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Spatial Development of the Region in New Economic Realities

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***Abstract*—The article defines the conditions for strategic planning in the economic space of the region: stability, the value and the importance of economic space, the high capital intensity of enterprises in the region, well-prescribed business processes, and elaborate organizational structure of management of the territory. At the same time, regional problems associated with the presence of economic sanctions and changes in sales markets, seasonal operation of enterprises, and a high level of depreciation of fixed assets were identified. It is shown that smart specialization can work and be applied in the field of tourism services, agricultural production, industry, in any other sphere of the economy, which has an innovative component, huge potential, and resources directly in this region. The analysis of indicators of sustainable development of the economic space of the Republic of Crimea based on the application of the Harrington Desirability Function according to the data of the subjects of the Southern Federal District of the Russian Federation is carried out. As a result of the research, it was revealed that the indicator Z4 (agricultural production index) fell into the "bad" zone, indicators Z1 (gross regional product per capita), Z2 (investment in fixed assets per capita), Z3 (industrial production indices) are in the "satisfactory" zone, but closer to the "bad" zone. Indicator Z5 (indices of construction products) is in the zone "satisfactory" closer to the zone "good". Only one indicator Z6 (indices of the physical volume of retail trade turnover) fell into the zone "good". The main further directions of the republic's spatial development have been defined: modernization of enterprises of the agro-industrial complex, the creation of the tourist industry at the international level, creation of effective innovative production, expansion of the service sphere.**

Keywords—spatial development, strategic planning, smart specialization, Harrington Desirability Function, structuring, economic space, tourism sector, high-tech production, agro-industrial complex.

I. INTRODUCTION

The economic space can be seen as a system of economic relations and interaction that is taking place in the present circumstances of a given territory. It is therefore highly relevant to study the spatial development of the region in the context of structural changes and new economic realities. The work aims to identify characteristics of regional structural interactions and conditions of strategic planning in the region and to define specialization in the spatial development of the Republic of Crimea in new economic realities.

Spatial development is defined as «improvement of the system of settlement and territorial organization of the economy, including through the implementation of an effective state policy of regional development», and the Spatial Development Strategy itself is a strategic planning document developed within the framework of the territorial objective [1]. In the context of the territorial approach, the concept of «economic space» is also one of the basic concepts. This is a concept defined by the Russian academician A. G. Granberg: "An economic space is a dense area containing many objects and links between them; settlements, industrial enterprises, economically developed and recreational areas, transport and engineering networks, etc." [2].

Academician A. I. Tatarkin pointed out the importance of improving the structure of the Territory's economic space: «The scientifically based structuring of the economic space of the Russian regions, as long as it is absent, becomes a factor that can play a significant role in the social and economic development of the territory of the country» [3].

The economic situation in the world in general, and in some parts of the Territories in particular, had now changed dramatically owing to the coronavirus pandemic, the processes of de-globalization, and new uncertainties. Therefore, in the light of the definitions considered, it is interesting to study the conditions (and are they?) of the strategic planning of the spatial development of the region in the new realities.

II. SPATIAL DEVELOPMENT OF THE REPUBLIC OF CRIMEA

A. Analysis of the fulfillment of the conditions for strategic planning of the spatial development of the Republic of Crimea

A strategic planning system is expected to be useful for the spatial development of the region. This approach requires an assessment of the conditions for the application of the strategic planning system in the Republic of Crimea (Table I) [4].

At the same time, the internal conditions for strategic planning in the region are a certain scale of financial and economic activities, a developed organizational structure of

territorial management, interrelated business processes, and the presence of internal control. Concerning the external factors of strategic planning, it should be noted that the State and the region must have political stability, and financial indicators should reflect the maturity of key sectors of the economic space and the significance and importance of the region. An analysis of the fulfillment of the conditions for the application of strategic planning for spatial development in the Republic of Crimea revealed that, in general, the conditions for strategic planning in the region were being met. At the same time, the problems identified will be resolved as the region's economic space develops.

B. Methodological aspects and principles of the smart specialization concept

The paper proposes to consider the methodological apparatus of the concept of Smart Specialisation in foreign and Russian practice of strategic planning of the spatial development of regions, using this practice at different levels of territorial administration, with the formation of policies from the bottom up, taking into account global technological trends and future specialization [1, 5].

The concept of smart specialization was developed at the end of 2009 by the Knowledge for Growth expert group of the European Commission's Research and Innovation Directorate as a response to the problem of fragmentation and duplication of innovation support from EU funds [5].

The concept is that the regional communities, consisting of companies, universities, and scientific organizations, are much more aware of the technologies used and the market opportunities of their region than at the State level.

Therefore, in the current context, where the complexity and diversity of technologies and their economic exploitation are very high, centralization of decision-making poses a high risk.

The concept of smart specialization focuses on the specification to the level of tools, algorithms, templates, and recommendations.

The principles of smart specialization include the following provisions:

– the search for a unique specialization is carried out for each economic space of the region;

– the determination of the specialization of the economic space of the region occurs "bottom-up" in the process of entrepreneurial search;

– broad framework: not only stimulating R&D but also restructuring the region's economy.

The main instruments and processes for implementing a smart spatial development strategy are clusters; research infrastructure, competence centers, and technology parks; cooperation between businesses and universities.

The main conceptual aspects of the application of smart specialization to the spatial development of the region are:

– the readiness of the regions primarily depends on the role of the regional leadership in the process of forming strategies for the socio-economic development of the region, in its ability to consolidate representatives of scientific spheres and entrepreneurship, who could jointly find those unique types of production activities that determine the smart specialization of regions;

– the leadership of the region alone does not decide on the development priorities of the region, including intelligent specialization, this is clearly stated at the legislative level;

– smart specialization can work and be applied in industry, tourism services, agricultural production, in any other sector of the economy which has an innovative component, great potential, and resources directly in the region; And most importantly, it will distinguish the region from others and help to occupy its unique niche;

– municipal entities may develop their specialization strategies, theoretically, but it should be noted that smart specialization is linked to the involvement of powerful resources (scientific base, institutes, universities, etc.). If such resources, scientific developments, are available in the region, then it will be possible for municipalities to do so;

– the main element of smart specialization is the formation of policies from the bottom up, the regions themselves can attract their stakeholders and define promising directions and specializations;

– all sectors of the region's economy can benefit from the smart specialization of both high-tech and low-tech enterprises;

– the method of smart specialization involves the involvement of all possible players in the market from science, business, and the public, and the process of finding priorities in comparison with foreign experience must last at least a year.

TABLE I. ANALYSIS OF THE FULFILLMENT OF THE CONDITIONS FOR THE APPLICATION OF STRATEGIC PLANNING FOR THE SPATIAL DEVELOPMENT OF THE REPUBLIC OF CRIMEA*

№	**Conditions for the application of strategic planning**	**Performance of the strategic planning environment**
1	Stability of the region's economic space	On the one hand, there is some relative stability in the region's economic space. There are also problematic aspects. 1. Economic sanctions and changing markets. 2. There is no guarantee that the legislation on taxes and charges for members of the Free Economic Zone (FEZ) will remain unchanged. 3. Seasonality of business operations.
2	Development of the economic space. of the region	1. The region is one of the largest tourist and resort-recreation centers in Russia. 2. The region has a shipbuilding industry. 3. The Republic is a major food producer.
3	Significance and importance of territory	The Republic of Crimea is important as a unique and strategically important region of the Russian Federation in the Azov-Black Sea region.

4	The capital intensity of regional enterprises	Enterprises in the construction, food-processing, machine-building, and shipbuilding industries are highly capital-intensive, and the Crimean Republic has a high level of depreciation of fixed assets.
5	Detailed organizational structure for the administration of the Territory	The organizational structures of government in the region have three spheres of application: State, commercial, and public. The lack of coherence in the governance structures of the vertical authority (federation-region-municipality) creates a large number of problems at the center and the points of interaction (industry-territory).
6	Closely related transactions and well-defined business processes	The classifications of the organizational structures of the administration correspond to the organizational forms of management: ministries, departments, committees, associations, joint-stock companies, municipal entities, private and public enterprises, banks, funds, etc. The elements of the organizational structure together form, to some extent, the organizational unity of closely interrelated operations for the realization of a common territorial purpose.
7	Control of the region's economic space	Each administrative organization (State, commercial, public) of the region has its control authorities.

C. Analysis of spatial development of the Republic of Crimea in 2015-2018.

Indicators of the development of the economic space of the Republic of Crimea for 2015-2018 are presented in Table II of the statistics presented in the papers [6-8]. Overall, the indicators presented show a positive development of the regional economic space.

TABLE II. INDICATORS OF THE DEVELOPMENT OF THE REGION'S ECONOMIC SPACE FOR 2015-2018

Indicators of the development of the economic space of the region	**2015**	**2016**	**2017**	**2018**
Gross regional product, RUB bln	266	328	346	391
Growth of the physical volume of GRP% to the previous year	8,5	6,0	4,0	5,1
Share in Russia's gross value added,%	0,40	0,47	0,46	0,46
Fixed capital investments, billion rubles	48	75	196	296
Industrial production index growth,% to the previous year	12,4	4,6	0,1	8,2
Housing construction volume, thousand m2	253	285	834	764
Average monthly salary, rubles	22440	24140	26165	29188

The Republic of Crimea is not only a tourist economic space. According to Krymstat, 33.1% of the gross regional product (GRP) is agriculture, industry, production, and distribution of electricity, water, gas, as well as construction. The share of trade in the GRP is 16.1%, and transport and communications account for another 5% of the GRP [9].

Interestingly, Krymstat does not distinguish tourism itself in the regional GRP. However, if you add up the spheres that relate mainly to tourism: you get 11.7% of the Crimean GRP. In recent years, the GRP of Crimea has been growing very actively and reached 391 billion rubles in 2018 [7, 9].

There have been some structural changes in the industry. As follows from Table II, the growth of the industrial production index in 2018 was 8.2%.

In 2018, 6.14 million tourists visited Crimea. At the same time, the flow of tourists to Crimea is steadily growing, and from 4.6 million in 2015 to 7.43 million in 2019. This means that there is a demand for travel services and there is a solvent buyer.

In the first half of 2020, the situation in the tourism industry of Crimea looked difficult due to the coronavirus pandemic. The agricultural sectors of the Republic of Kazakhstan have reduced the level of agricultural production by 12%. The reason is an acute shortage of water due to the termination of supplies through the canal from Ukraine [9].

Despite the sanctions and the coronavirus epidemic, all industries in the republic are working steadily. The problems of mechanical engineering and electrical industry enterprises are largely associated with outdated technology and wear and tear of fixed assets. In these conditions, the search for new markets, new types of products, and opportunities for attracting investments, and new specialization are critical.

D. Assessment of the spatial development of the region using the Harrington Desirability Function.

For a comparative assessment of the spatial development of the region, it is proposed to identify the specific indicators of the study region, which are the basis for the integrated indicator. Strategic plans in the Republic of Crimea may be developed based on an analysis of the level of development of the region's economic space, the significance of the region for the country, the capital intensity of the region's enterprises, and other factors. That is, based on a multi-criteria assessment.

It is possible to estimate the multi-criteria economic spaces of the regions using specially developed verbal scales. Such scales are applied primarily in cases where estimates are subjective.

Psychophysical scales establish a correspondence between natural values of indicators in physical scales and psychophysical parameters - subjective assessments of the "value" of these values.

Usually, the desirability function d(x) is constructed in such a way that in the most widespread region "satisfactory" is close to linear and at the same time varies from 0 to 1 over the entire possible set of values of the indicator.

The most famous and common is the Harrington Desirability Function [10, 16, 17]. He first introduced it during the quality control of mass production [11]. The Harrington Scale establishes a correspondence between linguistic estimates of the desirability of x and the numerical intervals d(x) (Table III).

TABLE III. HARRINGTON SCALE NUMBER INTERVALS

Linguistic assessment	**The intervals of values of the desirability function d(x)**
Very well	1,00-0,80
Good	0,80-0,63
Satisfactorily	0,63-0,37
poorly	0,37-0,20
Very bad	0,20-0,00

In practice, they are most often limited to three gradations of the Harrington scale corresponding to the linguistic categories "bad", "satisfactory", "good". In this case, the area that corresponds to the level "satisfactory" expands from 0.37 to 0.69, and in the area, "bad" and "good" are characterized by the intervals (0.00-0.37) and (0.69-1,00), respectively.

The Harrington desirability function is given by the following formula:

$$d_i = d(z_i) = \exp[-\exp(-z_i)] \quad (1)$$

$$z_i = \frac{x_i - x_{i0}}{x_{i1} - x_{i0}} \quad (2)$$

where z_i - coded values of the *i*-th indicator, which are dimensionless; x_i - the value of the *i*-th informative indicator; x_{i0} i x_{i1} - boundaries of the area "satisfactory" in the initial scale:

$$d_{i0} = d\big(x_i(z_{i0})\big) = 0.37;\ d_{i1} = d\big(z_i(x_{i1})\big) = 0.69. \quad (3)$$

With the coded value of the informative index *z = 0* (the lower boundary of the region is "satisfactory"), the desirability function takes the value 0.368, with *z = 1*, that is, the lower boundary of the region is "satisfactory", *d(z)* = 0.692. For its construction, it is sufficient that the experts indicate the limits of the initial (initial) indicators $x_{i1} = x_{max}$ i $x_{i0}=x_{min}$, within which the indicator is assessed as satisfactory. In particular, these values can be taken equal to $x_{i1} = x_{max}$ i $x_{i0} = x_{min}$, that is, corresponding to the maximum and minimum values of the indicator for the data array of the investigated subject of the federal district and subjects of the federal district - competitors.

The introduction of the scale of desirability makes it possible to reduce the initial (initial) multicriteria decision-making problems with different-sized criteria to a multi-criteria problem with criteria that are measured in one scale. Therefore, the next step is the folding of the partial desirability functions di into a generalized criterion D. The corresponding generalized criteria are equal to the geometric mean

$$D_1 = D_G = exp\left[\frac{\sum_{i=1}^{n} ln(d_i)}{n}\right] = \left(\prod_{i=1}^{n} d_i\right)^{1/n} \quad (4)$$

and logarithmic mean

$$D_2 = D_L = exp\left[-\left(\prod_{i=1}^{n}(-\ln(d_i))\right)^{1/n}\right]. \quad (5)$$

If the particular criteria are not equivalent, then in formulas (4) and (5), weights are applied.

Since comparison of the criteria, *D(G)* and *D(L)* shows that the generalized criterion *D(G)* gives a stricter estimate than *D(L)*: in the entire domain of definition of particular desirability functions and therefore we will use *D(G)*.

We use the Harrington function (1) to obtain an integral criterion for spatial development (4). For this, we use spatial data: data from the studied region (Republic of Crimea), for which the level of spatial development will be assessed, and data from other regions operating in the Southern Federal District (Table IV).

For the indicators of the spatial development of the subjects of the Southern Federal District for 2017-2018 (without the indicators of the studied region of the Republic of Crimea), the range of changes in the criterion x_{min}, x_{max} is determined, which are substituted into formula 2 ($x_{i1} = x_{max}$ i $x_{i0} = x_{min}$). The calculation of partial and integral indicators is performed in Table IV using formulas (1-3, 4) (Table V).

TABLE IV. SPATIAL DEVELOPMENT INDICATORS OF THE SOUTHERN FEDERAL DISTRICT, 2018*

Subjects of the Southern Federal District	**Gross regional product per capita (rubles) (Z_1)**	**Fixed capital investments (excluding budget funds) (per capita) (rubles) (Z_2)**	**Industrial production indices (as a percentage of the previous year) (Z_3)**	**Indices of production of agricultural products produced (as a percentage of the previous year) (Z_4)**	**Construction production indices (as a percentage of the previous year) (Z_5)**	**Indices of the physical volume of retail trade turnover (as a percentage of the previous year) (Z_6)**
Republic of Crimea	187726,0	53890,8	108,2	88,9	242,5	109,5
Republic of Adygea	219259,4	35456,9	102,9	97,2	147,9	108,8
Republic of Kalmykia	240454,4	32858,7	98,7	95,1	229,2	105,5
Krasnodar region	398397,2	73421,5	104,2	96,0	88,5	102,6
Astrakhan region	413440,6	139988,6	116,2	105,8	82,2	101,5
Volgograd region	305129,9	64263,7	101,7	96,8	64,2	103,4
Rostov region	318782,2	54701,3	109,7	90,4	66,5	103,1
Sevastopol	164978,4	61684,3	129,2	94,3	354,7	101,8

*** Constructed by the author based on the data of Krymstat [6, 8, 9]**

TABLE V. CALCULATION OF HARRINGTON'S DESIRABILITY FUNCTION D(Z) AND GENERALIZED DEVELOPMENT LEVEL D(G) FOR THE REPUBLIC OF CRIMEA AS AN ENTITY OF THE SOUTHERN FEDERAL DISTRICT

Indicators	X_{min}	X_{max}	*Z*	*EXP(-Z)*	*d(z)*	d_0	d_1	D_G
Z_1	164978,4	413440,6	0,09155356	0,91251244	0,40151418	0,368	0,69	–
Z_2	32858,7	139988,6	0,19632334	0,82174649	0,43966312	0,368	0,69	–
Z_3	98,7	129,2	0,31147541	0,73236562	0,48077032	0,368	0,69	–
Z_4	90,4	105,8	-0,0974026	1,10230407	0,33210501	0,368	0,69	–
Z_5	64,2	354,7	0,61376936	0,54130664	0,58198731	0,368	0,69	–
Z_6	101,5	108,8	1,09589041	0,33424186	0,71588062	0,368	0,69	–
								0,476758

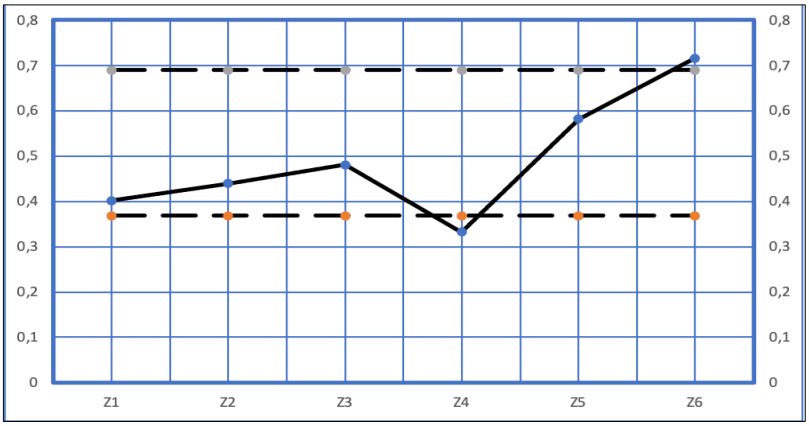

Fig. 1. The graph of the desirability function for the indicators of the spatial development of the Republic of Crimea d(z) is a solid line. Lines above d1 (dash-dotted) and below d0 (dash-dotted) limit the region "satisfactorily" above and below, respectively

Based on the performed calculations, a graph of the Harrington Desirability Function of spatial development indicators for the Republic of Crimea in comparison with other subjects of the Southern Federal District was built (Fig. 1). Indicator Z_4 (agricultural production index) fell into the "bad" zone. As can be seen from Fig. 1, all indicators Z_1 (gross regional product per capita), Z_2 (investment in fixed assets per capita), Z_3 (industrial production indices) are in the "satisfactory" zone, but closer to the "bad" zone. Indicator Z_5 (indices of construction products) is in the zone "satisfactory" closer to the zone "good". Only one indicator Z_6 (indices of the physical volume of retail trade turnover) fell into the zone "good".

In the Republic of Crimea, it is necessary to develop, first of all, agriculture, increase the GRP per capita, develop industry, and increase investment in fixed assets.

The integral indicator of the level of regional development obtained based on the values of the desirability function according to formula (4), has the value $D(G) = 0.4767$, which is within the "satisfactory" zone.

E. Strategy of the spatial development of the Republic of Crimea taking into account prospective economic specialization.

The prospective economic specialization of a constituent entity of the Russian Federation is a set of enlarged types of economic activities (industries).

According to the strategy of the spatial development of the Russian Federation for the period up to 2025, the following main industries in the Republic of Crimea belong to the promising economic specialization [1]:

– tourism - activities of hotels and public;
– food;
– food industry;
– manufacture of electrical equipment;
– crop and livestock production;
– fishing and fish farming.

In line with the implementation of national projects, the Ministry of Economic Development of the Republic of Crimea is carrying out the following main regional projects [12]:

1. "Targeted support for increasing labor productivity at enterprises."

2. "Improving the conditions for doing business"

3. Export of services.

These regional projects are aimed at developing infrastructure facilities in Crimea, normalizing the trade balance, attracting investment in the economy, developing entrepreneurship, and creating new jobs.

A free economic zone functions in the Republic of Crimea, as a zone of outrunning economic growth. According to the Ministry of Economic Development of the Republic of Kazakhstan, by the beginning of March 2019, 1333 agreements on the implementation of projects were concluded with 1285 participants in the FEZ [13].

The development strategy of the Republic of Crimea until 2030 provides for economic diversification; development of high-tech industries; creation of high-performance jobs in service industries; modernization of the agro-industrial complex [14, 15].

III. Conclusion

1. The conditions of strategic planning in the economic space of the region are determined: the development of the economic space, the region, the value of the territory, the capital intensity of the enterprises of the region, the detailed organizational structure of the territory management, closely interrelated operations, control of the economic space of the region.

2. The principles and main aspects of spatial development based on the concept of smart specialization are considered, aimed at increasing the "consciousness" of innovative development in the region.

3. The indicators of the development of the Republic of Crimea in recent years have been studied and the positive dynamics and growth of GRP and related indicators have been revealed.

4. Accordingly, the strategy of spatial development in the Republic of Crimea should be aimed at increasing the values of the following indicators: first of all - Z_4 (index of agricultural production), then - Z_1 (gross regional product per capita), Z_2 (investments in the main capital per capita) and Z_3 (industrial production index).

5. The main further directions of the republic's spatial development have been determined: the creation of the tourism industry of an international level, the creation of effective innovative industries, the expansion of the service sector; modernization of enterprises of the agro-industrial complex.

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