Artículo de investigación

Instruments to Choose Priorities of the Spatial Development of the Region in the Context of Smart Specialization

Инструментарий выбора приоритетов пространственного развития региона в контексте Smart Specialisation

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Abstract

The article is devoted to studying the processes of spatial development and geo-economic integration of the subjects of the Central Black Earth macroregion in Russia. The authors have developed and tested the methodology for analyzing the spatial potential and assessing the geo-integration of territories. It has been determined that all areas of the Central Black Earth macroregion have high spatial potential. However, a high level of geo-economic integration is characteristic only for the Lipetsk Region. The list of critical breakthrough technologies has been made, and the technological profile of the Central Black Earth macroregion has been formed. A management matrix for selecting priorities and scenarios for the spatial development of the region in the context of smart specialization has been worked out. According to the results of the study, the

Аннотация

Статья посвящена исследованию процессов пространственного развития и геоэкономической интеграции субъектов Центрально-Черноземного макрорегиона России. Авторами разработана и апробирована методика анализа пространственного потенциала и оценки геоинтегрированности территорий. Установлено, что все области Центрально-Черноземного макрорегиона обладают высоким пространственным потенциалом. Однако высокий уровень геоэкономической интеграции характерен только для Липецкой области. Определен перечень критических прорывных технологий, и сформирован технологический профиль Центрально-Черноземного макрорегиона. Построена управленческая матрица выбора приоритетов и сценариев пространственного развития

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strategy of international technological specialization in the area of basic technologies of power electrical engineering, nano-, bio-, information and cognitive technologies is promising for the Lipetsk Region. The Belgorod, Voronezh, Kursk and Tambov Regions should choose a strategy of local technological specialization based on the interregional interaction in priority technological sectors.

Keywords: Region, macroregion, spatial development, smart specialization, assessment tools, spatial potential, geo-economic integration, technological profile, management matrix.

региона в контексте «умной специализации». По результатам исследования, для Липецкой области перспективной является стратегия международной технологической специализации в сфере базовых технологий силовой электротехники, нано-, био-, информационных и когнитивных технологий. Белгородская, Воронежская, Курская и Тамбовская области должны выбирать стратегию локальной технологической специализации на основе межрегионального взаимодействия в приоритетных технологических секторах.

Ключевые слова: регион, макрорегион, пространственное развитие, «умная специализация», инструментарий оценки, пространственный потенциал, геоэкономическая интеграция, технологический профиль, управленческая матрица.

Introduction

Nowadays the Russian Federation is reforming the system of territorial strategic planning related to the adoption of Federal Law No. 172-FZ On Strategic Planning in the Russian Federation dated July 28, 2014 and the Fundamentals of the State Policy for the Regional Development of the Russian Federation for the Period until 2025 approved by Decree of the President of the Russian Federation in January 2017. It provides for the need to develop and actualize a set of hierarchically subordinate documents on strategic planning at the federal, macroregional, regional and municipal levels. A fundamentally new document, the Spatial Development Strategy of the Russian Federation for the Period Until 2025, has been recently developed. It provides for the formation of macroregions in the Russian economic space and defines promising areas of economic specialization for each region according to the Russian National Classifier of Types of Economic Activity. At the same time, traditional industries still have priority over more complex intersectoral and intercluster projects.

The general paths of spatial development of the Russian economy in the near future are determined by the following groups of factors:

- Exhaustion of the current export-raw material model of the economy under the impact of changes in world markets for raw materials and capital,
- Cyclical processes of updating the accumulated property of the population (5 – 7 years), fixed assets (10 – 12), and basic technologies (15 – 20) in various sectors,
- Fundamental shifts in the resource base of the economy, including labor resources,
- Challenges from the outside world in the main areas of the economic integration of Russia determined by the growth of the global instability and the strategies of world “centers of power” (USA, EU, China, and Japan), and strengthening of new “centers of power” (China, India),
- Deployment of negative demographic and social trends, the further degradation of social infrastructure (housing and communal services, healthcare, and education), and
- The need to modernize the production and technological base of infrastructure industries (Bukhvald, Valentik, 2016), (Kotlyakov, Treivish, Glezer, Shvetsov, 2013), (Artobolevsky et al., 2009), (Lachininsky, 2012).

At the same time, the paradigm shift in the Russian regional policy towards self-development of regions means, in fact, the establishment of an adequate (in addition to the existing economic regions, federal districts, etc.)

regional structure of the country's economy whose elements are geo-economic regions, and the national economy itself acquires properties of a geo-economic system. In the context of the economic and spatial development paradigm, regions are fragments of the geo-economic space, where under globalization and increasing competition for strategic resources and investments, international, national and regional interests are focused and challenged. Polarization and disintegration of the economic space substantiated by the uneven distribution and concentration of the economic activity at the local, subnational, country and international levels are growing (Granberg et al., 2011), (Lachininskii, Semenova, Lachininskii, 2016), (Minakir, Demyanenko, 2010).

It is possible to avoid duplication of competencies and fragmentation of support measures, to take into account the level of spatial potential development and the degree of geo-economic integration of regions by identifying individual unique development priorities for each region based on using the concept of Smart Specialization as a methodology for choosing the areas of spatial development of a territory.

The concept of Smart Specialization was formulated by the expert group of the European Commission Knowledge for Growth in 2009 (Foray, David, Hall, 2009). Later it was developed in the works of a number of foreign (Boschma, 2014), (Coffano, Foray, 2014), (Karayannis, Grigorudis, 2016), (McCann, 2015), (McCann, Ortega-Argilés, 2013), (McCann, Ortega-Argilés, 2014) and Russian researchers (Dubrovskaya, Kudryavtseva, 2017), (Zemtsov, Barinova, 2016). It was also officially stated in regulatory legal acts of international economic organizations (European Parliament, 2012), (European Parliament, 2013), (OECD, 2013), (HORIZON, 2020) as a methodology for determining innovative priorities in the system of developing a policy of sustainable spatial development because its systematic consistent implementation contributes to achieving sustainable development goals, e.g., the extirpation of famine and poverty, employment and economic growth, industrialization based on innovations and the development of infrastructure, reduction of inequality, etc. However, in Russia there are systemic obstacles that impede the formation of smart specialization. They are related to fragmenting and isolating of regions from one another, the lack of mechanisms to form interregional production chains, a centralized and universal nature of strategic planning for the economic development that does not take into account specific features and needs of certain regions: geographical, resource, environmental, production, and infrastructure (Kutsenko, Islankina, Kindras, 2018), (Repichev, Tugacheva, Vorobyova, Avdeeva, 2018).

Methods

a) General description

The empirical basis of the study was the publications of the Federal State Statistics Service (Rosstat), materials of the official websites of governors, the government and the Development Corporation of regions belonging to the Central Black Earth macroregion (Belgorod, Voronezh, Kursk, Lipetsk and Tambov Regions), the Russia's Spatial Development Strategy up to 2025 dated 13.02.2019, the Strategy for Scientific and Technological Development of Russia Until 2035 dated 01.12.2016, the National Technological Initiative project of the Agency for Strategic Initiatives, and the List of Priority Areas for the Development of Science and Technologies of the Russian Federation and Enginery dated 07.07.2011.

b) Algorithm

Figure 1 shows the empirical research strategy combining four interrelated implementation stages and a sequence of certain procedures within each of them.

The list of statistical indicators for the analysis of the spatial potential of the region was formed by the authors based on the study and generalization of a number of works on this issue (Zemtsov, Baburin, 2016), (Kodolova, 2014), (Mayburov, 2003), (Parshutina, Polozhentseva, Klevtsova, 2017). It includes the share of the urban population as an indicator of the level of the region urbanization, the density of paved roads as an indicator of the connectivity of space, and the density of the population as an indicator of the density of the economic space.

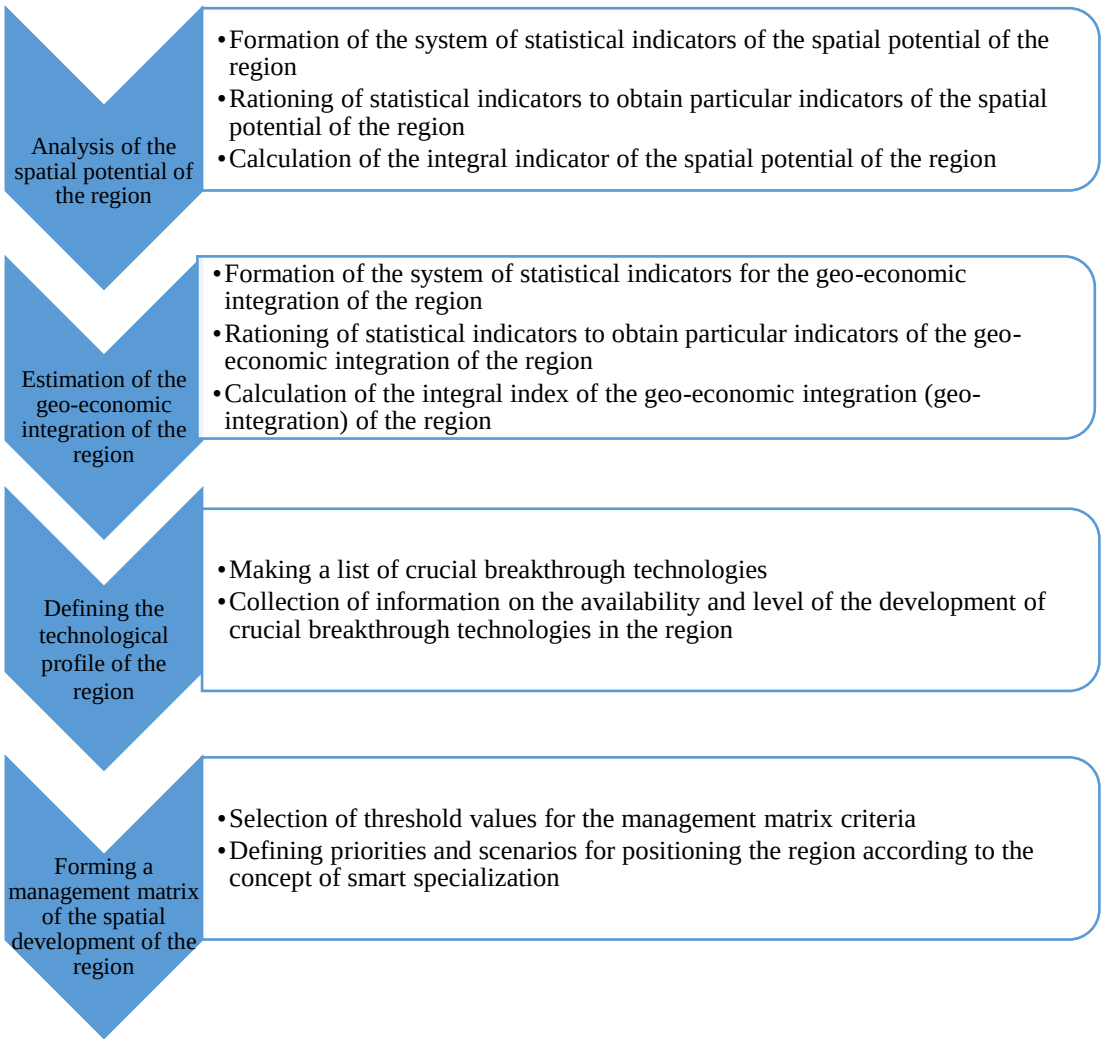

Figure 1. Empirical Research Strategy

When determining the degree of the geo-economic integration of the region, the authors took the methodology described in the works (Kuznetsov, Mezhevich, Lachininsky, 2015), (Lachininsky, 2016) as the basis. This methodology involves determining the degree of the region's integration into the world economy as a ratio of the coefficient on the localization of the region's foreign trade activity (the ratio of the region's foreign trade turnover per capita as to the similar average Russian indicator) and the region's GRP localization coefficient (the region's GRP per capita ratio as to the same average Russian indicator). The authors supplemented these indicators with the indicator of the share of foreign investments in the total volume of investments in fixed assets of the region.

c) Flow Chart

The suggested indicator system as a whole is shown in Table 1. The study period is from 2012 to 2017.

Table 1. System of Statistical Indicators of Spatial Potential and Geo-Economic Integration of the Region

Ser. No.	Indicator	Unit
Indicators of analyzing the spatial potential of the region		
1.	Density of the population	Persons per 1 km^2
2.	Share of the urban population	%
3.	Density of paved roads	km of roads per 1,000 km^2 of the territory
Indicators of estimating the geo-economic integration of the region		
1.	Gross regional product per capita	RUB
2.	External turnover per capita	dollars
3.	Share of foreign investments in the total amount of investments	%

The statistical indicators for obtaining particular indicators were normalized in relation to the average Russian indicators according to formula (1):

$$f_i = \frac{x_i}{x_{ir}} \quad (1)$$

where fi was the value of the particular indicator, xi was the value of the regional statistical indicator, and xir was the value of the average Russian statistical indicator.

The integral indicators of the spatial potential and geo-economic integration of the region were calculated based on rating numbers of the relevant groups of particular indicators defined according to formula (2):

$$R_j = \sqrt{\sum_{i=1}^{n} f_i^{\,2}} \quad (2)$$

where Rj was the rating number of the group of particular indicators, fi was the value of the particular indicator, and n was the number of particular indicators for the relevant integral indicator.

The obtained values were normalized in relation to the average Russian ones.

Results

The results of analyzing the spatial potential of the regions in the Central Black Earth macroregion in the context of particular indicators are shown in Tables 2 – 4.

Table 2. Indicators of the Density of the Economic Space in the Central Black Earth Macroregion

Region	2012	2013	2014	2015	2016	2017
Belgorod Region	7.13	7.13	6.33	6.33	6.33	6.33
Voronezh region	5.63	5.63	5.00	5.00	5.00	5.00
Kursk Region	4.75	4.75	4.11	4.22	4.22	4.11
Lipetsk Region	6.00	6.00	5.33	5.33	5.33	5.33
Tambov Region	3.88	3.88	3.44	3.44	3.33	3.33

Table 3. Connectivity Indicators of the Economic Space in the Central Black Earth Macroregion

Region	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Belgorod Region	11.11	11.02	11.25	11.54	11.76	11.82
Voronezh region	5.61	5.50	5.38	5.36	5.45	5.56
Kursk Region	6.22	5.95	5.87	5.85	5.84	5.92
Lipetsk Region	8.93	8.74	8.57	8.52	8.52	8.60
Tambov Region	4.80	4.90	4.77	4.62	4.61	4.65

Table 4. Indicators of the Level of Urbanization in the Central Black Earth Macroregion

Region	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Belgorod Region	1.10	0.90	0.90	0.91	0.91	0.91
Voronezh region	0.90	0.90	0.90	0.91	0.91	0.91
Kursk Region	0.90	0.90	0.90	0.91	0.91	0.91
Lipetsk Region	0.86	0.86	0.87	0.87	0.86	0.87
Tambov Region	0.80	0.80	0.81	0.81	0.81	0.82

The results of analyzing the spatial potential of the regions in the Central Black Earth macroregion in the context of particular indicators make it possible to conclude that in terms of the density and coherence of space, all regions under study are at a level higher than the average Russian one. This is explained by the location of the regions under study in the central part of Russia, which is traditionally characterized by high density of population and developed infrastructure. What is more, in both cases the leader is the Belgorod Region. The lowest indicators are characteristic of the Tambov Region. The relatively low urbanization as compared to the average Russian level is associated with the agricultural specialization that is traditional for the entire macroregion. In the macroregion under study there is only one city with the population of over one million people. This is the city of Voronezh.

The dynamics of the integral indicator of the spatial potential for the period under consideration are shown in Table 5.

Table 5. Integral indicators of the Spatial Potential of the Central Black Earth Macroregion

Region	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Belgorod Region	7.65	7.59	7.47	7.62	7.73	7.76
Voronezh region	4.62	4.57	4.27	4.26	4.30	4.35
Kursk Region	4.55	4.43	4.17	4.20	4.19	4.19
Lipetsk Region	6.23	6.14	5.85	5.83	5.82	5.86
Tambov Region	3.59	3.63	3.43	3.36	3.32	3.33

According to Table 5, all regions of the Central Black Earth macroregion are characterized by a high spatial potential as compared to the average Russian one. The leader is the Belgorod Region, while the outsider is the Tambov Region. The largest contribution to the integral indicator is made by the particular indicator of the economic space coherence.

The results of estimating the geo-economic integration of the regions in the Central Black Earth macroregion in the context of particular indicators are given in Tables 6 – 8.

Table 6. Indicators of Localization of the Economy of the Central Black Earth Macroregion

Region	2012	2013	2014	2015	2016	2017
Belgorod Region	1.02	0.98	0.99	1.00	1.00	1.00
Voronezh region	0.69	0.70	0.76	0.77	0.76	0.74
Kursk Region	0.64	0.64	0.66	0.67	0.69	0.69
Lipetsk Region	0.72	0.72	0.85	0.86	0.86	0.86
Tambov Region	0.54	0.58	0.66	0.67	0.63	0.57

Table 7. Indicators of Localization of Foreign Trade Activity in the Central Black Earth Macroregion

Region	2012	2013	2014	2015	2016	2017
Belgorod Region	0.98	0.84	0.78	0.76	0.72	0.71
Voronezh region	0.22	0.21	0.21	0.25	0.26	0.28
Kursk Region	0.20	0.21	0.19	0.22	0.25	0.24
Lipetsk Region	1.00	0.89	0.90	1.00	1.07	1.22
Tambov Region	0.06	0.07	0.08	0.08	0.08	0.09

Table 8. Indicators of Localization of Investment Activity in the Central Black Earth Macroregion

Region	2012	2013	2014	2015	2016	2017
Belgorod Region	0.27	0.26	0.19	0.08	0.28	0.28
Voronezh region	0.80	0.42	0.23	0.08	0.12	0.18
Kursk Region	0.05	0.13	0.06	0.06	0.04	0.72
Lipetsk Region	0.58	0.68	0.77	0.65	1.16	1.54
Tambov Region	0.04	0.16	0.07	0.05	0.04	0.06

The results of the analysis of the geo-economic integration of the regions in the Central Black Earth macroregion in the context of particular indicators make it possible to conclude that according to the indicators on the localization of foreign trade and investment activity, the leader is the Lipetsk Region, and according to the economy localization – the Belgorod Region. The outsider for all particular indicators of the geo-economic integration is the Tambov Region. The dynamics of the integral indicator of spatial potential for the period under consideration are shown in Table 9.

Table 9. Integral Indicators of Geo-Economic Integration of the Central Black Earth Macroregion

Region	2012	2013	2014	2015	2016	2017
Belgorod Region	0.83	0.76	0.73	0.73	0.73	0.73
Voronezh region	0.63	0.48	0.47	0.47	0.47	0.47
Kursk Region	0.39	0.40	0.40	0.41	0.42	0.59
Lipetsk Region	0.79	0.77	0.84	0.85	1.04	1.24
Tambov Region	0.32	0.35	0.39	0.39	0.37	0.34

According to Table 9, all regions of the Central Black Earth macroregion, except for the Lipetsk Region, are characterized by a low level of geo-economic integration as compared to the average Russian one. In the Belgorod and Voronezh Regions, the integrated indicator started declining in 2014, which can be explained by the effect of international economic sanctions against the Russian Federation.

The opportunities of the spatial development of the Central Black Earth macroregion are associated, inter alia, with the technological potential localized in its areas. So-called breakthrough technologies may vary. The authors formed it based on the List of Crucial Technologies of the Russian Federation recorded in the List of Priority Areas for the Development of Science, Technology and Technics of the Russian Federation dated 07.07.2011 and made a technological profile of all areas of the Central Black Earth macroregion that took into account the developments in the regions based on the data from official websites of the regions (Table 10).

Table 10. Technological Profile of the Central Black Earth Macroregion

Region	Crucial technologies								
	MT	EE	3BT	BVT	CM	NBIT	NF	BT	PR
Belgorod Region		+		+	+	+		+	+
Voronezh region	+			+			+	+	+
Kursk Region				+		+	+	+	+
Lipetsk Region		+				+			+
Tambov Region						+			+

Note: MT – basic and critical military and industrial technologies for creating promising types of weapons, military and special equipment; EE – basic technologies of power electrical engineering; 3BT – biocatalytic, biosynthetic and biosensor technologies; BVT – biomedical and veterinary technologies; GT – genomic, proteomic and postgenomic technologies; CM – computer simulation of nanomaterials, nanodevices and nanotechnologies; NBIT – nano-, bio-, information, cognitive technologies; NF – technologies of nuclear energy, nuclear fuel cycle, safe management of radioactive waste and spent nuclear fuel; BT – bioengineering technologies; and PR – 17 technologies (1 – nanomaterials, 2 – multimedia, 3 – navigation, 4 – nanodevices, 5 – energy, 6 – structural nanomaterials, 7 – functional materials, 8 – software, 9 – ecology, 10 – geology, 11 – Emergencies, 12 – medicine, 13 – transport, 14 – carrier rockets, 15 – electronics, 16 – energy distribution, 17 – organics).

Next, the authors made the management matrix to define the priorities and scenarios of the regions' spatial development (Fig. 2), having taken as a basis and modified the developments described in the works (Filimonenko, Vasilieva, 2017), (Vasileva, Filimonenko, Karpycheva, Rusina, 2017). The authors took the average Russian integral indicators that were equal in the authors' methodology 1 as the threshold values for defining high/low spatial potential and high/low geo-integration of the territory.

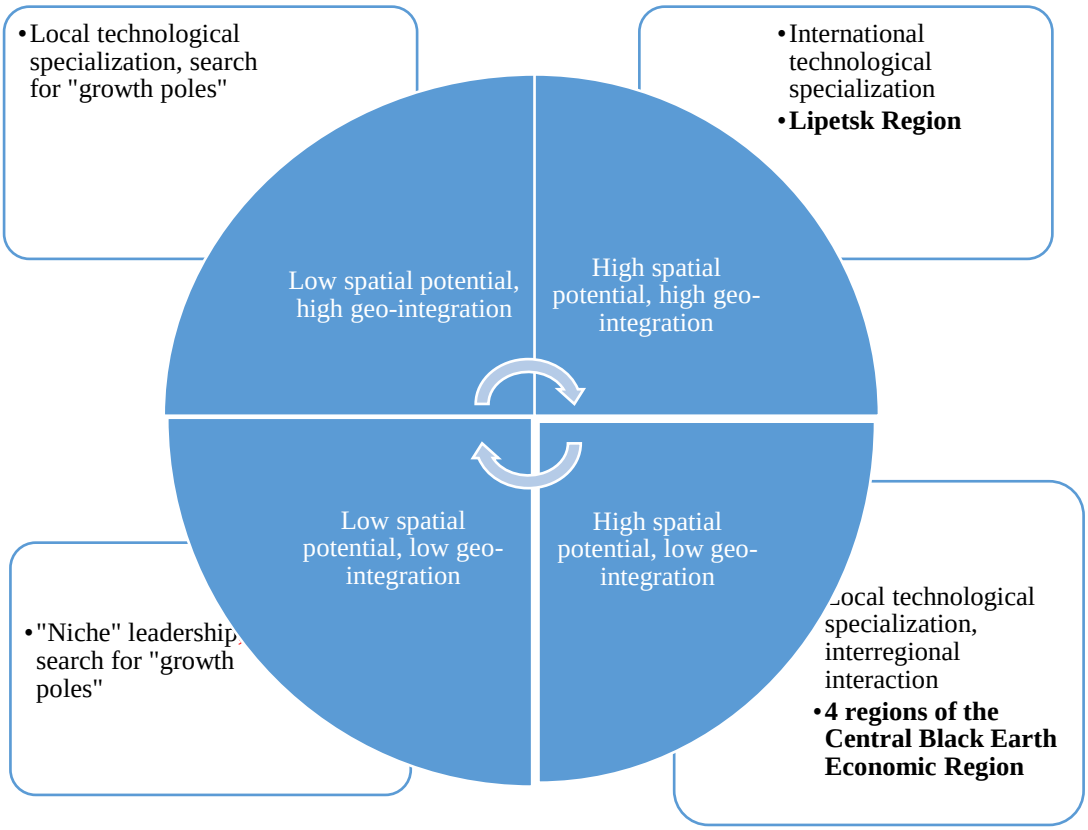

Figure 2. Matrix of the Region's Spatial Development

Thus, according to the results of the study, the Lipetsk Region can adhere to the strategy of international technological specialization in the area of basic technologies of power electrical engineering, nano-, bio-, information and cognitive technologies, as well as the technologies included in the group Other. The Belgorod, Voronezh, Kursk and Tambov Regions should choose a strategy of the local technological specialization based on the interregional interaction in the relevant technological sectors. Neither of the regions under consideration was included in the two remaining quadrants of the matrix ("Local technological specialization based on "growth poles" and "Niche leadership based on "growth poles").

Discussion

However, it is necessary to note that the complexity, diversity and convergent development of modern technologies, the deployment of the economy digitalization make centralization in the area of determining the economic specialization of regions extremely risky and inefficient, including due to the low quality of both federal and regional strategic planning.

At the federal level, for example, there is no relationship between the Spatial Development Strategy of the Russian Federation under consideration and such strategic documents as the Strategy for Innovative Development of the Russian Federation up to 2020, the state program of the Russian Federation Economic Development and Innovative Economics, and the Strategy for Scientific Technological Development of the Russian Federation until 2035, the national project Digital Economy of the Russian Federation that are effective now.

Conclusion

In the context of changing the vector of the economic integration and increasing global challenges and threats, reforming the system of territorial strategic planning, new methodological approaches based on the concept of smart specialization are needed. They make it possible to transit to the network cluster model,

to create new spatial formations of the interdisciplinary and intersectoral nature that form interregional areas of integrated sectors of the "new" and "traditional" economies generating important multiplicative effects and stimulating the improvement of the regional economy's competitiveness.

It is necessary to study the conceptual and methodological foundations of "smart specialization" of the territorial development, summarize foreign and national experience in introducing the principles of "smart specialization" in order to develop and test methodological instruments for determining priority areas and unique competitive advantages (competencies) of smart specialization in a region that takes into account interregional and foreign economic relations, areas of structural changes in reproduction processes, prospects for convergence ("coherence") of industries, the level of ICT development, and positioning in the technologic pyramid.

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