenets Autonomous Okrug	0,16	0,18	0,18	0,20	0,19	0,91	0,18	0,008

Source: authors based on (Association of Innovative Regions of Russia, 2019).

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Using the linear trend formula, we can identify the trend for subsequent years

$$Yt = a_0 + a_1 t \quad (4)$$

Accordingly, the linear trend parameters can be calculated as follows:

$$a_0 = \bar{y} = \frac{\Sigma y}{n} \quad (5)$$

$$a_1 = \frac{\Sigma yt}{\Sigma t^2} \quad (6)$$

Based on the above formulas, we can calculate the linear trend parameters and build a trend for 2019-202 (table 03 and table 04).

Table 03. Calculation of the linear trend parameters of the dynamics of the digitalization index of the regions under No. 1, No. 2, No. 3, No. 4, No. 5

Trend Indicator Values (TIVs)																	
Years	**t**	**Y**					**yt**					**t^2**	**Yt**				
2014	-2	0,50	0,51	0,38	0,44	0,34	-1	-1,02	-0,76	-0,88	-0,68	4	0,502	0,508	0,36	0,438	0,338
2015	-1	0,52	0,52	0,38	0,45	0,34	-0,52	-0,52	-0,38	-0,45	-0,34	1	0,539	0,529	0,402	0,45	0,362
2016	0	0,60	0,57	0,43	0,46	0,42	0	0	0	0	0	0	0,576	0,55	0,444	0,462	0,386
2017	1	0,63	0,55	0,50	0,47	0,40	0,63	0,55	0,5	0,47	0,4	1	0,613	0,571	0,486	0,474	0,41
2018	2	0,63	0,60	0,53	0,49	0,43	1,26	1,2	1,06	0,98	0,86	4	0,650	0,592	0,528	0,486	0,434
Total	0	-	-	-	-	-	0,37	0,21	0,42	0,12	0,24	10	2,88	2,75	2,22	2,31	1,93
2019	3	-	-	-	-	-	-	-	-	-	-	-	0,687	0,613	0,57	0,498	0,458
2020	4	-	-	-	-	-	-	-	-	-	-	-	0,724	0,634	0,612	0,51	0,482

Table 04. Calculation of the linear trend parameters of the dynamics of the digitalization index of the regions under No.6, No.7, No. 8, No. 9, No. 10

Trend Indicator Values (TIVs)																	
Years	**t**	**Y**					**yt**					**t^2**	**Yt**				
2014	-2	0,34	0	0,22	0,14	0,16	-0,68	0	-0,44	-0,28	-0,32	4	0,334	-0,008	0,212	0,142	0,166
2015	-1	0,35	0	0,22	0,15	0,18	-0,35	0	-0,22	-0,15	-0,18	1	0,353	0,084	0,225	0,165	0,174
2016	0	0,37	0,27	0,23	0,22	0,18	0	0	0	0	0	0	0,372	0,176	0,238	0,188	0,182
2017	1	0,38	0,3	0,25	0,2	0,2	0,38	0,3	0,25	0,2	0,2	1	0,391	0,268	0,251	0,211	0,19
2018	2	0,42	0,31	0,27	0,23	0,19	0,84	0,62	0,54	0,46	0,38	4	0,410	0,36	0,264	0,234	0,198
Total	0						0,19	0,92	0,13	0,23	0,08	10	1,86	0,88	1,19	0,94	0,91
2019	3	-	-	-	-	-	-	-	-	-	-	-	0,429	0,452	0,277	0,257	0,206
2020	4	-	-	-	-	-	-	-	-	-	-	-	0,448	0,544	0,29	0,28	0,214

6. Findings

Analyzing the data of the tables and the data obtained during the construction of the trend, we can conclude that there is a constant trend of increasing the digitalization index in the selected regions of the Russian Federation, while the forecast values also tend to increase in 2019-2020. It is worth noting that the Tomsk and Tyumen regions, which are part of the AIRR and belong to the group of “strong innovators” and “medium-strong innovators”, show the greatest growth, which means that the experience

of their implementation of the digital economy can be considered for possible extrapolation to other regions of the Russian Federation.

7. Conclusion

Digitalization allows solving problems and challenges in the economy in a short time, efficiently and with minimal risks, opens up great opportunities for growth, expansion of production and economic, financial and other activities of economic entities (Khalimon, Guseva, Kogotkova, & Brikoshina, 2019). To increase the digitalization index in the lagging regions of the Russian Federation, it is necessary to adopt comprehensive programs at the regional level, for example, such as the “Informatization Program” (Republic of Tatarstan); Improve regional laws governing the development of the digital economy; provide staff development in the field of digitalization and make additions to educational programs aimed at creating a digital environment; ensure the development of the Internet.

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