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Digital Technologies in Production and Spatial Development of Regions

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ABSTRACT
This paper deals with studying the process of active use of digital products with the purpose of increasing the sustainability of regional economic systems, due to the rational production and spatial placement of production capacities.
The objective of the study is the determination of directions of the most efficient implementation of digital technologies into the social and economic processes of territorial formations for the provision of their shift to the technological mode. An important task is developing active approaches to the digitalization of state authorities, formation of "e-government" elements, digital development, business, and social structures in the regions. The study hypothesis is the actual issue of determining the presence of the dependence of production forces based on digital technologies implementation into the production and spatial development of the regions.
The study is based on methods of the economy and statistical and comparative analysis, that served as the basis for assessing the state of development of production and spatial directions in the activity of regions in conditions of digital technologies implementation.
The result of the theoretical analysis and the study conducted proved the earlier-offered hypothesis on the presence of a high degree of dependence of the indicators of industrial development of regions, represented by annual indices of industrial production and territorial distribution as the residential construction index, on the digitalization index in the respective region.
According to the study results, conclusions were made about the considerable influence of digital technologies use in the regions, expressed through their digitalization index, on the state of production index and residential construction as the spatial development element.
It was impossible to determine the certain values of correlation dependence due to the absence of statistical data for the period required.
Differences in the potentials of regions in adapting to digital changes, causing negative consequences, were marked out as well. The means offered can be used by the state authorities for assessing similar issues.
Keywords: *digital technologies, production and spatial development, regional economic systems, economic growth*

1. INTRODUCTION

Rational placement of production capacities throughout the territory of the countries and the regions in conditions of implementing of the accepted directions for the extended implementation of digital technologies into various sectors of the economy, the industrial specialization of the federal subjects has been gaining more actuality for the recent years. At this, due to the need of achieving the high level of compatibility of products and elements in complex systems, the need for digital production standardization comes into the picture for business and the state [1]. It is especially important for manufacturing industries, where standards can be a tool for innovation modernization and accelerated implementation. Meanwhile, the digital standardization of innovative production is widely used at leading Western enterprises in the West, being the most common in high tech sectors [2, 3].
It terms of production and spatial development of the regions, the creation of the so-called digital doubles of spatial enterprises has been developing recently [4].
The core of the specified processes is creating digital copies of actual physical objects in the form of production enterprises, finance corporations, helping to optimize the efficiency of all key processes in them.

This phenomenon is relatively new and is typical for the digital economy; it was also formed in the West and based on the virtual company model, providing its functioning due to the multiple data permanent updating process [5].
The inclusion of modern Russian enterprises into the category of fulfilling such requirements sets the business digital transformation task, which is actual for many companies because now the concepts of “innovation” and “information technology” are often equated because these are IT that are capable of providing the implementation of the innovation strategy and digital transformation [6]. At this, typical changes in terms of business digital transformation appear in the management practice. New management practices exist both for the enterprise itself, including digital products, business models, management chains, business processes, and for the decision making local level [7].
These circumstances oblige the enterprises to maintain a high degree of readiness for the digital transformations, that will naturally require the qualitative transformation of the company structures responsible for the digital transformation of the entire business, which will determine the company potential and its further competitive ability. At this, the company's possibility to assess the readiness of this department to the planned transformations is important [8].
At this, it should be emphasized that methods of assessing the IT department readiness to the company digital transformations are widely used by Western companies [9]. These requirements can be fully set for companies carrying out professional activity in the IT-sphere.
The way this company enjoys the confidence of its business customers, its market position and, accordingly, income and security will depend on [10].
This circumstance is important, and the most foreign IT companies focus on it because it forms their image, customer location, and competitive ability [11, 12].
In this type of activity, the leading role belongs tot he company management. The degree of the company top management qualification and the presence of the required digital competencies will determine, to the considerable extent, the digital transformation quality, the company prestige and competitive ability, and customer trust because the duly prepared management is the driver of business innovations and the implementation of digital technologies [13].
And so, not without a reason, Western economy pays such serious attention to the company management preparation, especially in conditions of the digital economy, and assigns it the management of IT technologies as a strategic weapon of forming the population well-being and sustainability [14]. It should be emphasized here that digitalization contributes not only to production development but also to the improvement of the spatial structure of the state and the regions. Along with that, assessing the state of digital technologies in the regions demonstrates the considerable differences in these indicators and the unevenness of the use of digital products in them. At this, the need for implementing efficient measures for regional digital systems development provides for not only the understanding of their qualitative content but for their exact quantitative assessment [15].
Based on the existing foreign experience for assessing regional digital ecosystems, besides the population Internet activity, the similar organizations' activity and the state digitalization status are usually assessed [16, 17].
Digital development of regional systems is been actively solved through the field of state and municipal control based on possibilities given by advantages of the so-called "e-government" [18], which, in fact, is a system of state services supporting task solution and providing the population involvement into the territory management with electronic information tools.
Moreover, the use of e-communications and network technologies will enable regional authorities to transform production processes and forms of interaction between the economic agents against the background of economy and Internet digitalization [19].
An important issue for production and spatial development of regions in connection with digitalization are risks of social nature in connection with the release of the considerable amount of stuff and possible deformation of regional labor markets due to various potential of adaptation to digital changes by the territories [20].
Meanwhile, the development of digital technologies greatly contributes to widening possibilities of forming regional startups in the information technology field, which is proven by the world experience [21]. At this, the majority of such companies are created in cities or populated areas with higher educational establishments.
Therefore, the consideration of theoretical aspects of digital technologies' impact on production and spatial development of regions showed that the issues of digitalization introduction into economic systems of the Federation entities have an ambiguous impact on the state of regions. At the same time, the prevailing positive trends formed in them contain the separate negative aspects causing the negative impact on the production and spatial field and escalating processes of political, economic, and social nature.
Accordingly, digitalization, affecting all aspects both of economic and social nature, has a direct impact on industrial and territorial development. The proof of this hypothesis conditioned the main objective of this study.

2. METHODS

Further, by the example of the Central Federal District regions, we plan to consider the influence of implementation of digital products on the development of industrial production and residential construction as one of the territory development elements.
It should be mentioned that data under the digital component of the economy are given in statistical publications for a rather limited period. The circumstance specified narrows the study possibilities to a certain extent. The data required are given in Table 1.

Table 1 Indices of CFD entities development, 2017

	Business digitalization index	Including the Index indicators				Industry production index	Comissioning of residential houses
		Specific weight of organizations (from total organizations) using (per cent):					
		broadband Internet	cloud services	RFID technologies	ERP systems		
Central Federal District	**29**	**87.4**	**25.8**	**5.3**	**15.4**	**102.1**	**101.3**
Belgorod Region	29	87.5	26.8	5.6	12.9	106.1	96.3
Bryansk Region	26	87.4	19.4	3.5	9.0	107.3	83.9
Vladimir Region	27	87.8	25.4	3.9	13.6	100.6	106.1
Voronezh Region	29	88.4	26.8	4.5	12.4	106.7	100.5
Ivanovo Region	27	86.7	24.7	4.2	10.8	101.2	192.2
Kaluga Region	28	87.5	21.9	4.0	16.0	115.1	119.7
Kostroma Region	23	78.0	12.5	4.3	10.8	108.6	100.3
Kursk Region	26	78.8	26.5	4.8	12.4	103.1	100.7
Lipetsk Region	28	91.9	23.9	4.5	10.4	103.0	100.6
Moscow Region	30	86.4	24.7	5.9	22.3	111.3	101.8
Orlov Region	25	85.1	21.3	3.2	8.7	96.7	74.3
Ryazan Region	27	85.6	24.3	4.2	12.8	102.0	100.6
Smolensk Region	24	86.5	16.0	3.4	6.7	102.8	76.9
Tambov Region	30	94.6	37.1	2.7	9.7	110.1	100.8
Tver Region	23	78.4	17.9	3.5	8.1	101.8	118.1
Tula Region	27	82.4	22.5	5.3	15.1	106.2	11.9
Yaroslavl Region	29	89.1	27.3	5.4	14.5	114.2	94.6
Moscow	35	94.9	35.7	8.5	21.5	101.0	101.0

Source: Digitalization index, Statistical compilation of NRU HSE, "Digital economy indicators 2019", Production factors and new housing supply – Statistical compilation: "Regions of Russia: socio-economic indicators for 2018"

Some clarifications should be given concerning Table 1. The last data on the digitalization index in statistical compilations of NRU HSE 2019 are available only for 2017, later data are absent even in the 2020 compilation. In order to provide the compatibility, the production factors and new housing supply indicators were taken from the Statistical annual compilation "Regions of Russia." Social and economic indicators of 2018

3. RESULTS

It is seen from Table 1 that the following regions have the lowest digitalization index: 23 – Kostroma Region, 24 – Smolensk Region, 25 – Orlov Region, 23 – Tver Region, 26 – Bryansk Region. In terms of the industrial production index, the last position is held by Orlov Region – 96.7, lower than the district level – Vladimir Region – 100.6, Ivanov Region – 101.2, Ryazan Region – 102.0, Tver Region -101.8, Moscow city —101.0.

The digitalization coefficient under CFD is 29, on this more or less high level, only 6 can be named – Belgorod Region – 29, Voronezh Region – 29, Yaroslavl Region – 29, Moscow and Tambov Regions – 30 each, and Moscow city – 35.

The spatial development status, in the absence of the respective indicators, can be assessed in terms of new housing supply. The lowest indicator - 74.3% is in Orlov Region, 83.9% in Bryansk Region, 76.9% in Smolensk Region, 94.6% in Yaroslavl Region, 96.3% in Belgorod Region. In addition, indicators in the following regions are lower than average district ones: Voronezh Region – 100.5, Kursk Region – 100.3, Lipetsk Region – 100.7, Ryazan Region – 100.6, Kostroma Region – 100.3. Therefore, it is possible to identify the most repeated regions in terms of the worst indicators: by digitalization index – Kostroma Region, Tver Region, Smolensk Region, Orlov Region, Bryansk Region. By production development coefficient: Orlov Region, Ivanov Region, Ryazan Region, Tver Region, Vladimir Region. By new housing supply: Orlov Region, Bryansk Region, Smolensk Region, Yaroslavl Region.

4. DISCUSSION

As we see, by all three indicators, the most frequently repeated regions are Kostroma Region, Bryansk Region, Orlov Region, Tver Region, Smolensk Region. In other words, the certain dependence of the production and spatial coefficients on the digitalization coefficient is tracked. We understand that the interconnection specifed is indirect. Although, the line of conclusions can be made with the purpose of further consolidation of positions of the regions specified in these conditions. Therefore, growth reserves are seen in increasing the mass nature of cloud services use (for example, this indicator for Kostroma Region is 12.5%, which is more than 2 times

lower as the leader subject's indicator) and in wider use of RFID technologies and ERP systems. The regions detected are almost 2 times behind the leading positions under the last indicators.

5. CONCLUSION

Thus, studying the processes of the influence of digital technologies development in regions on their production and spatial development confirmed the results of consideration of theoretical aspects of this activity, the essence of which is the considerable impact of the use of digital products on the state of industrial production and residential construction as one of spatial development elements, and various potentials of regions and their capability to adapt to digital changes, causing negative consequences of political, economic and social nature in separate cases. The analysis carried out allowed to confirm the stated interaction indirectly and to mark out some reserves of economy digitalization growth for separate regions.

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