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Economical and statistical analysis of the basic parameters of sustainable development of leading Russian regions

A. Yu. Kosobutskaya[1], V. N. Serdyuk[2], K. V. Soltis[3]✉

[1] Voronezh State University, 1 University sq., Voronezh, 394018, Russian Federation

[2] Donetsk National University, 24 Universitetskaya str., Donetsk, 283001, Russian Federation

[3] Voronezh branch of Plekhanov Russian University of Economics, 67A Karla Marksa str., Voronezh, 394030, Russian Federation

Subject. Sustainable development of Russian regions. Basic parameters of sustainable development of Russian regions in three spheres: economic, social, and environmental.
Objectives. To determine the regions with similar social, economic, and environmental parameters reflecting their level of sustainability and to group them into virtual clusters. To develop a methodological approach to the analysis of the basic parameters of sustainable development of leading Russian regions and to determine the points of stabilisation and destabilisation for these regions.
Research methods. Dialectical method, monographic method, comparative analysis, structuring of an array of information – virtual clustering method. Using the dialectical and monographic methods to assess the sustainability of Russian regions, we justified the use of 10 parameters characterising the economic, social, and environmental subsystems of Russian regions. The information array included data about 82 regions for the period between 2017 and 2021. In the study, we calculated the average values of sustainability indicators for each region over the said time period. The regions were grouped using the k-means algorithm and the Statistica software. The degree of sustainability of clusters was assessed based on the sum of mean normalised values of the analysed parameters. A comparison of the mean normalised values obtained for each cluster with mean values for each cluster and each parameter allowed us to determine the points of stabilisation and destabilisation for the leading clusters.
Results and discussion. By dividing the regions into groups, we managed to form six homogeneous clusters with a high degree of reliability. They differ in their structural composition of the studied parameters reflecting the level of development of social and economic subsystems of the regions comprising the clusters. The sustainability of clusters was assessed based on the sums of normalised values of the analysed parameters. The leading clusters are A and B. They are far ahead of the medium cluster C. Clusters D, E, and F form a group of outsiders. Economic, social, and environmental parameters were used to determine the points of stabilisation and destabilisation for the leading clusters.

Key words: sustainable development, region, clusters, stabilisation point, destabilisation point.

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Introduction

Issues of sustainability and sustainable regional development have been a matter of discussion and controversy in scientific literature.

According to N. N. Mikheeva (2021), at the moment there are at least two definitions of sustainability of social and economic systems. The first one implies that sustainability is the ability of a system to restore and return to its original state after experiencing shocks, including recession in the national economy or across particular industries, natural disasters, etc. According to the second approach, sustainability is the ability of a system to change as a response to shocks. These are known as the R-sustainability and S-sustainability of social and economic systems (Malkina et al., 2022).

A. G. Ivolga and A. A. Chaplitskaya (2014) point out that the term sustainable development is controversial in itself: sustainability means balance, while development implies the need to break this balance. We agree that the notions of sustainability and sustainable development are rather contradictory. Moreover, we believe that resolving this controversy can serve as a theoretical basis for the development of a sustainable development management system for systems of any level.

The above mentioned authors believe that the controversy can be resolved rather straightforwardly – by determining a transformation vector which can raise the competitiveness of the system (Ivolga & Chaplitskaya, 2014). As for the sustainable regional development, the authors conclude that it is a combination of legal, economic, social, and production relations, as well as resources helping the region to return to the state of stability, increased competitiveness, quality of life, and balanced relations between the state, the business community, the society in general, and the environment (Ivolga & Chaplitskaya, 2014).

We believe that this definition can serve as a theoretical basis for the management of sustainable development of social and economic systems. However, it is not quite clear how this definition can be used for a quantitative evaluation of sustainability and even less so of sustainable development, which involves economic, social, institutional, and environmental changes. While there are several methodological approaches that can be used to evaluate economic and social parameters, there is no clear methodology of quantitative evaluation of the interactions between regional institutional subsystems (local authorities, business, and public organisations).

According to E. S. Gruznevich (2017), sustainable development is associated with two properties – dynamics and statics. These properties "ensure the stable functioning of a system by resisting negative external factors and allow the system to move to a new level, provided that its social, economic, and environmental subsystems are in balance".

V. A. Guzey (2021) points out that the idea of sustainable development is based on the theory of equilibrium, according to which development is always aimed at reaching the state of equilibrium. The author believes that equilibrium implies sustainability, while occurring changes ensure further development. These two states should be in harmony.

We believe that sustainable development should be considered as a dynamic process. In this regard it is important to determine a reasonable ratio between stability and instability of the social and economic system. On one hand, maximum stability means fixed technological, social, economic, and other parameters, which makes it difficult to introduce changes and can have a negative effect on the development of the system. On the other hand, development requires changes and transition from one state of stability to another. In this case, the problem is to determine the quantitative boundary between stability and instability.

Researchers often view stability and balance as similar, even identical concepts. Thus, T. V. Alferova (2023) suggests that the balance in regional development can be assessed based on sustainable development goals set mainly within the biocentric paradigm. Although the environmental aspect is an important part of sustainable development, we should note that regions might have other important goals depending on the degree of development of the environmental, social, and economic spheres and their prospects.

Some researchers see a connection between sustainable development of spatial and functional systems. Thus, E. A. Osipova (2016) notes the connection between a region’s sustainability (the study focuses on the Khabarovsk Territory) and sustainability of the forest complex.

N. A. Shibaeva and M. A. Katalnikova (2023) addressed an important problem associated with the sustainable development of Russian regions – the state and social and economic dynamics of rural areas. We agree with the authors in that it is important to take into account the geopolitical aspect of the development of rural areas, since it helps to ensure the territorial integrity of the country and political stability within it.

As we can see, modern scientific literature focuses on various aspects and issues of sustainable development of the country’s regions (Kosobutskaya & Soltis, 2023). In our study, we tried to analyse the state of the economic, social, and environmental subsystems of the regions that are leaders in sustainable development. The study was based on a limited number of objective, available, and easily calculated statistical indicators.

The purpose of our study was to determine the basic parameters of the economic, social, and environmental subsystems of the regions that are leaders in sustainable development, identify the stabilisation points ensuring the leadership of the studied regions, and the destabilisation points, where the degree of sustainability is lower.

Research materials and methods

To identify similar regions based on certain parameters of sustainable development, we used a virtual clustering algorithm suggested by Hartigan & Wong (1979). At the moment, the algorithm is widely used by Russian scholars to analyse social and economic processes occurring at regional and other levels, because it helps to determine regions with similar characteristics, group them into clusters, and perform group ranking and comparative assessment.

We agree with P. A. Prokhorenkov, T. V. Reger, and N. V. Gudkova (2022) that grouping regions into virtual clusters makes it possible to determine and solve problems typical for each group, intensify social and economic processes, and enhance the effectiveness of management by assigning the resources to top priority areas. It is also possible to analyse regions representing each cluster, determine the difference between clusters with regard to the studied parameters, and identify the causes of poor development of certain regions as compared to the leaders.

One of the key issues in the assessment of sustainability and sustainable regional development is the choice of the parameters. The parameters, their number, and the measurement units used in the latest studies vary greatly and depend on the specifics of the studied regions, their problems and strategic goals, as well as the purpose of the study.

We believe that it is not reasonable to use a large number of parameters to assess regional sustainability. More so, it is theoretically and practically impossible.

Since the most common sustainable development goals are economic effectiveness, social justice, and environmental integrity, in our study, we used the following groups of parameters to assess regional sustainability:

1) economic parameters: GRP per capita, roubles (var 1)[1]; percentage of innovative goods, jobs, and services in the total volume of shipped goods and performed jobs and services, % (var 2)[2]; the level of employment, % (var 3)[3]; the level of loan security with created value, roubles GRP / 1 rouble of granted loans (var 4)[4];

2) social parameters: average income per month, roubles (var 5)[5]; deposits in roubles and foreign currency per capita, roubles (var 6)[6]; percentage of students, % (var 7)[7]; average life expectancy, years (var 8)[8];

3) Ecological parameters: percentage of neutralised pollutants in the total amount of pollutants produced by stationary sources, % (var 9)[9]; environmental expenditure per capita, roubles (var 10)[10].

Using these parameters, we formed an initial data array regarding 82 regions over five years (2017–2021). Then we used mean values for each parameter over the studies period to normalise the data to a range of 0–1. The clustering of the regions was performed using the k-means algorithm in the Statistica software.

Results

The calculations performed for various clustering options demonstrated that the most reliable mean values can be obtained when there are six clusters (the other options were four, five, six, and seven clusters).

Six clusters present quite homogeneous groups (virtual clusters) with characteristic structural compositions of parameters reflecting the development levels of certain social and economic subsystems of the regions. The combination of values of the parameters indicates the overall degree of sustainability of the regions.

Normalised mean values for each cluster are given in Table.

A graphical interpretation of the clusters is given in Fig. 1.

Let's consider the ratio of the overall degrees of sustainability of each cluster. A value of 10.0 is theoretically acceptable. It can be obtained by summing up all ten parameters, provided that their value is maximum, i. e. 1.0. In this case, the level of sustainability is 100 %. However, scientific literature shows that regional social and economic subsystems do not reach this level (Digel et al., 2022; Treshchevsky et al., 2021; Tsenina & Voronina, 2023; Vertakova et al.,

[1] Section "National accounts" of the official website of the Federal State Statistics Service. URL: https://rosstat.gov.ru/statistics/accounts

[2] Section "Science, innovations, and technologies" of the official website of the Federal State Statistics Service. URL: https://rosstat.gov.ru/statistics/science

[3] Section "Labour force, employment, and unemployment" of the official website of the Federal State Statistics Service. URL: https://rosstat.gov.ru/labour_force

[4] Calculated based on: Russian Regions. Social and Economic Parameters. 2022 : Statistics digest / Rosstat. Moscow, 2022. pp. 1028–1029 ; Russian Regions. Social and Economic Parameters. 2020 : Statistics digest / Rosstat. Moscow, 2020. pp. 1138–1139; 1148–1149 ; Section "National accounts" of the official website of the Federal State Statistics Service. URL: https://rosstat.gov.ru/statistics/accounts

[5] Russian Regions. Social and Economic Parameters. 2022 : Statistics digest … pp. 198–199.

[6] Calculated based on: Russian Regions. Social and Economic Parameters. 2022 : Statistics digest … pp. 1017–1019; 1021–1023; 43–44 ; Russian Regions. Social and Economic Parameters. 2020 : Statistics digest … pp. 1126–1133; 43–44.

[7] Russian Regions. Social and Economic Parameters. 2022 : Statistics digest … pp. 344–347 ; Russian Regions. Social and Economic Parameters. 2020 : Statistics digest … pp. 378–381.

[8] Russian Regions. Social and Economic Parameters. 2022 : Statistics digest … pp. 380–381 ; Russian Regions. Social and Economic Parameters. 2020 : Statistics digest … pp. 411–412.

[9] Russian Regions. Social and Economic Parameters. 2022 : Statistics digest … pp. 447–448 ; Russian Regions. Social and Economic Parameters. 2020 : Statistics digest … pp. 477–478.

[10] Calculated based on: Russian Regions. Social and Economic Parameters. 2022 : Statistics digest … pp. 447–448; 43–44 ; Russian Regions. Social and Economic Parameters. 2020 : Statistics digest … pp. 485–486; 43–44.

Table

Mean values for each cluster

Parameters	Cluster A	Cluster B	Cluster C	Cluster D	Cluster E	Cluster F	Mean value for the parameter
Var1	0.545	0.729	0.167	0.097	0.146	0.116	0.300
Var2	0.277	0.068	0.406	0.053	0.087	0.248	0.190
Var3	0.641	0.670	0.376	0.225	0.266	0.309	0.415
Var4	0.023	0.289	0.090	0.692	0.232	0.142	0.245
Var5	0.662	0.603	0.218	0.124	0.143	0.156	0.318
Var6	0.751	0.271	0.162	0.058	0.114	0.130	0.248
Var7	0.994	0.223	0.444	0.394	0.305	0.429	0.465
Var8	0.631	0.262	0.358	0.560	0.290	0.359	0.410
Var9	0.596	0.558	0.865	0.268	0.753	0.340	0.563
Var10	0.142	0.811	0.177	0.116	0.198	0.126	0.262
Total value for the cluster	5.261	4.486	3.264	2.587	2.534	2.354	3.414
Mean value for the cluster	0.526	0.449	0.326	0.259	0.253	0.235	–

Source: calculated by the authors based on the materials of the Federal Service for National Statistics.

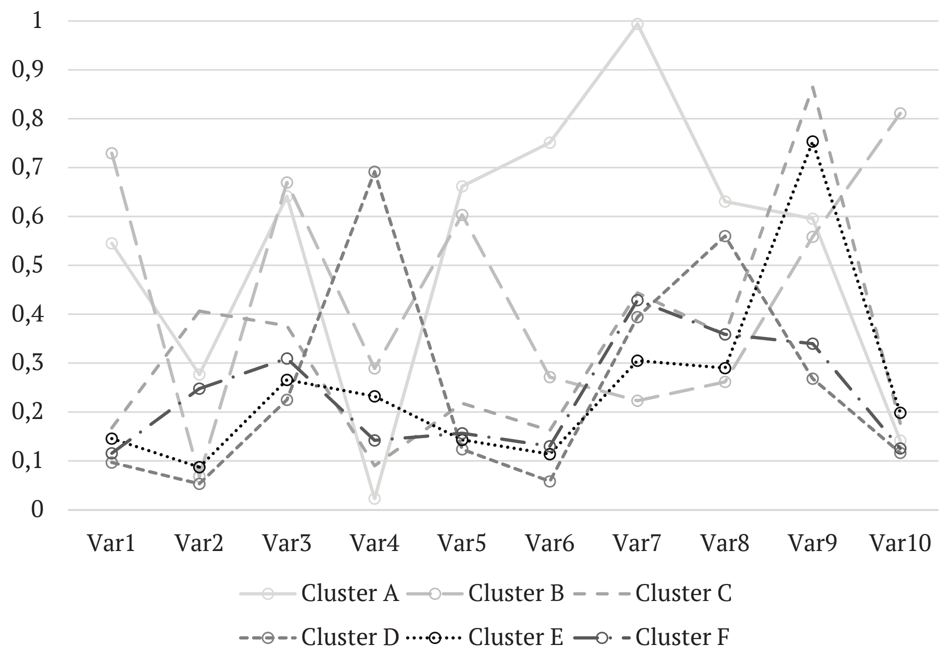

Fig. 1. Mean values for each cluster

2022; Vlasyuk, 2023; Endovitsky et al., 2023; Nikitina & Kurkin, 2020).

Cluster A demonstrated the highest degree of sustainability. This cluster includes two regions – Moscow and Saint-Petersburg. In our study, the calculated ratio of cluster A was 5.26.

The total of mean values for cluster B was significantly lower than that of cluster A, that is 4.48.

The total of mean values for cluster C was 3.26, which is 62 % of the total for cluster A and 72.8 % of the total obtained for cluster B.

As we can see, the groups of leaders (cluster A and B) and the medium level group are characterised by a graduate decrease in the overall degree of sustainability calculated based on the sum of mean normalised values of the studied parameters.

A further decrease in the sum of mean normalised values (2.59) allowed us to form one of the outsider clusters, cluster D. The differences between outsider clusters are less significant. Thus, the total for cluster E was 2.53, and the total for cluster F was 2.35. We can thus conclude that there is a group of clusters, including cluster D, E, and F, whose sums of mean normalised values vary from 2.35 to 2.58. There is no significant difference between these clusters, and we can say that they show a similar degree of sustainability.

We should also note that the analysed clusters differ in their structure. To perform both quantitative and qualitative assessment of the structure of the analysed clusters, we assumed that the qualitative parameter can be defined as associated with the stabilisation points, indicating a higher degree of sustainability of the regions in the cluster, and the destabilisation points, indicating a lower degree of sustainability.

Then we considered both groups of points when comparing different clusters and the regions within these clusters. In the first case, the mean normalised values are higher than mean values obtained for each parameter. In the latter case, we considered mean values obtained for each cluster (Table). Let's now analyse the structural composition of the stabilisation and destabilisation points in the leading clusters.

Cluster A is characterised by the following parameters. The GRP per capita (var 1) is a stabilisation point. The value of the parameter is 0.54 with the mean normalised value being 0.3. However, the value of this parameter is higher for cluster B.

The percentage of innovative goods, jobs, and services in the total volume of shipped goods and performed jobs and services (var 2) is also a stabilisation point, when comparing clusters (0.28 with the mean value 0.19). Here, cluster A is also second to cluster B.

The level of employment (var 3) is 0.64, which is higher than the mean value for clusters (0.41), but still lower than that for cluster B.

The level of loan security with created value (var 4) is the lowest as compared to other clusters (0.02) with the mean value 0.24. This parameter can be viewed as a weak spot of the economic subsystem of cluster A and therefore as a destabilisation point.

As for the social parameters, the average income per month (var 5) is the highest as compared to the other clusters (0.66 with the mean value 0.32). However, the value of the same parameter for cluster B is 0.6, so the difference is not very significant.

The value of the parameter "deposits in roubles and foreign currency per capita" (var 6) is 0.75, which is higher than the mean value (0.25).

One of the key social parameters indicating the number of qualified specialists in the region, i. e. the percentage of students (var 7) for cluster A is almost maximum (0.99) and more than twice higher than the mean value (0.46).

The average life expectancy (var 8) for cluster A is 0.63 with the mean value 0.41. This is a good result and can be considered as a stabilisation point.

Thus, the values of the social parameters for cluster A present a combination of stabilisation points as compared to the other clusters.

One of the environmental parameters, namely the percentage of neutralised pollutants in the total amount of pollutants produced by stationary sources (var 9), can also be considered a stabilisation point for cluster A, since it is higher than the mean value (0.59 and 0.56 respectively). However, cluster A takes only third place based on this parameter after clusters C and E. It is also not significantly higher than that for cluster B (0.56).

The other ecological parameter "environmental expenditure" (var 10) for cluster A is lower than the mean value (0.14 and 0.26 respectively), which can be considered as a destabilisation point. Clusters B, C, and E demonstrated the highest values for this parameter.

Therefore, cluster A has a large number of stabilisation points with regard to most assessment parameters. The strongest side of the cluster includes social parameters, while the weakest economic spot of the cluster is low security of loans with created value. The environmental parameters of the cluster are also rather weak. Environmental expenditure is lower than in other clusters. The percentage of neutralised pollutants in the total amount of pollutants produced by stationary sources, though higher than the mean value, is still lower than in other clusters.

Cluster B takes second place based on the overall level of sustainability. The total of mean normalised values is 4.48. Cluster B is behind cluster A by 0.78. The cluster includes northern and eastern regions of Russia: the Republic of Sakha (Yakutia), the Murmansk Region, the Tyumen Region, the Magadan Region, the Sakhalin Region, and the Chukotka Autonomous District.

The GRP per capita for cluster B is the highest of all clusters (0.73). It is almost 2.5 times higher than the mean cluster value (0.3) and significantly higher than the value demonstrated by cluster A. This results from two factors: advanced manufacturing industries and a small population. This presents a stabilisation point from the point of view of both the industrial development and the ability of the regions to attract additional human resources.

A definite destabilisation point is the low level of innovative development – 0.07 with a mean value of 0.19. Based on this parameter, industrially developed cluster B only takes fifth place, with only cluster F behind.

Another stabilisation point is the level of employment. Cluster B takes the first place (0.67 with the mean value 0.41).

The security of credits with created value is medium – 0.29 with a mean intercluster value of 0.24. This can also be considered a stabilisation point, especially as compared to the more developed cluster A (0.02). Another argument in favour of considering this as a stabilisation point is the fact that the value of this parameter for cluster A is extremely high. While the average income is high in both clusters, the number of loans in cluster B is significantly smaller than in cluster A.

A social stabilisation point for cluster B is the average income per capita, which is almost twice as high as the mean normalised value (0.60 and 0.32 respectively). Cluster B is not much behind cluster A according to this parameter (0.60 and 0.66 respectively).

The sum of deposits in roubles and foreign currency per capita is another stabilisation point for cluster B – 0.27 with a mean value of 0.24. However, the value of this parameter for cluster A is three times higher (0.75), although the level of income per capita is similar.

Social parameters demonstrate a very negative phenomenon – a small number of students (0.22 with a mean value of 0.46). It is the lowest value of all. This is obviously a destabilisation point for the cluster.

Another social destabilisation point is the low average life expectancy – 0.26 with a mean value of 0.41. It is the lowest value of all.

The percentage of neutralised pollutants in the total amount of pollutants produced by stationary sources is the same as the mean value (0.56 if rounded to two decimal places). Based on this parameter, cluster B takes fourth place, which makes it possible to consider the parameter as neither a stabilisation nor a destabilisation point.

Cluster B is also the leader regarding the environmental expenditure (0.81 with a mean value of 0.26).

Discussion

The suggested methodology is based on the limited range of the most basic parameters characterising the degree of sustainability of regions of the Russian Federation that can be divided into three groups: economic parameters, social parameters, and environmental parameters. We believe that a large number of parameters can hinder a comprehensive assessment of sustainability. Moreover, all the data used in the study is readily available in official statistics and can be used to make all the necessary calculations.

We should note that in scientific literature, the parameters used and their number vary greatly.

Thus N. A. Pechenitsina (2017) suggested 28 evaluation indicators, including 8 economic, 13 social, and 7 environmental indicators most commonly used for strategic planning at both regional and municipal levels. We assume that it is difficult to analyse the sustainability of regions based on this methodology, since all the suggested indicators are used to determine the development vectors of social and economic systems of various levels regardless of their sustainability.

E. V. Kornilova, V. Y. Zakharov, and D. A. Kornilov (2023) suggested a ranking methodology based on 21 indicators divided into five groups: indicators reflecting the level of income and employment of the population; indicators of healthy lifestyle; indicators of innovative activities; environmental indicators; and digitisation indicators. Some of these indicators have negative correlation, which can lead to wrong conclusions.

The methodology suggested by M. I. Gusenok (2017) is aimed at studying rural areas and determining their position in the regional structure. The weak spot of the methodology is an overwhelmingly large number of parameters: 33 indicators characterising the industrial aspect of development of rural areas divided into 5 groups and 37 indicators (also divided into 5 groups) characterising various aspects of the social structure of rural areas. These parameters do not include environmental parameters important for both industrial and rural territories. Rural areas might require a different set of environmental parameters than the regional parameters.

Furthermore, a large number of suggested parameters are not presented in municipal statistics. As a solution to this problem, the author suggests using certain techniques allowing to adapt statistical parameters for the purpose of the study (Gusenok, 2017). Such an adaptive approach to the formation of the database and calculations is, of course, theoretically and practically possible. However, it does not provide reliable results. Based on his calculations, the author drives conclusions about the level of social and economic development of certain rural areas, rather than about the sustainability of the region (Gusenok, 2017).

N. N. Egorova and L. G. Rudenko (2022) use 6 economic, 5 social, and 7 environmental indicators of sustainable development and suggest balancing them using a method of dynamic normal, i. e. by ordering the indicators based on the growth rate and the ability of the region to maintain it for a large period of time.

We should note that almost all the authors seek to solve a difficult problem – to perform a comprehensive assessment of various aspects of development. On one hand, this requires balancing. On the other hand, it is necessary to take into account the synergistic effect, i. e. additional sustainability as a result of combining, for instance, economic and social approaches.

Conclusions

In our study, we determined six homogeneous clusters with a high degree of reliability. The sustainability of clusters was assessed based on the sums of normalised mean values of the analysed parameters.

The leading clusters are A and B (5.26 and 4.48 respectively). They are far ahead of the medium cluster C (3.24). Clusters D, E, and F (2.59, 2.53, and 2.35 respectively) form a group of outsiders.

To perform a qualitative assessment of the structure of the leading clusters, we determined the points of stabilisation and destabilisation.

Based on the normalised values of the studied parameters, the stabilisation points of cluster A are the following:

– economic parameters: GRP per capita;

– social parameters: all the four parameters (average income per month, deposits in roubles and foreign currency per capita, the percentage of students, and the average life expectancy;

– environmental parameters: only the percentage of neutralised pollutants in the total amount of pollutants produced by stationary sources is higher than the mean value making this a weak spot of cluster A.

From the point of view of the internal economic structure of the cluster, the destabilisation points include the percentage of innovative goods, jobs, and services in the total volume of shipped goods and performed jobs and services. The are no destabilisation points on the social level. An environmental destabilisation point is environmental expenditure per capita.

The stabilisation points of cluster B are the following. Economic parameters: GRP per capita and the level of employment; social parameters: average income per capita; environmental parameters: both the percentage of neutralised pollutants in the total amount of pollutants produced by stationary sources and environmental expenditure.

The destabilisation points include the percentage of innovative goods, jobs, and services in the total volume of shipped goods and performed jobs and services (economic parameters) and the percentage of students and the average life expectancy (social parameters). A rather controversial parameter is the number of deposits in roubles and foreign currency per capita. It is a stabilisation point in the intercluster context, and a destabilisation point in the intracluster context. We believe this indicates a contrast between the level of income of the population and the ability (and will) to make savings.

The environmental parameters correspond to stabilisation points.

Conflict of Interest

The authors declare the absence of obvious and potential conflicts of interest related to the publication of this article.

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Anna Yu. Kosobutskaya, Dr. Sci. (Econ.), Full Prof., Voronezh State University, Voronezh, Russian Federation

E-mail: anna.rodnina@mail.ru

ORCID ID: 0000-0002-9013-6141

Vera N. Serdyuk, Dr. Sci. (Econ.), Full Prof., Donetsk State University, Donetsk, Russian Federation

E-mail: vera290256@mail.ru

ORCID ID: 0009-0008-0351-2550

Konstantin V. Soltis, Postgraduate Student, Voronezh Institute (branch) of Plekhanov Russian University of Economics, Voronezh, Russian Federation

E-mail: 5076607@gmail.com

ORCID ID: 0009-0009-4163-2323

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Экономико-статистический анализ базовых параметров российских регионов – лидеров устойчивого развития

А. Ю. Кособуцкая[1], В. Н. Сердюк[2], К. В. Солтис[3]✉

[1] Воронежский государственный университет, Университетская пл., 1, 394018, Воронеж, Российская Федерация

[2] Донецкий государственный университет, ул. Университетская, 24, 283001, Донецк, Российская Федерация

[3] Воронежский филиал РЭУ им. Г. В. Плеханова, ул. Карла Маркса, 67А, 394030, Воронеж, Российская Федерация

Предмет. Устойчивость развития российских регионов. Базовые параметры устойчивого развития регионов России в трех сферах: экономической, социальной и экологической.
Цели. Выявление регионов со схожими социально-экономическими и экологическими параметрами, отражающими уровень их устойчивости, группировка регионов в виртуальные кластеры. Разработка методического подхода к анализу базовых параметров российских регионов, образующих группы лидеров устойчивого развития; определение точек стабилизации и дестабилизации.
Методы исследования. Диалектический метод; монографический метод; сравнительный анализ; структуризация информационного массива – метод виртуальной кластеризации. На основе использования диалектического и монографического методов для оценки устойчивости регионов России обосновано применение 10 показателей, характеризующих экономическую, социальную и экологическую подсистемы административно-территориальных образований. Информационный массив включал данные за период 2017–2021 гг. по 82 регионам. В целях исследования по каждому региону рассчитаны средние значения параметров устойчивости за указанный период, проведено их нормирование. Группировка регионов выполнена по алгоритму k-средних (k-means) с помощью программы Statistica. Общий уровень устойчивости кластеров оценивался на основе суммы средних нормированных значений анализируемых параметров. Сравнение средних нормированных значений показателей по кластеру со средними значениями по кластерам и по каждому параметру позволило выделить «точки стабилизации» и «точки дестабилизации» кластеров, лидирующих в сфере устойчивого развития.
Результаты и обсуждение. Группировка регионов позволила с высокой степенью достоверности получить шесть достаточно однородных кластеров, различающихся структурной композицией параметров, отражающих уровни развития социально-экономических подсистем входящих в них регионов. Устойчивость кластера оценивалась по полученным суммарным нормированным значениям исследуемых параметров. Кластеры-лидеры «А» и «Б» существенно опережают средний по уровню развития кластер «В». Кластеры «Г», «Д» и «Е» сформировали группу аутсайдеров. По экономическому, социальному и экологическому блокам параметров для кластеров-лидеров определены «точки стабилизации» и «точки дестабилизации».

Ключевые слова: устойчивое развитие, регион, кластеры, точка стабилизации, точка дестабилизации.

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Кособуцкая Анна Юрьевна, д-р экон. наук, профессор, Воронежский государственный университет, Воронеж, Российская Федерация

E-mail: anna.rodnina@mail.ru

ORCID ID: 0000-0002-9013-6141

Сердюк Вера Николаевна, д-р экон. наук, профессор, Донецкий государственный университет, Донецк, Российская Федерация

E-mail: vera290256@mail.ru

ORCID ID: 0009-0008-0351-2550

Солтис Константин Владимирович, аспирант, Российский экономический университет им. Г. В. Плеханова, Воронежский филиал, Воронеж, Российская Федерация

E-mail: 5076607@gmail.com

ORCID ID: 0009-0009-4163-2323

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