RESEARCH ARTICLE

https://doi.org/10.17059/ekon.reg.2023-3-5
UDC 332.05
JEL O 10; O 18; R 11; R 58

Elena A. Tretiakova [a] ✉, *Maksim A. Kurganov* [b]

[a] Perm National Research Polytechnic University, Perm, Russian Federation
[a, b] HSE University Perm, Perm, Russian Federation

Stakeholder Approach to the Regional Sustainable Development: Empirical Study[1]

Abstract. Introduction of the concept of sustainable development (SD) led to the transformation of values and interests of key stakeholders: the government, population and business. Since consideration of regional stakeholder interests is crucial for ensuring SD of large countries like Russia, a methodology is needed to assess their fulfilment, balance and consistency. However, previous studies of regional sustainable development have not yet proposed such a methodology. The present paper examined and classified regional stakeholder interests and developed an indicator framework to evaluate their fulfilment. We proposed an algorithm for calculating 9 group and 7 integral indices which were subsequently used to measure the socio-economic-environmental balance and inter-stakeholder consistency of interests. The methodology was applied to 17 regions of the Volga and Ural Federal Districts of Russia. The research discovered that sustainable development in most regions was at a medium level. There was no significant difference in the fulfilment of interests among the different stakeholders, which can be interpreted as a factor strengthening social cohesion. Additionally, a socio-economic-environmental imbalance was revealed: the fulfilment of social interests was the highest and that of environmental interests was the lowest. Regression modelling has shown that the presence of this imbalance has a negative impact on SD of Russian regions. The proposed methodology may contribute to broaden the scope of analytical research in the field of sustainable development.

Keywords: sustainable development, regional economy, stakeholder interests, socio-economic-environmental balance of stakeholder interests, consistency of stakeholder interests, fulfilment of stakeholder interests, Russia, Russian regions, Volga Federal District, Ural Federal District

For citation: Tretiakova, E. A. & Kurganov, M. A. (2023). A Stakeholder Approach to the Regional Sustainable Development: Empirical Study. *Ekonomika regiona / Economy of regions, 19(3)*, 668-682. https://doi.org/10.17059/ekon.reg.2023-3-5

[1]

ИССЛЕДОВАТЕЛЬСКАЯ СТАТЬЯ

Е. А. Третьякова [а)], *М. А. Курганов* [б)]
[а)] Пермский национальный исследовательский политехнический университет, г. Пермь, Российская Федерация
[а, б)] Национальный исследовательский университет «Высшая школа экономики» — Пермь, г. Пермь, Российская Федерация

Стейкхолдерский подход к устойчивому региональному развитию: результаты эмпирического исследования

Аннотация. Реализация концепции устойчивого развития ведет к существенной трансформации ценностей и интересов таких ключевых стейкхолдеров, как правительство, население и бизнес-сообщество. Поскольку учет интересов региональных стейкхолдеров имеет решающее значение для обеспечения устойчивого развития таких крупных стран, как Россия, особую актуальность приобретает разработка отсутствующего на текущий момент методического инструментария для оценки уровня реализации интересов стейкхолдеров, степени их сбалансированности и согласованности. В данной работе рассмотрены и классифицированы интересы ключевых региональных стейкхолдеров, разработана система показателей для оценки уровня их реализации. Предложен алгоритм расчета 9 групповых и 7 интегральных индексов, используемых для измерения степени социо-эколого-экономической сбалансированности и межсубъектной согласованности интересов. Данный методический инструментарий был апробирован на примере 17 регионов Приволжского и Уральского федеральных округов. Установлено, что уровень реализации интересов стейкхолдеров преимущественно характеризуется как «средний», по уровню реализации интересы разных стейкхолдеров в целом согласованы. Однако имеет место выраженный дисбаланс в социо-эколого-экономическом разрезе: отмечен преимущественно высокий уровень реализации социальных интересов в сочетании с низким уровнем экологических интересов. Регрессионное моделирование показало, что наличие этого дисбаланса оказывает негативное влияние на устойчивого развития российских регионов. Предлагаемая методология может способствовать расширению сферы аналитических исследований в области устойчивого развития.

Ключевые слова: устойчивое развитие, региональная экономика, интересы стейкхолдеров, социо-эколого-экономическая сбалансированность интересов стейкхолдеров, согласованность интересов стейкхолдеров, реализация интересов стейкхолдеров, Россия, регионы России, Приволжский федеральный округ, Уральский федеральный округ

Для цитирования: Третьякова Е. А., Курганов М. А. (2023). Стейкхолдерский подход к устойчивому региональному развитию: результаты эмпирического исследования. *Экономика региона, 19(3)*, 668-682. https://doi.org/10.17059/ekon.reg.2023-3-5

Introduction

Sustainable development (SD), promoted worldwide by the United Nations Commission on Environment and Development, rests on three pillars: economic growth, social development and protection of the environment[1] (Shed'ko, 2015; Jovovic et al., 2017).

The global crisis of today proves that the current system of economic management is incapable of ensuring social progress without harming natural ecosystems and destabilising the society. Therefore, today, more than ever before, it is important to achieve socio-economic-environmental balance.

Russia, with its vast territory, is distinguished by the asymmetry of the socio-economic development of its regions. The constituent entities of the Russian Federation are located in different climatic zones; they differ from each other in the structure and volume of available resources, as well as industrial and scientific potential. At the same time, regional governments are given significant authority to manage resources and are relatively independent in decision-making (Alferova, 2021; Alibašić, 2018, Boymatov, 2016; Bochko, 2013). Consequently, regional governments are able to reverse the existing trend and create a socially-oriented economy, ensure environmental protection (Uskova, 2009; Wan et al., 2017) and contribute to SD of the country as a whole (Graymore et al., 2008; Jiménez-Aceituno et al., 2020).

Discussing the role of SD in the regional economy, researchers note that it should work as a basis for solving the most acute and large-scale regional problems and managing regional changes on the basis of economic, social and environmental measurements (Danilov-Danilyan, 2003;

[1] United Nations. (2008) Achieving Sustainable Development and Promoting Development Cooperation. UN, New York. Retrieved from: https://www.un.org/en/ecosoc/docs/pdfs/fina_08-45773.pdf (Date of access: 14.01.2022)

Graymore et al., 2008; Yanchenko et al., 2018). In recent years, there has been a shift of the centre of gravity of economic reforms to the regional level, which undoubtedly increases the importance of regional governments in the implementation of public policy and requires updating the methodology for assessing regional SD (Kurganov & Tretiakova, 2021; Tsapieva, 2010).

The paper is structured as follows: first, we provide the theoretical background of the study. Then, we consider the interests of key stakeholders in terms of the three pillars of SD and describe an indicator framework and methodology for data analysis. Next, we present the classification of regions based on the level of fulfilment of interests (LFI) of particular stakeholders and the level of socio-economic-environmental development of the region as a whole. We also consider the types of regions in terms of the balance and consistency of stakeholder interests. The article concludes with an assessment of the dependence of socio-economic-environmental development on the balance and consistency of interests of key stakeholders.

It should be noted that this is the exploratory part of empirical research. It does not seek to be representative or comprehensive of the stakeholder interests studied, but rather to provide an assessment of SD of 17 Russian regions.

Theoretical Background

In our study, we consider regional SD as a process of continuous qualitative changes, ensuring the growth of population well-being, social justice and environmental security. The provision of balanced social, environmental and economic development is impossible without the direct involvement of the population, business and regional government in the processes of regional change (Nikiforova et al., 2018; Pomeranz & Decker, 2018; Sartori et al., 2014). Each of these subjects has distinct economic interests as well as particular financial, innovative, natural and other resources, participates directly in the economy and might have a significant impact on regional sustainable development (Alibašić, 2018; Kurganov & Tretyakova, 2020). Thus, we consider the population, business and regional government as key regional stakeholders (RS).

The behaviour of key RS is significantly influenced by the international values of SD, which guide us towards an abundant world (economic sphere), a liveable world (environmental sphere) and a just world (social sphere) (Podoprigora et al., 2014). The values correspond to the three pillars of SD.

Based on the three pillars of SD, the interests of key RS can be classified and characterised as follows.

"Economic interests comprise:

1) economic interests of the population that are expressed in the desire to improve their financial situation and satisfy various needs, including intangible needs (Migranova et al., 2014; Lozano, 2012);

2) economic interests of business that are fulfilled through maintaining uninterrupted long-term operation (Bartelmus, 2003);

3) economic interests of the regional government that are related to ensuring the sufficiency of the regional budget and stimulating the growth of its revenue side;

Environmental interests include:

4) environmental interests of the population which are associated with improving the rational use of natural resources and protecting the environment (Cabezas et al., 2005);

5) environmental interests of business which consist in reducing the environmental intensity of its economic activity, which also provides a reduction in environmental fiscal burden (Lehtonen, 2004);

6) environmental interests of the regional government which are aimed at the encouragement of regional stakeholders to reduce the environmental burden;

Social interests incorporate:

7) social interests of the population which are associated with meeting the social needs of this economic agent (health care, education, law enforcement, etc.) provided by the state (Lehtonen, 2004);

8) social interests of business which are related to stability and conflict-free social business environment;

9) social interests of the regional government which are associated with the provision of social obligations and social services, aimed at maintaining social stability" (Shimanovsky et al., 2021).

Accounting for these groups of interests of regional stakeholders in the strategic regional development programmes and the implementation of sustainable development concept principles is an important target for regional transformations. This conclusion mainly follows from the works of Kurushina (2018), Tazhitdinov (2013), Porini and Striani (2017) who studied the integrated participation of the population, business and public authorities in regional change and the coordination of their interests. However, being focused more on the conceptual modelling of the processes and phenomena, previous studies of regional SD paid

much less attention to the development of methodologies to assess the consistency of stakeholders' interests and the level of their fulfilment.

Even though existing literature gives a detailed account of the importance of SD of territories and of the consistency of interests of the key stakeholders in the region, the problem of assessing the level of fulfilment, balance and consistency of their interests has not yet been sufficiently reflected in applied and fundamental research.

This study proposes a method for assessing the level of fulfilment of economic, social and environmental interests of three major stakeholders: the population, business and regional government. The method is used to assess the level of fulfilment as well as the balance and consistency of these interests in 17 regions of the Volga and Ural Federal Districts of Russia. We hypothesise that the balance and consistency of stakeholder interests affect SD of Russian regions.

Throughout the paper, the term "socio-economic-environmental balance of interests" will refer to an approximate equality in the LFI of the key stakeholders from the standpoint of spheres of SD. In other words, this term presupposes the absence of clear preferences for one of the spheres of SD to the detriment of another. The term "consistency of interests" will refer to an approximate equality in the LFI from the standpoint of each regional stakeholder: the regional government, population or business. In other words, this term presupposes the absence of explicit preferences for interests of one stakeholder to the detriment of interests of the other stakeholders. We consider these concepts important since the achievement of public consent is crucial for SD of regions.

Material and Methodology

In this study, we first assessed the fulfilment of economic, social and environmental interests of key RS: the government, business and population. We then assessed the balance and consistency of these interests to see whether they affect SD of Russian regions. The assessment was carried out based on a framework of 51 indicators.

The Indicator Framework

Several methods currently exist for the measurement of sustainable development. One of the most well-known is the UN approach based on monitoring the dynamics of individual indicators for each of the Sustainable Development Goals[1]. The benefit of this approach is that it uses a standard indicator framework, thereby allowing researchers to compare the results achieved in different countries. A significant disadvantage of this approach, however, is that it does not suggest an aggregated measure to assess the level of SD of a region.

There have been many attempts to develop such aggregated measures (Zeijl-Rozema, 2011). Most of these methodologies provide for the selection of indicators, their normalisation, calculation of group and integral indices (Uskova, 2009; Tret'yakova & Osipova, 2018) or creation of ratings (Zarghami & Fatourehchi, 2020). Based on existing achievements in this field, we propose to expand the analytical capabilities. For this purpose, we suggest 9 groups of indices corresponding to three interest groups (economic, social and environmental) of three RS (population, business and government). These 9 groups of indices include 51 indicators (Table 1).

In the selection of indicators, we were mainly guided by the Russian national Set of SDG indicators (National set 2021). In addition, we used other open statistical data provided by the Federal State Statistics Service, the Ministry of Natural Resources and Environment of the Russian Federation, the Ministry of Internal Affairs of the Russian Federation, the Federal Tax Service of Russia and the Federal Service for Hydrometeorology and Environmental Monitoring.

Data Analysis

In order to aggregate heterogeneous indicators into a single index that characterises the level of fulfilment of stakeholder interests, we performed their primary normalisation. The normalisation was carried out by comparing the actual value of a particular indicator in a particular region with the best achieved value of the same indicator in the entire group of regions under investigation. The use of the best value as a benchmark was due to the fact that Russia has not established target values for sustainable development indicators at the regional level.

If the growth of the indicator has a positive impact on the fulfilment of stakeholder interests (for example, for such indicators as the investments in fixed capital; the labour productivity; the total area of dwellings, average per one inhabitant, etc.), the normalised value was calculated according to (1). Otherwise (for such indicators as population with income below the subsistence minimum; fixed assets depreciation rate; the proportion of water samples that do not meet sanitary and hygienic standards, etc.), the normalised value was calculated according to (2).

[1] National set of SDG indicators (2021). Retrieved from: https://eng.rosstat.gov.ru/sdg/national (Date of access: 14.01.2022).

Table 1

The indicator framework for assessing the fulfilment of social, economic and environmental interests of key RS

Population	Business	Regional government
Indicators of economic interests		
— Population with income below the subsistence minimum, percent of the total population; — The number of subsistence minimums in the average per capita income of the population; — The ratio of total saving to total income of the population, percent; — The number of subsistence minimums in per capita consumer spending; — The number of pensioner's subsistence minimums in the average of pension; — Theatre spectators and museum visitors per 1,000 population; — Domestic tourism trips or outbound tourism trips, per 10,000 population	— Investments in fixed capital, percent of the previous year (at constant prices); — The ratio of gross regional product (GRP) to fixed capital; — Fixed assets depreciation rate, percent; — Current ratio; — Employment rate, percent; — The number of registered unemployed per vacancy; — Share of innovative goods and services in total sales, percent	— Revenues of consolidated budget, thousand roubles per capita; — Foreign direct investments in the Russian economy, percent of GRP; — Investments in fixed capital, percent of GRP; — Gross domestic expenditure on research and development (R&D) as a percentage of GRP; — Exports, percent of GRP; — Industrial production, percent of GRP; — Agricultural production, thousand roubles per capita
Indicators of social interests		
— Morbidity (newly diagnosed patients) per 1,000 population; — Medical personnel per 10,000 population; — Students in education programmes for bachelor, specialist, master programmes per 10,000 population; — Students in secondary vocational education programmes per 10,000 population; — Recorded crimes per 100,000 population; — Total area of dwellings, average per one inhabitant — total, sq. m	— Staff turnover rate; — Employed higher education graduates, percent of total employment; — Employed vocational education graduates, percent of total employment; — Labour productivity, percent to previous year; — Victims of industrial accidents with disability for one working day and more and fatal case per 1,000 employees	— Expenditures of the consolidated budget of the Russian Federation in social-cultural activities, percent of GRP; — Life expectancy at birth, years; — The dependency ratio; — Gini coefficient
Indicators of environmental interests		
— Population provided with safe drinking water, percent of the total population; — The proportion of water samples that do not meet sanitary and hygienic standards, percent; — The proportion of air samples exceeding the maximum permissible concentration (MPC), percent.	— Electricity consumption per million roubles of turnover of organisations, million kWh; — Emission of pollutants into the atmosphere per million roubles of turnover of organisations, tonnes; — Use of fresh water per million roubles of turnover of organisations, thousand m^3; — Discharge of polluted sewage per million roubles of turnover of organisations, thousand m^3; — Recycled and reused water per million roubles of turnover of organisations, thousand m^3; — Environmental taxes and charges of turnover of organisations, roubles	— Industrial and municipal wastes per capita, tonnes; — Recovery and disposal of industrial and municipal wastes per capita, tonnes; — Air pollutants captured and neutralised as percent of total amount of air pollutants from stationary sources; — The ratio between the volume of reforestation and the volume of harvested wood, ha/thousand m^3; — Expenditures on environmental protection in GRP, percent; — Environmental taxes and charges in GRP, percent

* Source: compiled by the authors.

$$K_{ij} = \frac{k_j^i}{k_{\max}^i}, \quad (1)$$

$$K_{ij} = \frac{k_{\min}^i}{k_j^i}, \quad (2)$$

where K_{ij} is the normalised value of the i-th indicator for the j-th region; k_j^i is the current value of the i-th indicator for the j-th region; $k^i{}_{\max}$ and $k^i{}_{\min}$ is are the maximum and minimum value i-th indicator in the sample of regions.

For each individual indicator, the normalised value characterises its achieved level in each specific period in each specific region compared to the potentially achievable best value in the analysed group of regions. At the same time, it is important to exclude the growth of the values of the normalised indices due to a decrease in the comparison base within the study period. For this purpose, the following principle was applied: the best indicator value in the group of regions under consideration, for which normalisation is made, should not be worse than the best value of the same indicator in the initial period of the study. Otherwise, normalisation was made by the best indicator value of the initial period[1].

The normalised indicator values were used to calculate group indices that characterised the level of fulfilment of interests (LFI) of RS across the main spheres (economic, environmental and social):

$$G_{S_pV_q} = \frac{\sum_{i=1}^{m} K_{ij}}{m}, \quad (3)$$

where $G_{S_pV_q}$ is the group index of the p-th regional stakeholder (S) for the q-th group of SD interests (V); m is the number of indicators.

Using group indices, we calculated integral indices that comprehensively characterise either the LFI of a particular stakeholder in all areas simultaneously (4), or the LFI of all stakeholders in one of the areas (5). After that, we determined the aggregate integral index that characterises the level of SD of the region in terms of fulfilling the interests of all stakeholders in all spheres of SD (6):

$$I(S_p) = \sqrt[3]{\prod_{p=1}^{3}\left(G_{S_pV_q}\right)}, \quad (4)$$

$$I(V_q) = \sqrt[3]{\prod_{q=1}^{3}\left(G_{S_pV_q}\right)}, \quad (5)$$

$$I(U) = \sqrt[9]{\prod_{p,q=1}^{9}\left(G_{S_pV_q}\right)}, \quad (6)$$

where $I(S_p)$ is the integral index for the p-th regional stakeholder in the context of all groups of socio-environmental and economic interests; $I(V_q)$ is the integral index for the q-th group of SD interests in the context of all stakeholders (population, business community, public authorities); $I(U)$ is the aggregate integral index of SD of the region.

We relied on the works of Russian and foreign researchers (see, e.g., Granberg, 2001; Sachs et al., 2018) to substantiate the ranges of criterion limits of the values of group and integral indices. As a result, the following scale was formed: 0.70–1.0 for a sufficiently high level of SD (hereinafter the term "high" is used); 0.50–0.69 for an insufficient level of development ("medium"); less than 0.50 for a low level of development.

Integral indices allowed us to classify regions by comparing the level of fulfilment of particular stakeholder interests with the achieved level of SD of the region as a whole. The groups of regions thus identified are shown in Figure 1. The proposed typology makes it possible to identify problem areas and determine managerial priorities.

To assess the degree of consistency and the degree of balance of interests of RS, we calculated the coefficients of variation (*Kv*) for the corresponding values of integral indices. The values of the Kv for the indices in economic, environmental and social spheres indicate the socio-economic-environmental balance (imbalance) in the LFI of regional stakeholders. When analysing the interests of a particular stakeholder, we measure what we refer to as intrastakeholder balance; when analysing the interests of all stakeholders, we measure what we refer to as interstakeholder balance. The Kv for the indices in the context of RS (for all three spheres simultaneously) indicate the consistency (inconsistency) in the level of fulfilment of regional stakeholder interests. These coefficients characterise the specifics of interaction between the population, business and regional government in the implementation of socio-economic-environmental interests. If the value of Kv exceeds 0.33, it indicates the presence of marked differentiation and indicates heterogeneity in the LFI. The introduction of Kv into the analysis allowed us to establish the typology of regions (Fig. 2).

The final step in the proposed methodology is econometric modelling, which allows us to determine the dependence of the level of SD of the region on the degree of socio-economic-environmental balance and interstakeholder coherence.

[1] The exception was the Exports, percent of GRP, as due to the impact of economic sanctions, the 2010 level was fundamentally unattainable.

LFI of a particular stakeholder $I(S_p)$	*0.70–1.00*	**Group VII** — *High LFI;* — *Low level of SD*	**Group VII** — *High LFI;* — *Medium level of SD*	**Group IX** — *High LFI;* — *High level of SD*
	0.50–0.69	**Group IV** — *Medium LFI;* — *Low level of SD*	**Group V** — *Medium LFI;* — *Medium level of SD*	**Group VI** — *Medium LFI;* — *High level of SD*
	0.00–0.49	**Group I** — *Low LFI;* — *Low level of SD*	**Group II** — *Low LFI;* — *Medium level of SD*	**Group III** — *Low LFI;* — *High level of SD*
Thresholds		*0.00–0.49*	*0.50–0.69*	*0.70–1.00*
		The level of SD of the region I(U)		

Fig. 1. *Integrated assessment matrix for SD and the LFI*

Degree of consistency of stakeholder interests Note: based on the Kv for $I(S_p)$	*High (Kv < 0.33)*	**Group III** *An imbalance in the LFI*	**Group IV** *Balance across spheres and consistency in the level of fulfilment of socio-economic-environmental interests of stakeholders*
	Low (Kv > 0.33)	**Group I** *Sphere imbalances and inconsistency in the LFI*	**Group II** *Inconsistency in the LFI*
Thresholds		*Low (Kv > 0.33)*	*High (Kv < 0.33)*
		Degree of socio-economic-environmental balance of stakeholder interests Note: based on the Kv for $I(V_q)$	

Fig. 2. *Integrated assessment matrix for the consistency and socio-economic-environmental balance of interests of RS*

Data management and analysis were performed using Gretl 2019. Significance levels were set at the 5 % level using the student t-test.

It should be noted that the considered methodology has a number of limitations. First, the indicator normalisation performed excludes the use of indicators with negative values, which makes it impossible to include such indicators as natural or migration loss of population, the losses of enterprises, etc. Second, the methodology is based on interregional comparisons, so it is only correct for a homogeneous group of regions. However, once the target values of SD indicators are established in Russia at the regional level, this limitation can be overcome. In this case, normalisation of indicators will be performed according to the target value rather than the best achieved one.

Results and Discussion

To study the LFI of stakeholders, we have chosen the regions of the Volga and Ural Federal Districts of Russia. These were the Republic of Bashkortostan, Republic of Mari El, Republic of Mordovia, Republic of Tatarstan, Udmurt Republic, Chuvash Republic, Perm Territory, Kirov Region, Nizhny Novgorod Region, Orenburg Region, Penza Region, Samara Region, Saratov Region, Ulyanovsk Region, Kurgan Region, Sverdlovsk Region, and Chelyabinsk Region. These regions have similar geographical, climatic, resource characteristics and analogous pathways of socio-economic development. They have a developed industry, as well as significant scientific, technical and human resource potential. This group of regions can be considered homogeneous, because in the analysed period (2010–2019), the coefficient of variation in GRP per capita did not exceed 0.31, consolidated budget income per capita did not exceed 0.17 and the unemployment rate did not exceed 0.25.

The analysis showed that the best values of indicators of economic and environmental interests of the population demonstrated positive dynamics (a trend towards sustainable development). This confirms the findings of our previous studies (Kurganov & Tretiakova, 2021). The values of the best indicators for regional business did not have any pronounced trends. The best values of most indicators characterising the fulfilment of interests of the regional government have changed in the opposite direction (a trend away from sustainable development).

The group indices presented in Figures 3–5 indicate an intrastakeholder imbalance in the LFI. In particular, in 2019 in the Perm Territory, the indices of the fulfilment of interests for the population were quite high, while for the regional business and government, the economic indices were medium, the environmental indices were low and the social indices were high. In addition, there was an interstakeholder imbalance of interests in the spheres of SD. For example, in 2019 in the Perm Territory, the integral index characterising the level of fulfilment of environmental interests of all stakeholders in the aggregate was low, for eco-

nomic interests it was medium, and for social interests it was high.

Figures 3–5 show that the highest values of indices characterising economic interests of the population were observed in the Republic of Tatarstan, the Sverdlovsk and Nizhny Novgorod Regions and the Perm Territory. This may be due to a higher number of subsistence minimums in per capita consumer spending and better satisfaction of material and non-material needs, including recreational needs. Comparatively low economic business indices were observed in the Republic of Mari El, Kurgan Region and Orenburg Region. It is highly likely that this situation could have been caused by a relatively low level of innovativeness of produced goods.

The study identified a significant variation in the indicators of environmental intensity of economic activity. For example, as of 2019, 0.25 thousand m3 of fresh water were used per million roubles of turnover of organisations in the Sverdlovsk Region, and 1.5 thousand m3 in the Orenburg Region. The share of atmospheric pollutants captured and neutralised ranged from 16 % in the Chuvash Republic to 97.4 % in the Penza Region. A significant variation in the values of environmental indicators has resulted in generally low values of environmental indices, where progress in one region in one indicator has automatically led to a decrease in the standard values of the same indicator in all the other regions.

The high level of fulfilment of social interests of all RS was probably due to the establishment of uniform social standards and norms at the federal level to ensure a decent quality of life. These standards are set forth in the Decree of the Government of the Russian Federation of 26 December 2017 No. 1640 “On Approval of the State Programme

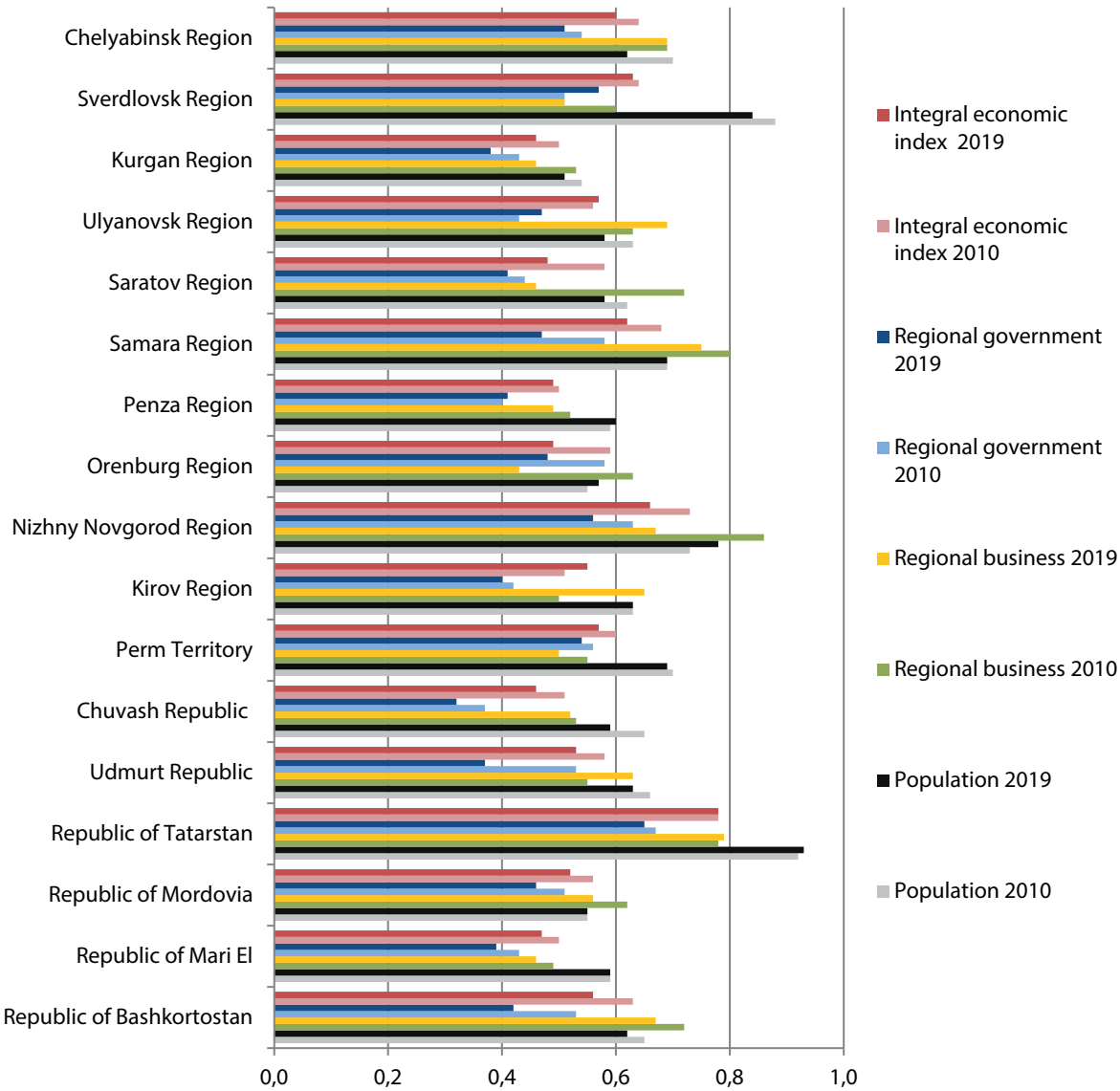

Fig. 3. *Group and integral economic indices of the LFI of key RS (source: estimated by the authors based on statistical data)*

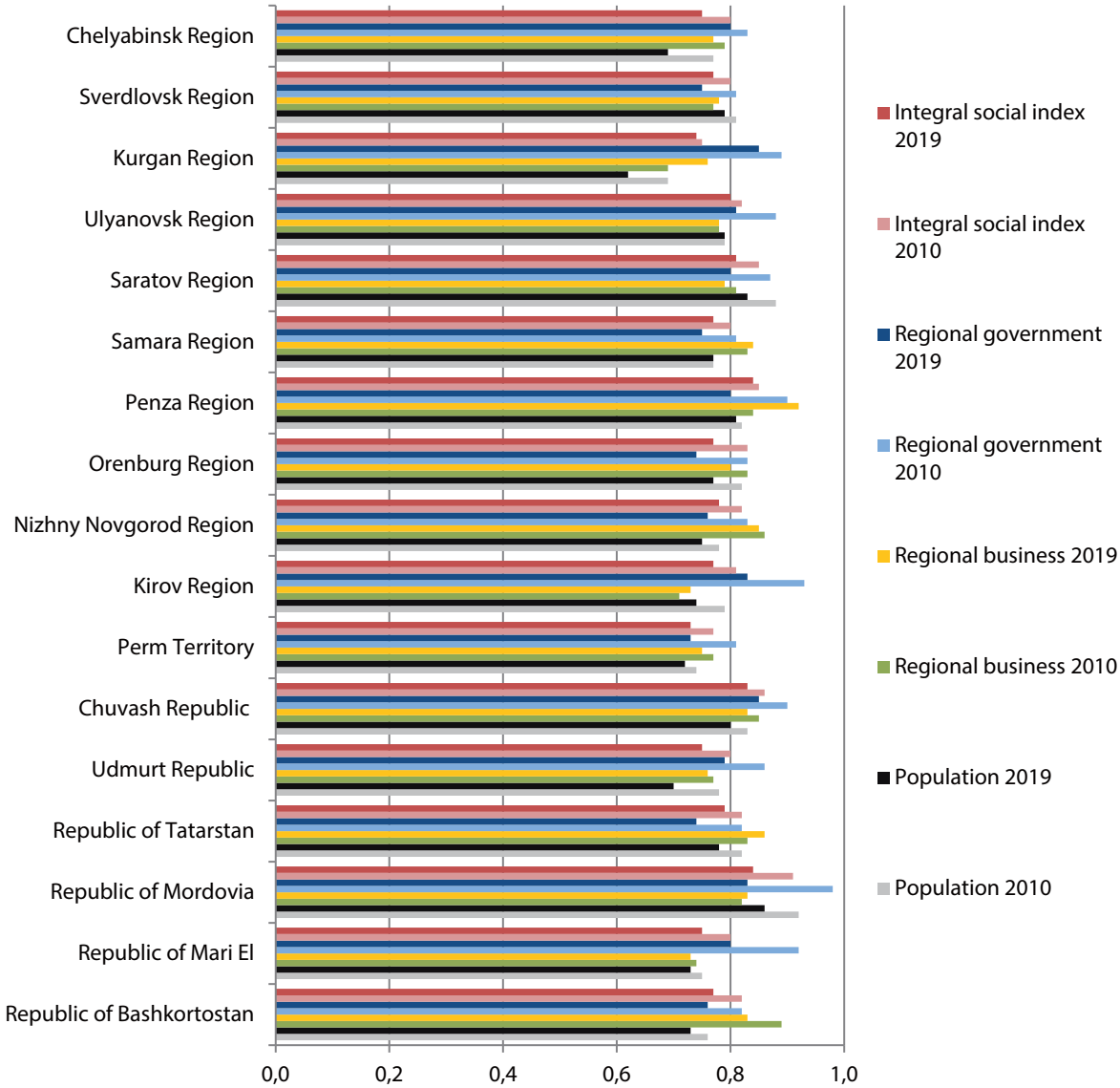

Fig. 4. *Group and integral social indices of the LFI of key RS (source: estimated by the authors based on statistical data)*

of the Russian Federation Development of Healthcare" and the Decree of the Government of the Russian Federation of 30 March 2020 No. 370 "On Amendments to the State Programme of the Russian Federation Promotion of Employment". However, the indices in this sphere have demonstrated a downward trend in most of the studied regions. It was most pronounced in relation to the interests of the regional government. Combined with a growing demographic burden, this trend creates additional barriers to the fulfilment of social obligations to the population.

The data in Figure 6 reveal certain differences in the LFI of different stakeholders.

In most regions, the highest LFI is registered for the population. The relatively high integral indices for the LFI of certain RS do not lead to a high level of socio-economic-environmental development of the region as a whole. This fact indicates that there is an imbalance and inconsistency in the fulfilment of regional stakeholder interests hindering regional sustainable development. This finding confirms the main hypothesis of the study that SD of regions is highly dependent on the fulfilment, consistency and balance of interests of their key stakeholders.

Table 2 shows that the level of fulfilment of socio-economic-environmental interests of the population has increased in 10 of the 17 regions in 2019 compared to 2010. In particular, the Kurgan region moved from Group I to Group IV, and 9 regions moved from Group V to Group VIII. The positive dynamics could be attributed to the active social policy of the federal government in recent years.

Table 2 shows that Russian regions are mainly concentrated in Group V with regard to the fulfilment of interests of the regional business. The rel-

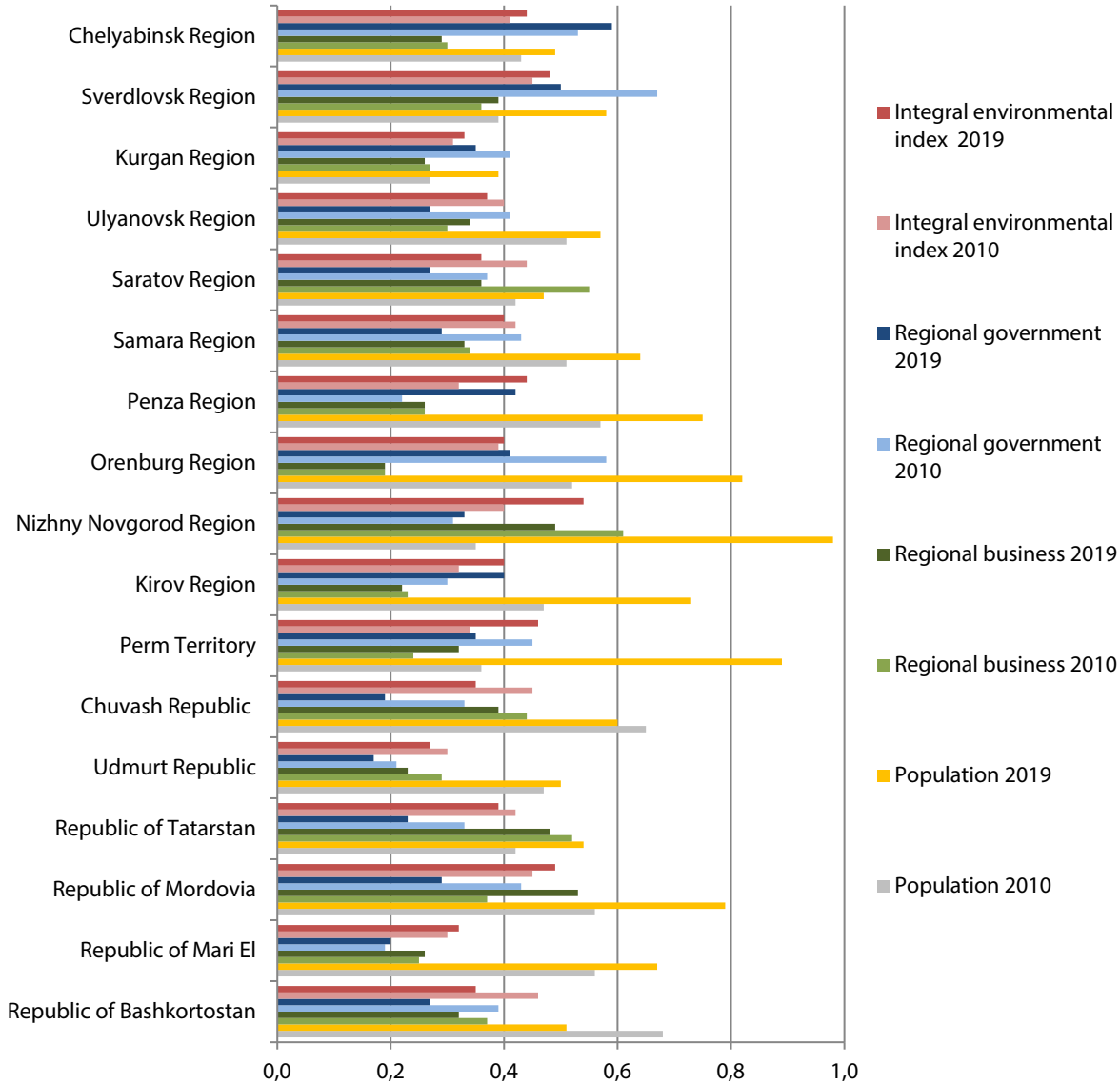

Fig. 5. *Group and integral environmental indices of the LFI of key RS (source: estimated by the authors based on statistical data)*

Table 2

Allocation of regions in the integrated assessment matrix for SD and the LFI

Region	Population		Regional business		Regional government	
	2010	2019	2010	2019	2010	2019
Republic of Bashkortostan	VIII	V	V	V	V	II
Republic of Mari El	IV	IV	I	I	I	I
Republic of Mordovia	V	VIII	V	V	V	II
Republic of Tatarstan	V	VIII	V	V	V	II
Udmurt Republic	V	IV	V	I	II	I
Chuvash Republic	VIII	V	V	V	II	II
Perm Territory	V	VIII	II	V	V	V
Kirov Region	V	VIII	II	II	II	V
Nizhny Novgorod Region	V	VIII	VIII	V	V	V
Orenburg Region	V	VIII	II	II	V	V
Penza Region	V	VIII	II	II	I	V
Samara Region	V	VIII	V	V	V	II
Saratov Region	V	V	V	V	V	II
Ulyanovsk Region	V	V	V	V	V	II
Kurgan Region	V	IV	I	I	IV	I
Sverdlovsk Region	V	VIII	V	V	V	V
Chelyabinsk Region	V	V	V	V	V	V

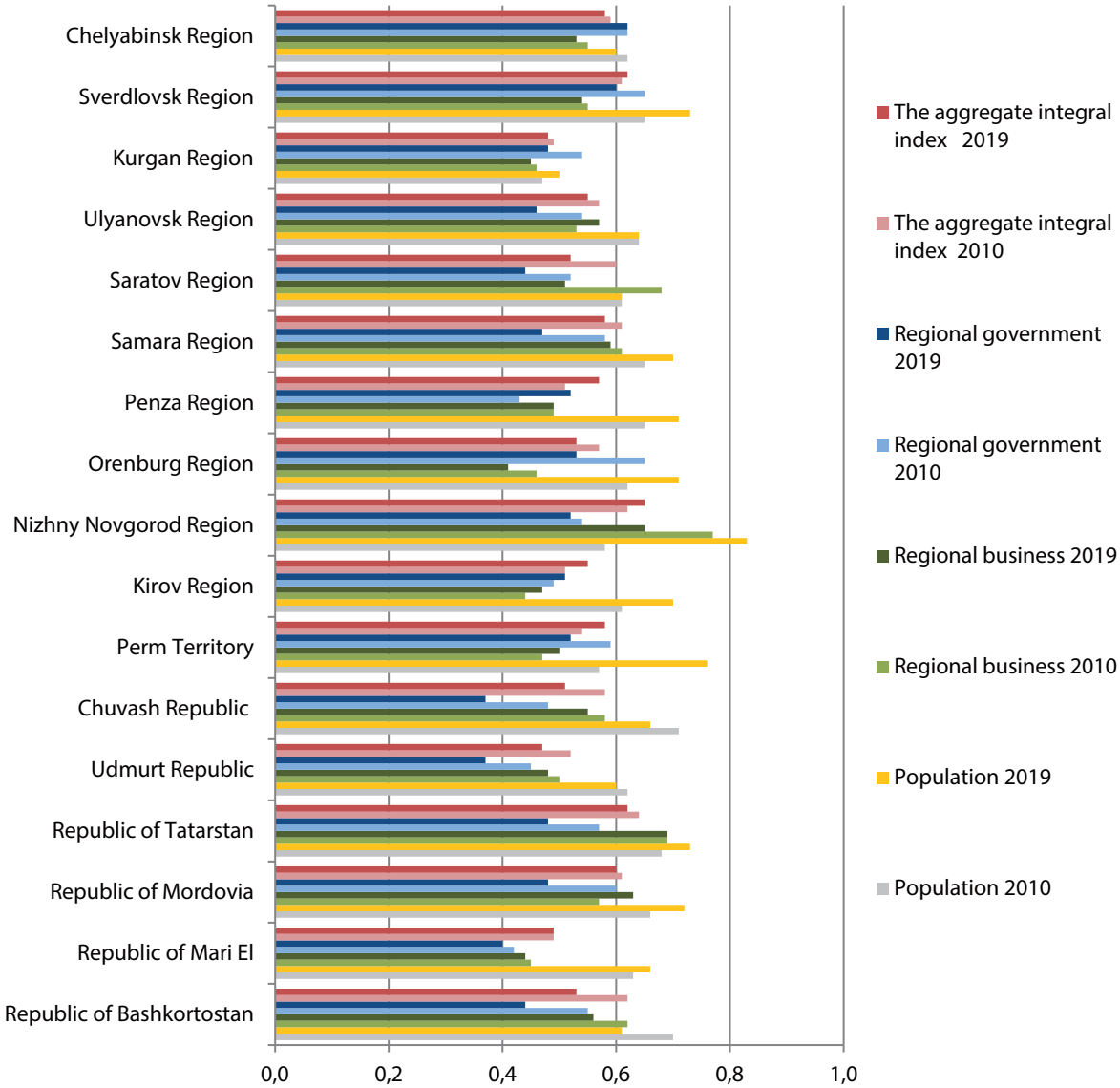

Fig. 6. *The integral indices and the aggregate integral index of the fulfilment of interests of RS (source: estimated by the authors based on statistical data)*

ative stability of positions of the regions may be a result of sufficient adaptability of regional business communities.

The LFI of the regional government decreased in 7 of the 17 regions studied (Table 2). In particular, one region (Kurgan Region) moved from Group IV to Group I, and 6 regions moved from Group V to Group II. These trends are probably due to a drop in the share of fixed capital investments in GRP, the share of internal research and development costs in GRP and the share of exports in GRP.

The Kv indicates a high level of interstakeholder consistency of socio-economic-environmental interests of the population, regional business and the regional government (Kv were below 0.33). The exception was the Republic of Mari El, where the inconsistency of interests of stakeholders was registered in 2012–2013 and 2016–2018. In those years, the Republic of Mari El had seen a visible decline in the LFI of the regional government. We believe that this is the main reason for the increased inconsistency. A high degree of interstakeholder consistency indicates that there is no discrimination towards any of the stakeholders. The absence of conflict of interest among key stakeholders is very important in ensuring sustainable regional development.

On the other hand, a low balance between the social, environmental and economic interests of stakeholders was observed in most of the studied regions. The high consistency and low balance of interests led to the concentration of regions mainly in Group III of the corresponding matrix (Fig. 7).

To visualise the dynamics of SD of particular regions, we used phase portraits. The phase portrait visualises the trajectory of the region and

Degree of consistency of stakeholder interests Note: based on the Kv for $I(S_p)$			
	High (Kv < 0.33)	**Group III** ***2010*** *Republic of Mari El, Republic of Mordovia, Republic of Tatarstan, Udmurt Republic, Chuvash Republic, Perm Territory, Kirov Region, Nizhny Novgorod Region, Orenburg Region, Penza Region, Saratov Region, Ulyanovsk Region, Kurgan Region* ***2019*** *Republic of Bashkortostan, Republic of Mari El, Republic of Tatarstan, Udmurt Republic, Chuvash Republic, Orenburg Region, Penza Region, Samara Region, Saratov Region, Ulyanovsk Region, Kurgan Region*	**Group IV** ***2010*** *Republic of Bashkortostan, Samara Region, Sverdlovsk Region, Chelyabinsk Region* ***2019*** *Republic of Mordovia, Perm Territory, Kirov Region, Nizhny Novgorod Region, Sverdlovsk Region, Chelyabinsk Region*
	Low (Kv > 0.33)	**Group I**	**Group II**
Thresholds		*Low (Kv > 0.33)*	*High (Kv < 0.33)*
		Degree of socio-economic-environmental balance of stakeholder interests *Note: based on the Kv for $I(V_q)$*	

Fig. 7. *Allocation of regions in the integrated assessment matrix for the consistency and socio-economic-environmental balance of interests of RS*

helps identify established trends, including qualitative changes or phase transitions. This allowed us to visualise the relationship between the balance of stakeholder interests and the level of SD of the region. In particular, Figure 8a demonstrates an increase in the LFI of the population from medium to high in the Nizhny Novgorod Region, while maintaining a medium level of socio-economic development of the region as a whole. As a result, there is a phase transition: the region moves from Group V to Group VIII (Figure 8a). This progressive phase transition was accompanied by an increase in the degree of intrastakeholder socio-economic-environmental balance of interests, as is evidenced by the downward dynamics of the Kv (Fig. 8b).

Figure 9a demonstrates the attraction effect in the Penza Region. First, the level of fulfilment of regional business interests rises from low to medium. There is a positive phase transition from Group I to Group V (2012). Then in 2013, there was a negative phase transition: the region returned to Group I. The attractor that brought the region back to the low position seems to be the relative scarcity of resources and insufficient institutional efforts, which prevented the region from maintaining a new qualitative level. Figure 9b shows that the progressive dynamics was accompanied by an increase in the level of intrastakeholder interest balance (decrease in the value of the Kv), while the return to the initial positions, on the contrary, was accompanied by its decrease (increase in the value of the Kv). The region's positive phase transition from Group I to Group II in 2019 (Fig. 9a) was also accompanied by an increase in the balance of stakeholder interests (Fig. 9b).

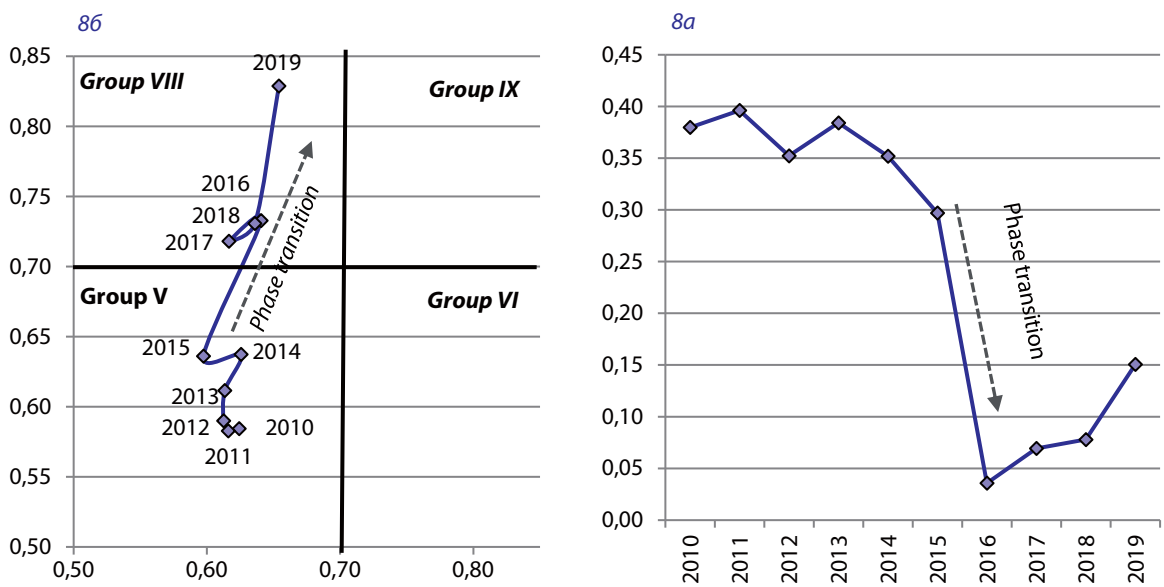

Fig. 8. *Comparing the phase portrait and the assessment of the intrastakeholder balance of interests for the population (Nizhny Novgorod Region)*

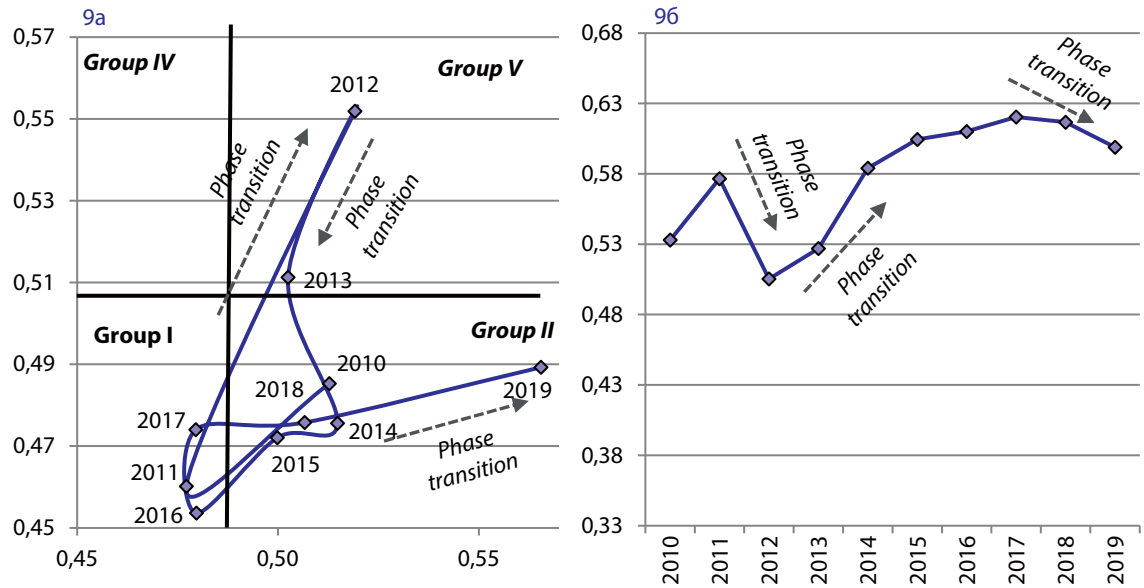

Fig. 9. *Comparing the phase portrait and the assessment of the intrastakeholder balance of interests for the regional business (Penza Region)*

Table 3

Parameters of regression models of the impact of the level of balance and consistency of stakeholder interests on the SD of the region

Group	Regression equation	R^2	*p*-value *F*-criterion
Regions of Group III	$Y = -1.02^{***} - 0.42x_1^{***} - 0.004x_2$	0.93	0.00
Regions of Group IV	$Y = -0.73^{**} - 0.14x_1^{**} - 0.012x_2$	0.81	0.01

Where Y is the logarithm of the aggregated index characterising the level of SD in the region; x_1 is the logarithm of the *Kv* characterising the degree of imbalance of stakeholders' interests; x_2 is the logarithm of the *Kv* that characterises the degree of inconsistency of stakeholders' interests.

The symbol «**» indicates variables that are significant at the significance level of 5 %.

The symbol «***» indicates variables that are significant at the significance level of 1 %.

* Source: estimated by the authors based on statistical data.

Table 3 shows the results of correlation and regression analysis for the regions in Groups III and IV. As follows from Table 2, the dependence of the level of regional SD on the degree of balance and consistency of stakeholder interests is statistically significant, as we originally hypothesised.

The proposed methodology reveals the existing inconsistency in the fulfilment of regional stakeholder interests and imbalances between the spheres of SD. It highlights existing problem areas and might inform government policies.

Conclusion

This article focuses on the relationship between the balance and consistency of socio-economic-environmental interests of regional stakeholders and sustainable development of Russian regions. The study covered 17 regions of the Russian Federation for the period from 2010 to 2019.

We developed the indicator framework and a special methodology to assess the level of fulfilment of socio-economic-environmental interests of such RS as the population, business and regional government. The results showed that most regions have a medium LFI and a medium level of SD. The study revealed no significant differences in the LFI of different stakeholders. Consequently, no priority is given to any of the stakeholders to the detriment of the others. Consistency in the fulfilment of interests of different stakeholders promotes social cohesion in Russian regions.

We found evidence of a socio-economic-environmental imbalance in the fulfilment of stakeholder interests across the spheres of SD. The social interests of all stakeholders were fulfilled to the greatest extent while the environmental interests were fulfilled the least. The dynamic analysis showed that the changes towards SD were accompanied by a decrease in the level of socio-economic-environmental imbalance in the fulfilment of regional stakeholder interests. Conversely, the changes in the opposite direction were combined with an increase in a socio-economic-environmental imbalance.

The proposed methodology contributes to the study of the balance and consistency of stakeholder

interests and their impact on regional SD. It allows for a more detailed analysis of the dynamics of economic, environmental and social indicators of SD from the standpoint of fulfilment of stakeholder interests. It helps identify existing trends and imbalances and prove scientifically the existence of issues which should be dealt with to ensure SD of Russian regions. The evidence from this study can inform the design of regional development programmes. This might pave the way to reducing existing imbalances and avoiding conflicts of interest in the future in order to maintain social harmony.

References

Alferova, T. (2021). Establishment of the concept of sustainable development: regional aspect. *Vestnik Permskogo natsionalnogo issledovatelskogo politekhnicheskogo universiteta. Sotsialno-ekonomicheskie nauki [PNRPU Sociology and Economics Bulletin], 1,* 252-263. DOI: 10.15593/2224-9354/2021.1.19 (In Russ.)

Alibašić, H. (2018). *Sustainability and Resilience Planning for Local Governments: The Quadruple Bottom Line Strategy.* Cham: Springer International Publishing, 120.

Bartelmus, P. (2003). Dematerialization and capital maintenance: two sides of the sustainability coin. *Ecological Economics, 1,* 61-81. DOI: 10.1016/S0921-8009(03)00078-8.

Bochko, V. (2013). The coordinated and socially focused development of economy — important scientific direction of economic researches. *Zhurnal ekonomicheskoy teorii [Russian Journal of Economic Theory], 3,* 27-38. (In Russ.)

Boymatov, A. (2016). Theoretical grounds of sustainable development of regional economy. *Vestnik Tadzhikskogo gosudarstvennogo universiteta prava, biznesa i politiki. Seriya gumanitarnykh nauk [Bulletin of TSU LBP. Series of Humanitarian Sciences], 2,* 16-23. (In Russ.)

Cabezas, H., Pawlowski, C., Mayer, A. & Hoagland, T. (2005). Sustainable systems theory: ecological and other aspects. *Journal of Cleaner Production, 5,* 455-467. DOI: 10.1016/j.jclepro.2003.09.011.

Danilov-Danilian, V. I. (2003). Sustainable Development (Theoretical and Methodological Analysis). *Ekonomika i matematicheskie metody [Economics and Mathematical Methods], 2,* 123-135. (In Russ.)

Granberg, A. (2004). *Osnovy regionalnoy ekonomiki [Fundamentals of Regional Economics].* Moscow: Publishing House of the Higher School of Economics, 495. (In Russ.)

Graymore, M., Sipe, N. & Rickson, R. (2008). Regional sustainability: how useful are the current tools of sustainability assessment at the regional scale? *Ecological Economics, 3,* 362-372. DOI: 10.1016/j.ecolecon.2008.06.002.

Jiménez-Aceituno, A., Peterson, G., Norström, A., Wong, G. & Downing, A. (2020). Local lens for SDG implementation: lessons from bottom-up approaches in Africa. *Sustainability Science, 15(3),* 729-743. DOI: 10.1007/s11625-019-00746-0.

Jovovic, R., Draskovic, M., Delibasic, M. & Jovovic, M. (2017). The concept of sustainable regional development — institutional aspects, policies and prospects. *Journal of International Studies, 1,* 255-266 DOI: 10.14254/2071-8330.2017/10-1/18.

Kurganov, M. & Tretiakova, E. (2021). Ecological innovations for regional sustainable development: an empirical study. *SHS Web of Conferences, 116,* 00043. DOI: 10.1051/shsconf/202111600043.

Kurganov, M. & Tretyakova, E. (2020). Sustainable Regional Development Assessment in terms of Realizing the Values of Key Stakeholders. *Journal of New Economy, 4,* 104-130. DOI: 10.29141/2658-5081-2020-21-4-6.

Kurushina, E. (2018). Modern Paradigms of Spatial Development. *Vestnik Kemerovskogo gosudarstvennogo universiteta. Seriya: Politicheskie, sotsiologicheskie i ekonomicheskie nauki [Bulletin of Kemerovo State University. Series: Political, Sociological and Economic Sciences], 1,* 117-122. DOI: 10.21603/2500-3372-2018-1-117-122 (In Russ.)

Lehtonen, M. (2004). The environmental-social interface of sustainable development: capabilities, social capital, institutions. *Ecological Economics, 49(2),* 199-214. DOI: 10.1016/j.ecolecon.2004.03.019.

Lozano, R. (2012). Towards better embedding sustainability into companies' systems: an analysis of voluntary corporate initiatives. *Journal of Cleaner Production, 25,* 14-26. DOI:10.1016/j.jclepro.2011.11.060.

Migranova, L., Toreev, V. & Yarasheva, A. (2014). Economic behavior: analysis and prospects. *Ekonomicheskie i sotsialnye peremeny: fakty, tendentsii, prognoz [Economic and social changes: facts, trends, forecast], 1,* 93-100. DOI: 10.15838/esc/2014.1.31.11 (In Russ.)

Nikiforova, E., Klepikova, L. & Schneider, O. (2018). Sustainable Development of Economic Entities: Key Tasks, Stages, and Interests of Stakeholders. *Azimut nauchnykh issledovaniy: ekonomika i upravlenie [Azimuth of scientific research: economics and administration], 3,* 120-124. (In Russ.)

Podoprigora, M., Makarova, E. & Khlebnikova, A. (2014). Sustainable Development Modeling of Southern Federal District. *Izvestiya Saratovskogo universiteta. Novaya seriya. Seriya Ekonomika. Upravlenie. Pravo [Izvestiya of Saratov University. Economics. Management. Law], 3,* 488-495. DOI: 10.18500/1994-2540-2014-14-3-488-495.

Pomeranz, E. & Decker, D. (2018). Designing regional-level stakeholder engagement processes: striving for good governance while meeting the challenges of scale. *Journal of Environmental Policy & Planning, 4,* 403-418. DOI: 10.1080/1523908X.2017.1417119

Porrini, D. & Striani, F. (2017). Sustainable Development as a Macro-Regional Goal. *Journal of Reviews on Global Economics, 6,* 87-97. DOI: 10.6000/1929-7092.2017.06.07.

Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G. & Fuller, G. (2018). *SDG Index and Dashboards Report 2018*. Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN), New York. Retrieved from: https://www.sdgindex.org/reports/sdg-index-and-dashboards-2018/

Sartori, S., Latrônico, F. & Campos, L. (2014). Sustainability and sustainable development: A taxonomy in the field of literature. *Ambiente & Sociedade, XVII(1),* 1-20. DOI: 10.1590/1809-44220003491.

Shed'ko, Yu. (2015). Set of mechanisms for management of sustainable development in the region. *Ekonomika i upravlenie: problem, resheniya [Economics and Management: Problems, Solutions], 8,* 92-97. (In Russ.)

Shimanovsky, D., Kurganov, M. & Tretiakova, E. (2021). Analysis of Relationships among the Values of Economic Agents in the Context of Sustainable Development of Regions. *Vestnik Yuzhno-Uralskogo gosudarstvennogo universiteta. Seriya: Ekonomika i menedzhment [Bulletin of the South Ural State University. Series: Economics and Management], 1,* 57-68. DOI: 10.14529/em210106 (In Russ.)

Tazhitdinov, I. (2013). The Applying Stakeholder Approach to Strategic Management of Territories Development. *Ekonomika regiona [Economy of Region], 2,* 17-27. DOI: 10.17059/2013-2-2. (In Russ.)

Tret'yakova, E. & Osipova, M. (2018). Evaluation of sustainable development indicators for regions of Russia. *Problemy prognozirovaniya [Studies on Russian Economic Development], 2,* 124-134. DOI: https://doi.org/10.1134/S1075700718020144 (In Russ.)

Tsapieva, O. (2010). Sustainable development of a Regions: Theoretical Foundations and the Model. *Problemy sovremennoy ekonomiki [Problems of Modern Economics], 2,* 307-311. (In Russ.)

Uskova, T. (2009). *Upravlenie ustoychivym razvitiem regiona [Management of sustainable development of the region]*. Vologda: FSBIS VolSC RAS, 355. (In Russ.)

Wan, L., Zhang, Y., Qi, S., Li, H., Chen, X. & Zang, S. (2016). A Study of Regional Sustainable Development Based on GIS/RS and SD Model—Case of Hadaqi Industrial Corridor. *Journal of Cleaner Production, 142,* 654-662. DOI: 10.1016/j.jclepro.2016.09.086.

Yanchenko, A., Androsenko, N. & Ivanova, G. (2018). Modern Mechanisms of Standardization for Improving the Ecological Situation in the Regions. *Ekonomika regiona [Economy of Region], 2,* 516-529. DOI: 10.17059/2018-2-14 (In Russ.)

Zarghami, E. & Fatourehchi, D. (2020) Comparative analysis of rating systems in developing and developed countries: A systematic review and a future agenda towards a region-based sustainability assessment. *Journal of Cleaner Production, 5,* 120024. DOI: 10.1016/j.jclepro.2020.120024.

Zeijl-Rozema, A., Ferraguto, L. & Caratti, P. (2011) Comparing region-specific sustainability assessments through indicator systems: Feasible or not? *Ecological Economics, 70(3),* 475-486. DOI: 10.1016/j.ecolecon.2010.09.025

About the Authors

Elena A. Tretiakova — Dr. Sci. (Econ.), Professor, Professor of the Department of Environmental Protection, Perm National Research Polytechnic University; Professor of the Department of Management, HSE University Perm; Scopus Author ID: 55888410400; https://orcid.org/0000-0002-9345-1040 (10, Gagarina Boul., Perm, 614990; 38, Studencheskaya St., Perm, 614070, Russian Federation; e-mail: E.A.T.pnrpu@yandex.ru).

Maksim A. Kurganov — Cand. Sci. (Econ.), Lecturer of the Department of Management, Acting Head of the Department of Management, HSE University Perm; https://orcid.org/0000-0003-2108-1068 (38, Studencheskaya St., Perm, 614070, Russian Federation; e-mail: MAKurganov@hse.ru).

Информация об авторах

Третьякова Елена Андреевна — доктор экономических наук, профессор, профессор кафедры охраны окружающей среды, Пермский национальный исследовательский политехнический университет; профессор, департамент менеджмента, Национальный исследовательский университет «Высшая школа экономики» — Пермь; Scopus Author ID: 55888410400; https://orcid.org/000-0002-9345-1040 (Российская Федерация, 614990, г. Пермь, бульвар Гагарина, 10; 614070, г. Пермь, ул. Студенческая, 38; e-mail: E.A.T.pnrpu@yandex.ru).

Курганов Максим Андреевич — кандидат экономических наук, преподаватель департамента менеджмента, и. о. руководителя департамента менеджмента, Национальный исследовательский университет «Высшая школа экономики» — Пермь; https://orcid.org/0000-0003-2108-1068 (Российская Федерация, 614070, г. Пермь, ул. Студенческая, 38; e-mail: MAKurganov@hse.ru).

Дата поступления рукописи: 02.02.2022.
Прошла рецензирование: 08.11.2022.
Принято решение о публикации: 15.06.2023.

Received: 02 Feb 2022.
Reviewed: 08 Nov 2022.
Accepted: 15 Jun 2023.