On the Introduction of the Innovation System in the Eastern Regions of the Russian Federation

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\textbf{Abstract.} The aim of the research is to identify the role of the Siberian and Far East regions of the Russian Federation in the innovative potential and to rank these regions according to their innovative activity. Employing multivariate analysis methods, the authors conclude that with a small share of enterprises engaged in innovations, funds spent for these purposes, and the lowest volumes of innovative products in the country, the regions farthest from the central European part have significant total innovative potential, ranking second and third in innovative activity among other federal districts of Russia. Based on the results of the component analysis of the general economic infrastructure availability, a rating of the eastern regions that are part of the Siberian and Far Eastern Federal District is compiled.

1. Introduction

The strategic goal of developing remote Russian territories is to harmonise interests of all subjects of the regional economic system by stimulating a balanced phased growth of the innovation type. The territory of Siberia and the Far East is characterised by extreme natural and climatic living conditions, which calls for the development of sustainable labour potential system at the legislative and administrative level in these remote, vast and uninhabited spaces. Serious efforts in this connection are made by the Plenipotentiaries of the President of the Russian Federation in the federal districts and by the Ministry of the Russian Federation for the development of the Far East. In the course of exhibitions, career counselling, workshops, competitions, lectures and presentations in the central part of Russia, large-scale work is ongoing to attract the young generation to continue their education in the Far East and to start their own business on favourable terms.

Attention is drawn to the fact of the dynamic development of the countries of the Asia-Pacific region, which show a significant increase both in traditional factors of production and innovation. In turn, the current economic development of the eastern part of Russia testifies to the extremely weak involvement of the territorial, natural-resource, environmental, logistic, transit, tourist and recreational potentials in a single national economic complex of the country. Under these conditions, further intensification of all spheres of socio-political, industrial and economic activities, as well as the demographic component of the development of the countries of the Asia-Pacific region, make the emergence of future geopolitical threats to the sovereignty, economic security and territorial integrity of the Russian Federation apparent.

Traditionally, the territory of Siberia has always had a scientific and technical vector of evolutionary development due to the presence of large industrial facilities of ferrous and non-ferrous metallurgy, the fuel and energy complex, and the food industry [1]. The territory of the Far East also has significant reserves of growth in the agricultural sector, woodworking industry, electric power industry and transport [2]. According to general estimates of the Ministry of Natural Resources of the Russian Federation, up to
4/5 of the oil, natural gas, coal, nickel, copper, gold, and hydropower resources are concentrated in the eastern part of Russia [1].

According to the Strategies for the Development of Siberia and the Far East approved in 2009-2010, the use of such significant reserves of material well-being should be based on removing restrictions on the inertial development of a number of industries and increasing their competitiveness in foreign markets [3]. The scenario approach to the implementation of the Strategies is closely linked to the innovative scenario of the Outline Plan of long-term development of the entire territory of Russia [4].

It should be noted that the innovative principles of regional development used as targets have been declared in the program documents earlier. In the “Outline Plan for a Shift to Sustainable Development in the Russian Federation, approved by Presidential decree on 1 April 1996, it was said that economic activity in the regions should be organised “… on the basis of mass introduction of energy and resource-saving technologies and targeted changes of the economic structure, the structure of personal and public consumption.” Due to the gradual development of the categorical apparatus of the modern Russian economic science, the term “innovation” is not yet present in the 1996 Outline Plan [5].

2. Research

2.1. The Present Structure of Siberia and the Far East Innovative Regional Development

The present structure of Siberia and the Far East innovative regional development can be described as rather weak, unable to draw a rich resource functional into investment relations within the framework of the prevailing forms of ownership. The identification of patterns in the innovative potential of the federal districts has been carried out using the k-means method. For the purposes of checking statistical significance, the analysis of variance has been carried out, according to the results of which cluster analysis is recognised as statistically significant. The federal districts in the resulting clusters have been ranked in order of increasing distance from the center of the cluster.

Along with this, it is noteworthy that the regions of Russia under study are leaders in foreign investments and are among the most significant territories for the West in terms of increasing their presence. After the sanction period of 2014–2015, the eastern regions of Russia take the second and fourth places in terms of foreign investment.

Thus, foreign states, represented by business communities and individual investors, see great prospects for themselves in the extraction, processing and export of natural resources of the undeveloped and almost uninhabited part of Russia, the development of which is still being carried out extensively. Moreover, foreign capital in administratively weak remote areas operates in a different way than it does in the Central and Ural Federal Districts. With this in mind, the formation of the future framework of economic security of the eastern regions of Russia is under threat.

2.2. Materials and Methods

The information in the analytical part of the study has been prepared on the basis of the annual statistical collection “Regions of Russia” and is presented as of 2017 due to significant time constraints in the activities of the Federal Service of State Statistics (Rosstat). For the same reason, information on the Crimean Federal District is not available in the calculated data and the results of the study. These grounds did not affect the objectivity of the research methods used and the reliability of the findings regarding the innovative development of the Russian regions that are part of the Siberian and Far Eastern Federal Districts.

Based on the published by Rosstat data on the innovative activity of the regions, a component analysis was carried out and an economic interpretation was given to the main components. The determination of
the place of the Siberian and Far Eastern federal districts in the ranking of the innovative potential of the territories of the Russian Federation was based on the following data available in Rosstat (Table 1).

Table 1. Initial Data for Federal District Ranking.

| Indicators* | Units       |
|-------------|-------------|
| 1 Innovative activity of organisations | percentage |
| 2 Volume of innovative products | percentage |
| 3 Innovation organisations reducing costs | percentage |
| 4 Innovation organisations reducing energy costs | percentage |
| 5 Innovation organisations reducing carbon dioxide | percentage |
| 6 Innovation organisations replacing raw materials with less hazardous ones | percentage |
| 7 Innovation organisations reducing environmental pollution | percentage |
| 8 Innovation organisations ensuring recycling | percentage |
| 9 Coefficient of inventive activity | percentage |

Note: * Federal State Statistics Service

The ranking of the constituent entities of the Russian Federation included in the Siberian and Far Eastern Federal Districts has been carried out according to the development of the general economic infrastructure. As the initial data, the statistical indicators shown in Table 2 have been used.

Table 2. Initial Data for Regional Ranking.

| Indicators* | Units       |
|-------------|-------------|
| 1 Exports to far-abroad countries | USD         |
| 2 Export with neighboring countries | USD         |
| 3 Budget revenues | rubles     |
| 4 Deposits in rubles | rubles      |
| 5 Net financial result of organisations | rubles     |
| 6 Investments in fixed capital | rubles     |
| 7 Scope of construction work performed | rubles      |
| 8 Retail trade turnover | rubles     |
| 9 Volume of paid services | rubles     |
| 10 The density of roads | kilometers |
| 11 Agricultural product | rubles     |
| 12 Scope of extraction of minerals work performed | rubles |
| 13 Scope of manufacturing activity work performed | rubles     |
| 14 Scope of electricity, gas and water production work performed | rubles |
| 15 GRP | rubles     |
| 16 Cost of fixed assets | rubles     |
| 17 Trade turnover of organisations | rubles     |
| 18 Increase in high-productivity jobs | units |
| 19 Share of investments in fixed capital in GRP | percentage |
| 20 Coefficient of inventive activity | units |

Note: *Federal State Statistics Service

For the purposes of analysis, a table of coordinates of the initial variables was formed in the space of the main components, which is a matrix of factor loads. Plots were constructed for the distribution of the factor coordinates of variables in the space of principal components (factors).
To explain the number of interpretation factors involved in the analysis, a “scree” graph was constructed. Then, the distribution of the observed objects was plotted in the factor space for the 1 and 2 main axes, since the remaining main components were not informative and did not participate in further analysis. To verify compliance with the law of normal distribution for each variable, scattering diagrams were constructed. When interpreting the results of the verification of compliance with the normality of distribution, it was taken into account that only 9 federal districts are allocated in Russia, and only 8 of them took part in the calculations.

2.3. Results

According to the component analysis, the dimension of the informational regional space of the nine indicators under consideration was reduced to two main components, which together account for 80.65% (52.58 + 28.07) of the variations of the initial variables, taking into account the fact that the remaining 5 explain less than 20% (7.72 + 6.11 + 2.94 + 1.98 + 0.60) variations of the initial variables, respectively. You can also notice that the mnemonic rule of Vilfredo Pareto “80/20” is being formed.

The result of the component analysis of the innovative potential of the Siberian and Far Eastern Federal District was is their place among the other federal districts of Russia according to the considered system of statistical indicators.

The ranking of the federal districts of the Russian Federation shows that the Siberian and Far Eastern federal districts are in third and second place in terms of innovation activity. The Volga and North Caucasus Federal Districts can be considered the least innovative and active in Russia (Table 3).

| Rank rating* | Names of Federal District          | Factor value |
|--------------|-----------------------------------|--------------|
| 1            | North-Western federal district    | 2,30067      |
| 2            | Eastern federal district          | 1,64714      |
| 3            | Siberian federal district         | 1,13036      |
| 4            | Central federal district          | 0,55394      |
| 5            | Southern federal district         | 0,11280      |
| 6            | Urals federal district            | -0,43475     |
| 7            | Volga federal district            | -0,50641     |
| 8            | North-Caucasus federal district   | -4,80377     |

Note: *authors’ calculations

In the course of the component analysis of the general economic infrastructure development in the regions of Siberia and the Far East, the dimension of the information space of 20 indicators under consideration has been reduced to two main components, which in total account for 66.56% (41.96 + 24.60) of the variations of the initial variables, the remaining 18 account for 33.44% of the variation in the source variables.

The result of the component analysis is the construction of an appropriate interregional rating, according to which the most developed general economic infrastructure is observed in the Krasnoyarsk Territory and the Irkutsk Region. The least developed economically in the east of Russia can be considered the Republic of Altai and the Republic of Tuva (Table 4).
Table 4. Ranking of the Siberian and Far Eastern Federal Districts According to the Development of General Economic Infrastructure.

| Rank rating* | Regions                             | Factor value |
|--------------|-------------------------------------|--------------|
| 1            | Krasnoyarsk region                  | 7,41211      |
| 2            | Kemerovo region                     | 4,52795      |
| 3            | Irkutsk region                      | 3,64922      |
| 4            | Novosibirsk region                  | 3,18639      |
| 5            | Republic of Sakha (Yakutia)         | 1,86126      |
| 6            | Sakhalin region                     | 1,64092      |
| 7            | Primorsky krai                      | 1,47907      |
| 8            | Omsk region                         | 0,89393      |
| 9            | Altai territory                     | 0,83131      |
| 10           | Khabarovsk territory                | 0,01679      |
| 11           | Tomsk region                        | -0,50424     |
| 12           | Amur region                         | -1,36223     |
| 13           | Kamchatka territory                 | -1,84142     |
| 14           | Zabaikalsky Krai                    | -1,95617     |
| 15           | Republic of Khakassia               | -2,01449     |
| 16           | Republic of Buryatia                | -2,13050     |
| 17           | Magadan region                      | -2,72762     |
| 18           | Chukotka autonomous okrug           | -2,99817     |
| 19           | Jewish autonomous region            | -3,17933     |
| 20           | Republic of Tuva                    | -3,36835     |
| 21           | Altai republic                      | -3,41644     |

Note: *authors’ calculations

2.4. Conclusions

More than twenty years have passed since the change in the state policy guidelines of sustainable development of the RF constituent entities. The most remote regions of Siberia and the Far East turn out to be the least involved in the reform process. Possessing colossal volumes of natural resources and a vast territory, the eastern regions of Russia continue to remain outside the innovative channel of the development. At the same time, the presented study statistically substantiates the assertion that it is the Far Eastern and Siberian federal districts that are among the most innovatively active in the total assessment of the data available in Rosstat. This advantage of the eastern regions of Russia has already been noticed by Western investors and reinforced by the volume of financing of various industries.

The urgent task of public administration in the regions under study is to equalise the imbalances in socio-economic development and the formation of an infrastructural support system for innovation not at the expense of the administrative resources of the central government, but at the expense of creating an effective innovation policy at the regional level. The achievement of this result will be facilitated by a rational initiative of the RF authorities of the constituent entities and the local self-government.

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