

*Research article*DOI: <https://doi.org/10.48554/SDEE.2021.2.4>**ECONOMIC SECURITY AND INNOVATIVE COMPONENT OF A REGION:
A COMPREHENSIVE ASSESSMENT**Andrey Zaytsev^{1*}, Pak Khe Sun², Olga Elkina², Tatiana Tarasova³, Nikolay Dmitriev¹¹ Peter the Great St.Petersburg Polytechnic University, Russian Federation, zajtsev.aa@spbstu.ru or andrey_z7@mail.ru, dmitriev_nd@spbstu.ru² Saint Petersburg State University of Economics, Russian Federation, natali-pak@yandex.ru, phdel-kina@mail.ru³ North-West Institute of Management of the Russian Academy of National Economy and Public Service under the President of the Russian Federation, St.Petersburg, Russian Federation, tarasova-tn@ranepa.ru

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Abstract

This article is devoted to designing a comprehensive assessment of the level of economic security of a region, taking into account its innovative component. The relevance of the study is supported by the need for a more detailed consideration of certain aspects of economic security to improve the efficiency of the functioning of the subjects of the Russian Federation and create favourable conditions for their economic development from a strategic perspective. The goal of this article is to determine a comprehensive assessment of the level of economic security of the subjects belonging to the Northwestern Federal District of the Russian Federation, as well as analysing the contribution of each region to ensuring national and economic security. To design a comprehensive assessment of the level of economic security of a region, it is proposed to average the normalized values of all indicators employing the simple average method. The method used is the basis of the rating approach of the European Commission employed for designing a comparative assessment of the level of innovative development of the EU regions, which makes it possible to adapt it to the Russian conditions, taking into account the specifics of the domestic economic system. As a result of the study, the criterion boundaries of the integral indicator for assessing the level of economic security were established, which allowed comparing the territorial entities within the region under consideration and identifying the level of secure development of the territory in the economic sphere. The result of the implementation of the proposed methodology was an assessment of the economic security level of regions. The proposed methodology for a comprehensive assessment of the economic security of the territory is characterized by efficiency, simplicity, and accessibility and also takes into account the innovative aspect of the development of a territory. The results obtained enable one to use the developed methodology to solve a wide range of issues to ensure the economic security of a region.

Keywords: sustainable development of a region, indicators of economic security, threshold parameters, regional infrastructure, innovative component of a region, assessment of economic security.

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ЭКОНОМИЧЕСКАЯ БЕЗОПАСНОСТЬ И ИННОВАЦИОННАЯ СОСТАВЛЯЮЩАЯ РЕГИОНА: КОМПЛЕКСНАЯ ОЦЕНКА

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Аннотация

Данная статья посвящена построению комплексной оценки уровня экономической безопасности региона с учетом ее инновационной составляющей. Актуальность исследования подтверждается необходимостью более детального рассмотрения отдельных аспектов экономической безопасности для повышения эффективности функционирования субъектов РФ и создания благоприятных условий их экономического развития в стратегической перспективе. Цель статьи заключается в определении комплексной оценки уровня экономической безопасности субъектов РФ Северо-Западного федерального округ, а также в проведении анализа вклада каждого региона в обеспечение национальной и экономической безопасности. Для определения комплексной оценки уровня экономической безопасности региона предлагается произвести усреднение нормализованных значений всех показателей индикаторов методом простого среднего. Используемый метод лежит в основе рейтингового подхода Европейской комиссии для определения сравнительной оценки уровня инновационного развития регионов ЕС, что позволяет адаптировать его к российским условиям, учитывая специфику отечественной экономической системы. В результате исследования были установлены критериальные границы интегрального показателя оценки уровня экономической безопасности, которые позволили провести сопоставление территориальных образований, входящих в анализируемый регион, и выявить уровень безопасного развития территории в экономической сфере. Представленная методика комплексной оценки экономической безопасности территории характеризуется действенностью, простотой и доступностью, а также учитывает инновационный аспект развития территориального образования. Полученные результаты позволяют использовать выработанную методику для решения обширного круга вопросов обеспечения экономической безопасности региона.

Ключевые слова: экономическая безопасность региона, устойчивое развитие региона, показатели экономической безопасности, пороговые параметры, региональная инфраструктура, инновационная составляющая региона, оценка экономической безопасности.

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1. Introduction

Despite the adoption of national and economic security (ES) strategies in the Russian Federation, the fragmented essence of the measures implemented within the framework of these documents is clearly visible. Firstly, it should be noted that there are a number of unresolved problems in the field of ES management of regions: ES indicator systems of development of the subjects of the Russian Federation and municipal entities and their threshold parameters have not been approved, and monitoring studies on the management of ES of territorial entities are imperfect (Moros, 2020). These conditions increase the relevance of creating effective and accessible methodological approaches to assessing the ES of a territory in the system of its ensuring at the regional level.

The purpose of this study is to design a comprehensive assessment of the level of ES of the subjects of the Russian Federation within the Northwestern Federal District (NWFD), taking into account the innovative component, as well as analysing the contribution of each region to ensuring ES at the national level. To this end, the following tasks were solved:

- A system of indicators for assessing the level of ES of a region has been formed, which should contain a minimum list of indicators for a specific time interval (one year in this study), available for processing and corresponding to socioeconomic indicators of the region's development.
- Threshold parameters for the indicators of the ES of a subject of the Russian Federation within the NWFD were established.
- A comprehensive assessment of the level of ES of the subjects of the Russian Federation within the NWFD was designed.

The object of the study is the subjects of the Russian Federation within the NWFD. The subject of the study is the ES of the subject of the Russian Federation. To build an analytical base, the data of the Federal State Statistics Service of the Russian Federation of the NWFD on the socioeconomic situation of the subjects were tested.

2. Literature review

The transformation of economic relations and institutional transformations dictate the need to rebuild the economic system, and the key role in improving economic efficiency belongs to the innovative potential (Rakhmeeva, 2020). In the context of globalization, a powerful innovative potential is needed to ensure the ES of territories, which prevents the emergence of not only traditional but also non-traditional threats: slave trade, international terrorism, shadow international sector activities, production and sale of drugs, cyberattacks, piracy, water shortages, environmental disasters, pandemics, etc. (Griman, 2015). The increasing importance of intangible assets at the entrepreneurial level also affects the functioning of higher levels of management, including regional structures. Intellectualization as a way of creating innovative capacity is already a driving force for progress and creation of conditions for maintaining the ES (Dmitriev et al., 2020b). However, current ES assessment methodologies are not sufficiently suitable for working out the role of innovative elements in strategic support.

The essence of the ES of the subjects of the Russian Federation lies in ensuring it through the actions of regional authorities and management by effectively employing the socioeconomic potential of the territory, including its innovative potential, which will lead to the acceleration of economic growth,

boost the competitiveness of the region, and ultimately improve the quality of life of the population. The key influence of these elements and the innovative potential itself on the ES indicators of a region has been considered in a number of studies, for example, in Pak et al. (2017), Ivleva et al. (2016), and Pak et al. (2018). The results obtained made it possible to judge the possibility of drawing parallels between the assessment of the safety of socioeconomic development and the effective use of the economic potential of the region, which allows taking into account an expanded number of indicators in the process of improving the quality of the ES indicator system.

Thus, to improve the existing system of ensuring the ES of the region, it is advisable to develop indicator and monitoring systems, which cannot be done without an appropriate integrated assessment apparatus (Denezhkina and Suzdaleva, 2011). The complex assessment of the ES should contain the elements of sustainable development, as without it, forming the approaches and methods of strategic development of a territory in the current macroeconomic environment becomes impossible.

The relationship between sustainable and safe development of the territory is confirmed in many studies, for example, in the work of Kirshner (1998), which necessitates the solution of an entire range of issues related to ensuring the ES of regions, including the problem of assessing its level. Also, his colleagues Neu and Volk are among the few Western authors who, at the end of the last century, noted in their works that one of the main components of national security is socioeconomic security (Neu and Volk, 1994).

A study of current methodological approaches to the assessment of ES showed that most of them employ a list of indicators and threshold values based on the assumption that the value of the corresponding indicator outside the established parameter indicates the emergence of threats to the economic interests of the region (Chernogorskiy et al., 2020; Chueva et al., 2017; Ionova, 2017). From the point of view of the authors, the analysis of the state of ES requires methods that utilize indicators that can provide a more multifaceted assessment and evaluate the qualitative aspects of the negative impact.

In this context, the methodology for assessing negative impacts, based on the tools of probability theory, in which the relationship between the financial resources of the region and business entities is noted, is prospective. However, the complexity of the algorithm for calculating a comprehensive assessment – due to the use of a large amount of information on the state of socioeconomic development of the region, forecasting, and assessing the consequences of negative impacts – complicates its practical implementation and operational management of the region (Feofilova, 2014; Leksin and Profiryev, 2017). A multifaceted methodology for assessing the ES, proposed by Syupova and Bondarenko (2019), which defines the components of the ES of a region – production, scientific and technical, investment, and social and demographic security with the appropriate indicators – is also worth noting. With the simplicity of calculations, the downside of many practical methods lies in the complexity of their implementation due to a significant volume of information.

Many researchers (Dyuzhilova and Vyakina, 2015; Mityakov et al., 2013; Rodionov et al., 2018) have based the formation of ES indicators on the postulate that ES is determined by its potential, ability to ensure protection and sustainable development. Other authors (Cheremisina, 2013; Mojseyenko et al., 2013) have noted that in the assessment of the ES of the region, it is necessary to take into account the level of sustainable growth of the economy, the financial system, the development of scientific potential, etc. In the work of Dyuzhilova and Vyakina (2015), when assessing the ES, “pain points” that can become a source of threats to the region are identified.

In the practice of forming a system of indicators for assessing the level of ES of a territory, scientists do not always include indicators that characterize the innovative level of development of the region, i.e. the innovative component of the ES. Such a flaw is noteworthy since it is the innovative

component that is the key element in the transition of the economy from the extractive path of development to the innovative one, which is important for the Russian economic system. In particular, the need to highlight the innovative component was defined in the “National Security Strategy of the Russian Federation: Decree of the President of the Russian Federation” (2017).

The study of existing methodologies allows us to conclude that there is no universally recognized method for assessing the ES of a region. Therefore, it is advisable to start the search for a complex approach to determining the level of ES of a region, which will enable stakeholders to judge the investment and innovation attractiveness of the region and compare the subjects of the Russian Federation by the level of their ES to determine the contribution of each subject of the Russian Federation in strengthening the ES development of the Federal District and the country as a whole. These conditions are a logical continuation of the research (Pak et al., 2017, 2018).

3. Materials and methods

3.1. Methodology of the study

The study proposes a comprehensive assessment of the level of ES of a region, which is most often used in similar works and meets the requirements presented.

The algorithm for calculating a comprehensive assessment consists of the following stages:

1. Normalization (level of significance) of each indicator will be carried out by determining the ratio of the actual indicator to the threshold parameter (coefficient) if an increase in the corresponding indicator is desirable; if a decrease in the indicator is desirable, then the threshold parameter is correlated with the actual one (e.g. for the level of unemployment, crime, etc. indicators); i.e. the threshold parameter is taken as a unit. The result is an opportunity to move away from the ES assessment by simply analysing the quantities and bringing them to a comparable level relative to the specified thresholds.

In this manner, a type of grouped indicator comparable in strategic areas provides an opportunity to conduct a comparative analysis and determine criteria that reflect the state of regional security. Meanwhile, normalizing and determining the level of significance is possible on the basis of various criteria, the formation of which is built both on the basis of an in-depth analysis of particular indicators and by constructing integral metrics. At the same time, the ratio of actual and threshold values will facilitate a systematic approach to the assessment of indicators that have mathematically determined units of measurement and allow normalization relative to the threshold value, which is taken as a unit.

2. A comprehensive assessment of the level of ES of a region is determined by averaging the normalized values of all indicators using the simple average method. This method is the basis of the rating approach of the European Commission for designing a comparative assessment of the level of innovative development of the regions of the European Union.

The scale of the proposed integrated assessment of the level of ES of a region is adaptive and can be subject to significant dynamics depending on the average values at the interregional level. At the same time, this approach allows taking an objective look at the essence of ES, highlighting the problematic position of the attributes of regional stability. The obtained values provide an opportunity to design mechanisms for identifying and responding to real and potential threats in the ES system, determining the presence of interval deviations from the reference values of ES (Shokhnekh et al., 2020). A comprehensive assessment is based on a number of coefficients that can be changed to provide more complete calculations of sustainability and security at the regional level (Edmonds et al., 2017).

The methodological basis for determining the sustainability and safety of territorial development is the use of specified indicators and integral criteria. At the same time, indicators should be considered through an analysis of growth rates since obtaining quantitative data may not always lead to the possibility of developing objective recommendations. In many respects, integral criteria provide a fairly clear and rational management basis, which is useable for mathematical calculations of the ES. However, the integral criteria are not sufficiently developed in the methodology – only in the case of the correct adjustment of the coefficients, it becomes possible to obtain a balanced assessment and identify bottlenecks in the ES (Senatro et al., 2015; Foltin, 2017). Thus, the study of the ES of a region determines the relevance of studying a broad range of indicators, which, through the calculation of indicators, provides specific information on key aspects of the socioeconomic state of the territory. Making this model more complex will provide the opportunity to calculate the ES of both the region as a whole and its individual component indicators, the monitoring of which, to a greater extent, reveals the nature of the ongoing processes and reflects the causes or consequences of existing threats. Consequently, the complications of a comprehensive assessment by analytical and information indicators strongly complement the overall picture of the state of the ES of regions and the course of processes.

3.2. Innovative development index (IDI) calculation method

The study employs the IDI of a region, which is determined through the rating method. This method is a product of the collective work of the Association of Innovative Regions of Russia (AIRR), the Ministry of Economic Development of the Russian Federation, and the administrations of the subjects of the Russian Federation¹. The method is based on determining the level of innovative development of a region using 29 indicators and is used by the regions as a real management tool. The basis for the formation of this rating is the methodological approach of the European Commission, using which a comparative assessment of the level of innovative development of the EU regions is determined. The methodology for forming the rating of innovative subjects of the Russian Federation is scientifically substantiated and uses official statistical data of the Federal State Statistics Service.

The methodology consists of the following blocks:

1. The “research and development” block consists of indicators, the main of which are the following: internal costs for research and development as a percentage of gross regional product (GRP), %; share of funds of business organizations in the total volume of internal expenditures on research and development, %; the number of articles published in journals indexed in WoS (Web of Science) to the number of researchers; the number of international PCT (Patent Cooperation Treaty) applications submitted to the workforce numbers (EAN - economically active population), etc.

2. The “innovative activity” block consists of the following indicators: the share of organizations that carried out technological innovations in the total number of organizations, %; the share of innovative goods, works, services in the total volume of shipped goods, works, services, the volume of revenues from the export of technologies in relation to GRP; the intensity of expenditure on technological innovations, %, etc.

3. The “socioeconomic conditions of innovative activity” block consists of the following indicators: the coefficient of renewal of fixed assets; GRP per person employed in the economy; the share of people employed in high-tech activities in the total number of people employed in the economy; the share of products of high-tech industries in the GRP, %; the share of organizations that used the Internet at a speed of at least 2 Mbit/s in the total number of surveyed organizations, etc.

¹ Rating of Innovative Regions of Russia [WWW Document], 2018. Association of Innovative Regions of Russia. Available at: <http://www.gks.ru>

4. The “activity of the region in the innovation sphere” block consists of the following indicators: the volume of budget investments (federal budget) in the regional innovation sphere to the volume of GRP; the level of innovative activity of the authorities and management of the constituent entities of the Russian Federation; the degree of participation of corporate structures in the development of clusters and technoparks, etc.

According to the rating results, the group of strong innovators is headed by St. Petersburg. In total, this group includes eight subjects of the Russian Federation: St. Petersburg, the Republic of Tatarstan, Moscow, Tomsk, Novosibirsk, Kaluga, the Moscow Region, and the Nizhny Novgorod Region. The Ulyanovsk, Lipetsk, Samara, Tyumen Regions, the Republics of Bashkortostan and Mordovia, the Perm and Krasnoyarsk Territories, and others (a total of 21 subjects of the Russian Federation) make up a group of medium-strong innovators. Altai, Stavropol, Krasnodar Territories, Irkutsk, Kirov, Leningrad, Arkhangelsk, Kursk and Kurgan Regions, and others (a total of 21 subjects of the Russian Federation) make up a group of medium innovators. Sevastopol, the Republic of Crimea, the Khanty-Mansi Autonomous Okrug–Yugra, and others (a total of 26 subjects of the Russian Federation) represent a group of medium-weak innovators. The group of outsiders is headed by the Nenets and Chukotka Autonomous Okrugs and the subjects of the North Caucasus.

The top three in sub-rankings are the following:

1. Moscow, St. Petersburg, and Tomsk region in the field of research and development
2. Republic of Tatarstan, Nizhny Novgorod region, and St. Petersburg in the field of innovative activities of organizations
3. Moscow, Kaluga region, and St. Petersburg in the field of creating socioeconomic conditions for innovation
4. Novosibirsk and Tomsk regions and the Republic of Tatarstan in the field of innovative activity of the subject of the Russian Federation

The presented analytical tool for determining the level of innovative development of the region clearly shows the regional authorities and management, the strengths and weaknesses of innovation systems, and the directions and dynamics of innovative development in all established indicators. It is also possible to determine that the innovation component plays a strategic role in ensuring ES and implementing the concept of sustainable development of the territories of the Russian Federation. Nevertheless, in the ongoing studies of assessing the level of ES, this aspect is practically not taken into account, which creates inaccuracies in making organizational decisions on the management of territories.

3.3. Approaches to solving problems

To assess the level of ES of a region, a number of indicators and threshold parameters from the methods of Abalkin (2002) and Glazyev (1997, 2015), ES indicators of Oleynikov (2014), and socioeconomic indicators presented in the Strategy of Economic Security of the Russian Federation for the period up to 2030 and the Strategy for Socioeconomic Development of the Northwestern Federal District² are used. Aggregation of various indicators allows justification of the most significant parameters for characterizing a particular region by the level of its ES. At the same time, within the framework of the study, it is proposed to construct the author’s approach on the basis of the use of generally accepted and well-established scientific tools. However, calculation of the ES is often carried out to determine the state of economic insecurity, for example, by forming index metrics and identifying problem states

² On approval of the Strategy of Socio-economic Development of the North-Western Federal District for the period up to 2020: Order of the Government of the Russian Federation N 2074-r, 2011.

(Hacker et al., 2014). Improving metrics and departing from the standardized integral approach allow forming a new potential for “convolution” of indicators that can be interchanged, which will provide certain opportunities for reduction of correlation influence of one of the normalized indicators and will ensure its full compensation through the allocation of new values of normalized indicators, setting their high importance for obtaining a comprehensive assessment.

These include the following indicators:

1. GRP per capita. This reflects the level of the economic potential of the region. A multi-criteria security assessment includes an assessment of the economic potential of the region and determines the effectiveness of its application. The economic potential determines the material base for the secure development of the territory. When determining the effectiveness of using the economic potential of the territory, a search for reserves by the main factors affecting the level of security of the region’s development is conducted (Ivleva et al., 2016). The threshold parameter is the highest value of this indicator among the regions (GRP per capita of the Nenets National District); i.e. the method of analogies (comparison of indicators with reference values) is used.

2. Industrial production index (IPI). It characterizes the dynamics of industrial production and reflects the change in production volumes in key industries, such as mining, electric power, gas and water supply, and manufacturing industries. The added value of these industries is the GRP of the region. Consequently, when the growth rate of the IPI is greater than the growth rate of the GRP and the GDP, then these industries are increasing the volume and production rates; otherwise, the industries are in the stage of reducing the growth rate of production. The threshold parameter is taken as the highest IPI among the regions of the Russian Federation (115% in the Krasnodar Territory).

3. Labour productivity index (LPI). It is the main indicator of the effectiveness of a region’s management, which significantly affects the pace of economic growth. In accordance with the methodology of the Federal State Statistics Service³, it represents the ratio of the GRP physical volume index to the total labour cost index for the region. Stakeholders pay special attention to this indicator. The threshold parameter is the highest LPI among the regions (113% in the Jewish Autonomous Region).

4. Degree of depreciation of fixed production assets. This is one of the key indicators of industrial safety; therefore, an important problem in managing the socioeconomic development of the region is the determination of the optimal ratio of investments in fixed assets, which is directed to the expansion, reconstruction of the main production, and new construction, since the degree of depreciation of funds can be used to judge the competitiveness of the industrial complex of the region. The threshold parameter is 60% (Glazyev, 1997).

5. The ratio of investments to the GRP. Investments in fixed assets determine the efficiency of the real sector of the economy. On the one hand, an increase in the volume of investments in fixed assets increases the volume and growth rate of the GRP; on the other hand, the growth in the volume of the GRP creates conditions for future investments. Also, the growth in the volume of investments in fixed assets is the main factor in the technological development of the industrial complex of the region. The threshold parameter is 25% (Glazyev, 1997).

6. Innovative development index (IDI). Using the IDI, the level of innovative development of the region is determined. As a real management tool, the IDI is defined using 29 indicators, which are grouped into the following blocks: research and development, innovative activity, socioeconomic conditions of innovation activity, and activity of the region in the innovation sphere. The threshold parameter is the highest IDI (0.68 in St. Petersburg).

³ On approval of the methodology for calculating the indicator “labour productivity index”: Order of Rosstat, 2018.

7. Unemployment rate. This determines the threat to the ES of the region in the social sphere. This indicator can be used to judge not only the state of the labour market but also the state of social health of the population living in the region. The unemployment rate is the ratio of the number of unemployed to the number of workforces (EAN) in percentage. The threshold parameter is 8% (according to the research of the International Labour Organization).

8. Fund ratio. This determines the level of social stratification. A sharp differentiation of the incomes of the population in the regions of the Russian Federation negatively affects the economic growth of the territories. This indicator is determined by the ratio of the average level of monetary incomes of 10% of the population with the highest incomes to 10% of the population with the lowest incomes. The threshold parameter is 10:1, based on international comparisons (Mityakov et al., 2013).

9. Share of population living below the poverty line. As one of the negative factors of the ES of a region, this creates conditions for the emergence of social conflicts in society. This indicator is determined by the ratio of the number of people whose incomes are below the subsistence minimum to the total number of the population in percentage. The threshold parameter is 10%, based on international comparisons (Mityakov et al., 2013).

10. Crime rate. This is one of the negative factors of the ES of a region. The increase in the crime rate is influenced by the growth in the number of people living below the poverty line and the number of unemployed. This indicator is determined by the sum of the crimes committed and their participants per certain population, for example, per 100 thousand people. The threshold parameter is 5 thousand crimes per 100 thousand people (Glazyev, 1997).

11. Life expectancy at birth. It is a social indicator of the ES used to assess public health. Life expectancy at birth is the number of years that an average person from the generation of births would have to live, provided that, throughout the life of this generation, age-related mortality remains at that level (Glazyev, 1997). The threshold value is 70 years.

12. Level of debt burden. The growth of this indicator indicates the emergence of a threat to the ES. In the Strategy of Economic Security of the Russian Federation until 2030, this indicator is absent; however, the high level of the debt burden creates conditions for the emergence of threats to the financial security of the region. This indicator is the ratio of the region's public debt to its own budget revenues in percentage. As a threshold parameter, we use the lowest value of this indicator among the regions (2.8% in the Leningrad region).

The above list of indicators can be used in the system of indicators for assessing the level of ES of a region since they fully reflect the specifics of the activities of the territories. The number of proposed indicators corresponds to the recommended standards for conducting reasonable calculations without unduly complicating the calculation system. At the same time, it is advisable to expand the methodology for taking into account the parameters of the region in the future, in particular, by taking into account specialization and differentiating states; however, such an approach will lead to a complication of the methodology and will not allow obtaining brief data for comparative analysis. The main advantage of the presented minimum indicators is the possibility of their rapid processing by specialists, practitioners, and novice researchers without the use of special technical means, which will allow us to assess the socioeconomic development of a region in the time interval under consideration and draw conclusions for comparative analysis without excessive in-depth study.

Table 1. Complex assessment of the level of ES of the subjects of the Russian Federation in the NWF for 2019

	Threshold parameter	Republic of Karelia	Republic of Komi	Arkhangelsk Region	Vologda Region	Kaliningrad Region	Leningrad Region	Murmansk Region	Novgorod Region	Pskov Region	St. Petersburg
GRP per capita, % of the highest in the Russian Federation	100	0.06	0.108	0.102	0.068	0.067	0.085	0.094	0.070	0.038	0.116
IPI, %	115	0.90	0.885	0.860	0.917	0.893	0.910	0.909	0.883	0.890	0.914
LPI, %	113	0.92	0.881	0.921	0.909	0.910	0.934	0.904	0.927	0.919	0.888
Degree of depreciation of fixed assets, %	60	1.15	1.220	1.169591	1.156069	1.899	1.351	1.357	1.3071895	1.3071895	1.500
Ratio of investment to the GRP, %	25	0.65	0.882	1.029	1.176	1.250	1.934	1.297	0.886	0.827	0.773
IDI	0.68	0.49	0.515	0.603	0.544	0.559	0.603	0.500	0.662	0.456	1.000
Unemployment rate, %	8	0.92	1.096	1.250	1.569	1.702	1.951	1.176	1.905	1.404	5.333
Fund ratio	10	1.06	0.800	0.800	0.980	0.952	0.893	0.952	1.020	0.990	0.680
The share of the population living below the poverty line, %	10	0.64	0.671	0.741	0.735	0.730	1.190	1.010	0.725	0.588	1.515
Crime rate, amount of crimes per 100 000 people	5000	2.60	2.513	2.914	3.294	3.621	4.184	3.117	2.786	3.997	5.203
Life expectancy at birth, years	70	1.01	1.015	1.030	1.020	1.042	1.044	1.024	1.004	1.002	1.085
Debt burden level, %	2.8	0.04	0.079	0.052	0.092	0.049	1.000	0.089	0.041	0.036	0.528
Complex assessment of the level of ES of the subject of the Russian Federation		0.87	0.89	0.96	1.04	1.14	1.34	1.04	1.02	1.04	1.63

4. Results

The results of the analysis are summarized in Table 1, which presents a comprehensive assessment of the level of ES of a region and the normalized values of indicators.

1. St. Petersburg, the leader among all regions of the country in IDI (0.68), holds the first place in terms of the ES level. It is taken as a threshold parameter for this indicator. A high IDI has a positive impact on the value of the comprehensive assessment. This once again confirms that the innovative component is one of the key factors in ensuring ES. A sharp differentiation of federal districts by the level of economic development demonstrates that a high degree of innovative development is observed only in the locomotive regions (Moscow, the Moscow Region, the Republic of Tatarstan, the Kaluga Region, etc.): in the Central, Northwestern, and Volga Federal Districts. The IDI, together with the lowest unemployment rates, poverty, and crime in the NWFD and the highest life expectancy and the lowest level of debt burden, puts St. Petersburg in the first place in terms of ES.

2. The second place is occupied by the Leningrad region. This region, in difficult economic conditions for the country, has maintained social stability and positive dynamics of development. During the analysed year, the main task of the budget policy of the Leningrad region – ensuring balance and maintaining financial stability – was successfully implemented. Since 2002, this region has been a financial donor. However, the following indicators of the ES level (5 out of 12) do not meet the established threshold parameters: 1. The volume of GRP per capita, its percentage of the highest indicator for the Russian Federation, is only 8.52%; 2. IPI, 104.6% against the threshold parameter of at least 115% (the highest IPI among the regions of the Russian Federation); 3. LPI, 105.5% against the threshold parameter of 113% (the highest LPI among the regions of the Russian Federation); 4. IDI, 0.41 against the threshold parameter of 0.68 (the highest IDI among the regions of the Russian Federation); 5. the ratio of funds is 11.2:1 against the threshold parameter of 10:1. The region has one of the lowest debt burden indicators, which significantly affects the value of the comprehensive assessment. The region is the leader in the ratio of investments to GRP indicator. In recent years, the region has been in the top 10 in terms of investment. The share of investments in GRP is a record 48% in 2019 (e.g. in newly industrialized countries, it exceeds 30%). The Leningrad region is in the top 10 in terms of investment per capita. The remaining indicators correspond to the set threshold parameters.

3. The third place is occupied by the Kaliningrad region, which has the lowest degree of depreciation of fixed production assets, 31.6% against the established threshold parameter of 60%. This indicates the competitiveness of the industrial potential of the region and the growth of investments in fixed assets. The ratio of investments in fixed assets to GRP is above the established threshold parameter. The regime of the special economic zone, which has been in force since the 1990s and is extended until 2031, creates all the necessary conditions for attracting investment. The implementation of priority areas for the development of the Kaliningrad region is reflected positively in the level of unemployment and crime, reducing the degree of social stratification of the population and increasing life expectancy. Despite the growth of human capital and the stimulation of scientific and innovative activities, the poverty level has exceeded the threshold. The volume of GRP per capita, LPI, IPI, IDI, and the level of debt burden did not reach the established threshold parameter.

The fourth place is occupied by three subjects of the Russian Federation: the Vologda Region, the Murmansk Region, and the Pskov Region.

4.1. Vologda Region. It ranks fourth in the country in terms of investment growth. In terms of investment activity, the region is among the 10 leading regions. Over the past five years, the volume of investments has increased by 1.75 times. The ratio of investments to the GRP exceeds the established threshold of 29.4. The volume of investments in fixed assets is growing annually, but the degree of depreciation of fixed assets is still high, especially in industries such as pulp and paper, mechanical engineering, and chemical. This indicator is still within the limits of the set parameter and is 51.9%. In the region's economy, production is modernized on the basis of the cluster approach. In the region, there are such support clusters as forestry, construction, agriculture and food, and recreational. The development of the cluster complex of the region created conditions for reducing unemployment, crime, significant differentiation of incomes of the population, and increasing the life expectancy of the population of the region. Nevertheless, a number of indicators, such as the volume of GRP per capita, LPI, IPI, IDI, and the level of debt burden, have not reached the established threshold, and the poverty level exceeds the threshold.

4.2. Murmansk Region. The main vector of the development of the region's economy is the Arctic. The port of Murmansk and its water areas in the spring of this year will receive the status of a territory of advanced development. In terms of GRP per capita, the region ranks 5th in the district and 17th among the subjects of the Russian Federation. In the GRP structure, the share of industry is 35%, including the share of extractive industries, which is more than 50%. More than 171 billion rubles of investments in fixed assets were allocated for the development of the economy and social sphere of the Murmansk region in 2019, including the own capital of businesses, accounting for more than 46% of this investment volume. More than 80% of the volume of investment is directed to the sphere of industry and transport. Fixed assets in key industries are being actively upgraded in the region. The degree of depreciation of fixed assets of the region is lower than in many regions of the district and does not exceed the threshold parameter, which affects the ratio of investments in fixed assets to the GRP indicator, which exceeds the established threshold. This is the only region in the county where the values of social indicators are within the set parameters.

4.3. Pskov Region. The industrial complex includes 199 large and medium-sized enterprises. The basis of the complex is made up of enterprises of "processing industries." The growth rate of industrial production has been increasing since 2015. The cluster approach in industry is the main direction for the strategic development of its industry. Although the indicators of the degree of depreciation of fixed assets, the ratio of investments in fixed assets to GRP, the level of unemployment, crime, and the coefficient of funds correspond to the established threshold parameter, the region is characterized by high levels of poverty and debt burden among the subjects of the Russian Federation within the NWFD.

Other regions of the NWFD:

5. Novgorod Region. In the region, the volume of industrial production is growing consistently (above the national average). There are several new projects for the development of industry, which should improve the employment situation in the region. Historical problems include low standard of living, outflow of population from the region, and lack of newly created jobs. The volume of investments in 2019 decreased compared to the previous year (mainly in processing). The ratio of investment to the GRP indicator has not reached the established threshold parameter (25%); it is 22%. The index of innovative development is quite high. The region ranks second in this indicator among the regions of the NWFD of the Russian Federation. The value of indicators of the degree of depreciation of fixed assets, the level of unemployment, crime, social stratification of the population, and life expectancy do not go beyond the values of the established threshold parameter. The remaining ES indicators do not meet the set threshold.

6. Arkhangelsk Region. Indicators of the ES of the region, such as the degree of depreciation of fixed assets, the ratio of investments to the GRP, the unemployment rate, crime, and life expectancy, do not go beyond the established threshold. Nevertheless, this region is characterized by a low level of renewal of fixed assets (the value of their depreciation indicator approaches the established threshold value), and unemployment is growing (6.4% against the established 8%).

7. Komi Republic. The value of ES indicators, which do not go beyond the values of the established threshold parameters, is inherent in indicators such as the degree of depreciation of fixed assets, the level of unemployment, crime, and life expectancy. Despite this, it should be noted that the unemployment rate (7.3%) is approaching the threshold parameter (8%); in terms of the number of crimes committed, the republic ranks first among the regions of the district; it has the lowest LPI. The republic has a large proportion of the poor population. According to this indicator, the region ranks second among the subjects of the Russian Federation in the district. The positive aspect is that in terms of GRP per capita, it ranks second among the subjects of the Russian Federation in the district.

8. Republic of Karelia. The basis of the region's economy is the mining and processing industries. In terms of GRP per capita, the republic ranks ninth among the regions of the district. The region has the lowest comprehensive assessment of the level of ES. Only the values of four indicators (the degree of depreciation of fixed assets, the coefficient of funds, life expectancy, and crime rate) do not go beyond the established threshold. The region has the highest unemployment rate (according to the experts' opinion, the main reason is that the level of qualification of the unemployed does not correspond to the proposed vacancies), respectively, the high level of poverty; in terms of the number of crimes committed and the level of debt burden (the budget of the subject of the Russian Federation is very dependent on transfers from the federal budget), it ranks second among the regions of the NWFD. The ratio of investments in fixed assets to the GRP indicator is the lowest compared to other regions of the district. The main reasons for the low investment activity of the region are the proximity of investment-attractive territories (Finland, St. Petersburg); high costs of construction and doing business are associated with the fact that the republic belongs to the territories of the Far North; constant outflow of the population; undeveloped deposits of minerals necessary for the development of the industry; and low level of energy supply in the region.

According to the established criterion boundaries of the integral indicator, St. Petersburg (1.63), Leningrad Region (1.34), and Kaliningrad Region (1.14) have a high level of ES of the region (comprehensive assessment is over 1.05). The Vologda, Murmansk, and Pskov regions have the same score, 1.04, with the Novgorod Region being at 1.02. Assessment of secure development of these subjects is included in the established limit of 1–1.04, which describes them as regions with a normal level of secure development in the economic sphere. The remaining subjects of the Russian Federation (the Republic of Karelia, the Komi Republic, and the Arkhangelsk Region) belong to regions with a low (pre-crisis) level of ES (comprehensive assessment ranges within 0.70–0.99).

The application of the proposed comprehensive indicator to the assessment of the level of ES demonstrates additional opportunities for identifying relationships between indicators and determining priority areas for the development of territories. As a justification for the need to include the IDI in the comprehensive assessment of the ES of a region, confirming our conclusions, we conducted a correlation analysis of the relationship between the integrated assessment of ES and ES indicators (Table 2).

Table 2. Close relationship between the complex assessment of ES of the region and indicators of ES

	Correlation ratio (r)	Number of degrees of freedom (f)	t-Student's criterion	Statistical significance of feature dependence (p)
GRP per capita, % of the highest in the Russian Federation	0.307	1.125	2.306	0.297499
IPI, %	0.512	1.686	2.306	0.135651
LPI, %	-0.148	0.422	2.306	0.685686
Degree of depreciation of fixed assets, %	0.468	1.500	2.306	0.177364
Ratio of investment to GRP, %	0.272	0.800	2.306	0.449987
IDI	0.829	4.195	2.306	0.004061
Unemployment rate, %	0.910	6.193	2.306	0.000448
Fund ratio	-0.477	1.536	2.306	0.168391
The share of the population living below the poverty line, %	0.902	5.907	2.306	0.000596
Crime rate, amount of crimes per 100 000 people	0.935	7.474	2.306	0.000140
Life expectancy at birth, years	0.887	5.428	2.306	0.000979
Debt burden level, %	0.729	3.014	2.306	0.19560

The presented results indicate that there is a strong correlation with the level of ES of the region of the following indicators: the IDI; the unemployment rate; the share of the population living below the poverty line; crime rate; and life expectancy. Consequently, the models on the basis of which the integrated assessment of ES of a region is based should include, along with socioeconomic indicators of the region's development, the IDI.

The application of the method of averaging the normalized values of all indicators using the simple average method allows us to bring all the indicators of the ES of a region to comparable values and determine the directions in which the region should develop. In particular, our correlation analysis determines a close relationship between the level of innovative development and the unemployment rate in the region, the share of the population living below the poverty line, and life expectancy (Table 3).

Table 3. Close relationship between the IDI and other indicators of ES

	Correlation ratio (r)	Number of degrees of freedom (f)	t-Student's criterion	Statistical significance of feature dependence (p)
Unemployment rate	0.957	9.334	2.306	0.000034
The share of the population living below the poverty line	0.800	3.768	2.306	0.007003
Life expectancy at birth	0.819	4.033	2.306	0.004974

5. Discussion

Despite the high importance of ensuring ES, there is a serious lack of scientific and practical materials focusing on it, especially from the point of view of creating innovative potential at the regional level. This problem does not allow the design of tools to influence the ES and develop effective management methods. From the authors' point of view, a comprehensive assessment should be only the first step before the formation of strategic support mechanisms for ES with a parallel build-up of the territory's innovative capabilities. In a market economy, the key subjects of ensuring ES are entrepreneurial structures, but the ability to use the corporate segment to achieve innovative goals does not always contribute to the interests of enterprises and society.

At the same time, the lack of an unambiguous understanding of the innovative component of ES is characteristic of both domestic and foreign experiences. In particular, Cable (1995) notes that the basis for ensuring ES is market regulators and cooperation between countries, and business structures are a secondary element that exist in the market space created by the state. At the same time, in addition to the macroeconomic influence, attention should be paid to the creation of innovative potential in the microeconomic environment since it is at the micro-level that the formation of intellectual resources that determine innovative development takes place. Thus, the business sector ensures the creation and redistribution of intellectual rent, which was considered in the literature (Dmitriev et al., 2020a; Ilchenko et al., 2020). Intellectual competitiveness ensures the strategic superiority of not only enterprises but also the territories of their operation, which increases the role of intellectual rent from the position of creating a sufficient level of ES.

Murdoch (2012) notes that a security threat occurs when there are changes in income, employment, inflation, reduced access to the market, raw materials, etc., in violation of economic sovereignty. In this context, it is advisable to use innovative potential for the development of the domestic market and the prevention of innovative intervention from outside. Orlova (2012) notes that the ES provides a state of the economy in which it is protected, primarily by economic means, from serious threats to its security arising from the influence of international factors. At the same time, attention should be paid not only to international and other macrofactors but also to the domestic state of resources, for which it is rational to ensure the regulation of market demand and social aspects of the functioning of society. To achieve this goal, it is possible to ensure the development of labour potential by providing fair wages based on rating tools (Rodionov et al., 2020). The intellectual aspects of creating ES through the formation of innovative potential are poorly developed, but it is human resources and intangible assets that prove their performance in conditions of increasing macroeconomic dynamics and the growing uncertainty of the geopolitical background. In particular, Jiang (2008) notes that ES has two aspects: competitiveness and independent economic sovereignty. Thus, innovation should be considered a strategic resource for the sustainable development of regions and the country as a whole.

The toolkit for assessing the ES of a region should provide a comprehensive account of the issues of territorial and industrial specification, as well as ensuring the identification of promising industries in the region that determine the possibilities for increasing the level of ES. Taking this fact into account allows for further improvement of the proposed methodology, but at the same time, it can significantly complicate its algorithms – due to the need for a comprehensive fundamental analysis of the territory – and reduce its quality. For example, in practice, one of the most significant security indicators is taking into account the agroindustrial potential of the territory and the potential for technical renewal of the agricultural sector (Kiritsa et al., 2021). In this context, taking it into account in the metrics of the assessment of the ES of a region should ensure that the complication

of the methodology is not significant, but at the same time, its apparatus should be developed in accordance with the ever-increasing instability of objective reality of the environment.

Considering industrial and regional specialization will allow us to take a fresh look at setting the threshold values in the future and improving the basis for calculating the existing metrics. In particular, it is possible to construct digital conditions for improving the system of using the socio-economic indicators of a particular region – it is necessary to ensure their interconnection with the approved scheme for analysing indicators. At the same time, a more complex variation of the scorecard should be compatible with the current accounting and forecasting system. As a result, there appears to be an objective opportunity to assess security in the context of its use to reduce the impact of destabilizing factors. It is proposed to direct the analysis of threshold values towards the minimization of indicators to increase the accessibility and simplify the interpretation of the values obtained.

The existing practical approaches to the implementation of ensuring ES at the regional level do not allow determination of their strengths and weaknesses. In Russian practice, the formation of a system of economic indicators and threshold parameters and the improvement of monitoring studies contribute to solving this problem. It is possible to use a number of generally recognized methods for assessing the ES (NORDSTAT DTLR, etc.); however, these methods do not allow establishing threshold values for indicators of ES of regions and assessing the level of ES of a region, taking into account the assessment of the innovative component (Iancu et al., 2014). At the same time, the methodology proposed by the authors allows for a comprehensive assessment of the ES of the region, taking into account the formation of a rating of innovative subjects of the Russian Federation. The use of this methodology allows us to compare information about the state of the regions from the point of view of innovative development to identify areas that should be key from the standpoint of the growth points of the regions. The presented methodology made it possible to normalize each indicator to make it comparable and design a comprehensive assessment of the ES of a region. This methodology enables one to obtain reliable comparative estimates of the level of ES of 10 regions, taking into account their innovative potential. Based on the data obtained, it is possible to design qualitative measures to strengthen ES.

6. Conclusions

The results of the research conducted can be characterized by the following aspects:

1. The list of ES indicators of the region is minimal, accessible, and corresponds to the socio-economic indicators of the regional development.

2. The proposed methodology is easy to implement and allows us to comprehensively assess the level of ES of regions and determine the contribution of each subject of the Russian Federation to strengthening the ES development of its Federal District and the country as a whole. Stakeholders, based on the results of the study, can choose the region most attractive in the investment and innovation spheres.

3. The proposed system of indicators takes into account the indicators of innovative development. Currently, when assessing the level of ES of the territory, the innovative component is not always singled out, while it is one of the main factors in ensuring the ES. The IDI should be included in the comprehensive assessment of the level of ES of a region. The results of the correlation analysis show that there is a close relationship between the IDI and the main ES indicators. It is an innovative development that determines the quality of life of the population of a particular region.

4. The index of innovative development is the highest in St. Petersburg, which is the leader in this indicator not only among the regions of the district but also in the whole country. IDI is quite high in the Arkhangelsk Region, Leningrad Region, and Novgorod Region. The lowest IDI is in the Pskov Region.

5. The implementation of the proposed methodology for assessing the level of ES of a region made it possible to determine that in the NWFD, only three subjects of the Russian Federation (the Republic of Karelia, the Republic of Komi, and the Arkhangelsk Region) belong to regions with a low (pre-crisis) level of ES. They are characterized by a significant degree of depreciation of fixed production assets and a high level of unemployment, poverty, and debt burden. Most of the subjects of the Russian Federation are regions with high and normal levels of ES.

6. For the regions of the NWFD, in the field of ES, it is typical not to achieve the established threshold parameters for a number of indicators: the volume of GRP per capita, the LPI, the IPI, the IDI, and the level of the debt burden.

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