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INDUSTRY CONCENTRATION MODELING OF SMALL AND MEDIUM-SIZED ENTERPRISES IN RUSSIAN REGIONS

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Abstract

One of the main ways to raise the efficiency of the Russian economy is its transformation, associated with the accelerated development of small and medium-sized enterprises. Using Ellison-Glazer spatial concentration indices the authors present the results of an analysis of the patterns of distribution of small and medium-sized enterprises (hereinafter referred to as SMEs) operating in the main sectors of the Russian economy. It considers the concentration assessment procedure based on SMEs employment in 78 regions of the country, and 13 types of economic activity. The official statistical information obtained from the total monitoring of all SMEs in Russia was used as initial data. A comparison of concentration rates in various types of economic activity is given, and regions that provide the largest contributions to industry concentration are identified. The highest rates of SMEs concentration are typical for fishing, mining, agriculture and forestry, as well as the production and distribution of electricity, gas and water. While enterprises in wholesale and retail trade, construction, transport and communications, as well as hotels and restaurants show the lowest rates. The study proves that the concentration indices in the economic activities related to commodities production are significantly higher than in the service sector. The results obtained have a certain theoretical and applied importance and can be used when conducting research on small and medium-sized enterprises, substantiating proposals for their development, as well as providing entrepreneurs with the necessary assistance and government support at all levels (federal, regional, municipal).

Keywords: Small and medium-sized enterprises, individual entrepreneurs, concentration index, types of economic activity, regions.

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1. Introduction

One of the founders of studies of spatial concentration or dispersion of the location of separate industries was Isard (1960). He proposed concentration as an indicator to assess the rate of production concentration. The development of the theory of spatial concentration and its detailed consideration is given in the paper (Ellison & Glaeser, 1997). It proposed the term concentration index and provided a mathematical model for its calculation, based on the rate of employment in a particular industry. It is indicated that the concentration index shows how the observed rate of employment concentration in the industry in question is greater than the random distribution.

Considering the experience gained so far in analyzing spatial concentration using Ellison-Glaser index, a number of interesting works can be noted. The studies of production concentration rate in countries such as Brazil, Vietnam and Russia are presented respectively in (Biderman & Lopes, 2015; Howard, Newman, & Tarp, 2016; Rastvortseva & Ternovskii, 2016). A comparative analysis of the spatial concentration of industry in several European countries is given in (Maslikhina, 2017). German researchers (Farhauer & Kröll, 2009) compared the various spatial concentration indices used, and concluded that Ellison-Glazer index has significant advantages. The studies of spatial concentration were associated with its assessment for all types of enterprises. At the same time, it should be noted that the issues of SMEs concentration have so far received insufficient attention in scientific publications.

2. Problem Statement

One of the most important aspects of improving the efficiency of the Russian economy is its transformation, associated with an increase in the role of SMEs and the production volume of this sector of the economy. The Federal law (Federal law “On the development of SME in the Russian Federation”, 2007) defines the criteria for classifying enterprises as small and medium-sized. According to this law the main criterion is the number of employees, which for a small enterprise should not exceed 100 people, and for a medium-sized enterprise is in the range from 101 to 250 people. SMEs also include individual entrepreneurs, that is, individuals who conduct business activities. As the results of scientific research show, entrepreneurship is one of the most important factors in increasing the sustainability and growth of modern economies (Decker, Haltiwanger, Jarmin, & Miranda, 2014; López & Hiebl, 2015; Grigore & Dragan, 2015; Pinkovetskaia, Nikitina, & Gromova, 2018). Numerous SMEs operate in the Russian business sector. In 2015, their number exceeded 4321 thousand, while 18449 thousand people worked there. At the same time, SMEs accounted for about 20% of the country’s GDP and the number of employees of all enterprises and organizations in Russia. This indicates that SMEs have not yet received much development in our country. For comparison, small enterprises in the European Union provide jobs for about 67% of the working population and produce 58% of the country’s GDP. The development of entrepreneurship in Russia should be based on determining the available reserves for its growth in each of the regions of the country and various types of economic activity. Therefore, the urgent issue is the study of patterns of SMEs distribution and, in particular, analysis of the concentration of production that has developed in entrepreneurial sector of the economy.

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3. Research Questions

Questions to be researched:

- What indicator should be used to assess the spatial concentration of SMEs?
- What industries are more common for the Russian entrepreneurial sector?
- What regions demonstrate a high concentration rate of SMEs by each industry?

Furthermore, we respond to recent calls in the literature for more systematic studies of concentration using Ellison-Glazer indices. In the course of the present study, we extended the existing knowledge about the concentration of goods and services production by SMEs located in various regions of Russia.

4. Purpose of the Study

The aim of study was to analyze the existing rate of SMEs industrial concentration in the regions of the country. The research process included four stages. At the first stage, the research methodology, design, and empirical data used were substantiated. The second stage was associated with the determination of the existing concentration indices of all SMEs by industry and region. At the third stage, a comparative analysis of the existing concentration indices of SMEs by main industries was carried out. The fourth stage was devoted to the analysis of contributions to concentration indices by regions.

5. Research Methods

In the course of the study, the results of which are presented in this article, the following hypothesis was tested - the possibility of assessing SMEs concentration using Ellison-Glazer spatial concentration index. The article deals with SMEs engaged in the production of goods and services. Production of goods is concentrated in SMEs, operating in agriculture, hunting and forestry; fishing, fish farming; mining; manufacturing; production and distribution of electricity, gas and water.

The service sector includes SMEs operating in construction; wholesale and retail trade; hotels and restaurants; transport and communications; real estate operations, rent; education; health; communal, social and personal services.

The study was based on the assessment of existing concentration rates using spatial concentration indices. As mentioned above, these indices are effectively used for comparative analysis by industries (types of economic activities). Concentration indices can be determined with the help of various indicators: the number of employees, gross output, fixed assets, investments. For a comparative analysis of the performance of SMEs in the regions of Russia it seems appropriate to use the indicator of employment (number of employees) in this sector of the economy. The choice of employment indicator is due to the fact that it is less dependent on the characteristics of socio-economic development and geographical location of compared regions.

Ellison-Glazer concentration indices (EG) are relative indicators and can be used for cross-sectoral and spatial (regional) comparisons of SME performance, respectively. The following formula is used to calculate these indices:

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$$G_j = \frac{\sum_{i=1}^{r}(S_{ij} - S_i)^2}{1 - \sum_{i=1}^{r} S_i},$$

where i - is the designation of the country's region;

r - the total number of regions;

j - the designation of economic activity;

$S_{ij} = z_{ij} / z_j$ - is the share of employed in SMEs in j - activity located in i -region in the total number of employed in this activity in Russia;

$S_i = z_i / z$ - is the share of employed in SMEs in i - region in the total number of employees of SMEs in Russia;

z - is the number of employed in SMEs in Russia, thousand people;

z_j - is the number of employed in SMEs operating in j- activity in Russia, thousand people;

z_i - is the number of employed in SMEs located in i-region , thousand people;

z_{ij} - is the number of employed in SMEs located in i- region and specialized in j- activity, thousand people.

The concentration index of Ellison-Glaser allows to determine the concentration rate by types of economic activities of SMEs. Accordingly, this index is calculated for each of the industries typical for SMEs. The numerator of the formula is the sum of the elements, each of which describes the deviation of the share of employed in SMEs located in particular region of the country, for a particular industry, from the share of employed in SMEs in this particular region in the total number of employees of all business structures in the country. The value of this numerator is minimal (close to zero) when the values S_{ij} and S_i are close in magnitude, that is, the share of employed in SMEs of the relevant industry in a particular region is similar to the national average. Conversely, the highest values of such elements are found in cases where the share of employed in SMEs in the relevant industry for a particular region is the most different from the national average value.

The formation of arrays of source data for the research was based on statistical information on the number of employees of SMEs and those employed in individual entrepreneurships by 13 types of activities in each region of the country. As the initial data, we used the results of the most complete "Continuous monitoring of the activity of small and medium-sized enterprises in 2015" conducted by the Federal State Statistics Service (Federal State Statistics Service, 2015).

When forming the data arrays, the number of employed in SMEs, as well as individual entrepreneurship in 78 subjects of the country (republics, territories, regions and cities of Federal value) was summed up. To avoid double counting, data for autonomous districts and autonomous region were excluded.

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6. Findings

Ellison-Glazer concentration indices were calculated for each of 13 industries according to the formula. The results of these calculations are given in the table 01.

Table 01. Ellison-Glazer concentration indices by types of economic activities

Number	Type of economic activity	Concentration index value
1	agriculture, hunting and forestry	0.0130
2	fishing, fish farming	0.0447
3	mining	0.0206
4	manufacturing	0.0021
5	production and distribution of electricity, gas and water	0.0102
6	construction	0.0006
7	wholesale and retail trade	0.0002
8	hotels and restaurants	0.0007
9	transport and communications	0.0006
10	real estate transactions, rent	0.0055
11	education	0.0021
12	health care	0.0025
13	communities, social and personal services	0.0017
	Average value	0.0080

Based on the obtained index values, a comparative analysis of the concentration rate of all SMEs by industries under consideration was carried out. The highest value of SMEs concentration is observed in such industries as fishing and fish farming, where Ellison-Glazer concentration index reaches 0.0447. The indices are above the national average for activities such as mining (0.0206), agriculture, hunting and forestry (0.0130), production and distribution of electricity, gas and water (0.0102). These four activities are the ones with the highest value of SMEs concentration. It is interesting to note that all these industries relate to the production of marketable products.

Values of Ellison-Glazer concentration indices on SMEs, engaged in nine types of activities, are lower than the national average value. Eight of the nine activities are in the service sector. The lowest value of the concentration index (0.0002) is typical for businesses in trade, which seems logical, since this industry is the most common for SMEs. In addition, low values of concentration index occur in such industries as construction (0.0006), transport and communications (0.0006), hotels and restaurants (0.0007). These types of activities are typical for SMEs in most regions of Russia. Similar conclusions on the prevalence of service enterprises in most countries are made in the article (Cuadrado-Roura, 2016).

Along with comparing concentration indices by industry, the analysis of regional contributions to spatial concentration indices for particular industry is of considerable interest. Enterprises related to fishing and fish farming are concentrated in the regions of the country that have access to seas. Among them are Sakhalin, Murmansk, Astrakhan, Arkhangelsk, Rostov, Magadan and Kaliningrad regions, the Republic of Karelia and Sakha (Yakutia), as well as Kamchatka, Krasnodar, Khabarovsk and Primorsky Krai. It is in these regions of the country that employment in SMEs in the fishing industry is significantly higher than in other regions.

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A significant contribution to the concentration index for SMEs engaged in mining takes place in Tyumen and Kemerovo regions, the Republic of Bashkortostan, Tatarstan and Sakha (Yakutia). As for businesses engaged in agriculture and forestry, the greatest contribution to the concentration index is noted in Rostov, Orenburg, Saratov, Volgograd regions, Krasnodar and Stavropol territories, the Republic of Bashkortostan, Tatarstan, Dagestan and Udmurt.

The largest contribution to the concentration index for SMEs operating in the production and distribution of electricity, gas and water is observed in Eastern Siberia and the Far East. These are Amur, Kemerovo and Irkutsk regions. The concentration of activities of SMEs engaged in real estate transactions and rent is noted in the largest cities of the RF- Moscow and St. Petersburg, which seems logical. High values of the industry concentration index indicate the possibility of creating appropriate clusters (Kerr & Kominers, 2015).

For other economic activities (construction, wholesale and retail trade, hotels and restaurants, transport and communications, education, health care, and other communal, social, and personal services), regional contributions to concentration indices are not large.

7. Conclusion

In general, the studies confirmed the hypothesis and showed the possibility of assessing of SMEs concentration using Ellison-Glazer spatial concentration index. The results of the study, containing scientific novelty, include the following:

- it is shown that the highest rate of concentration is observed in fishing, there is also a significant concentration of SMEs engaged in mining and in agriculture;

- it is proved that the concentration indices of SMEs in industries related to commodity production are significantly higher than in service sector;

- it is shown that in such industries as trade, the rate of concentration is the lowest, that is, SMEs of this type of activity are widely developed in all regions of the country.

According to the results of the work the following suggestions and recommendations can be formulated:

- it seems appropriate to use the calculation of concentration indices in the monitoring of entrepreneurship by all types of economic activity;

- the research of dynamics of concentration indices change by years is of interest;

- the proposed methodology can be used to assess the concentration rate of SMEs in municipalities;

- when developing programs and long-term plans for SMEs development , further saturation of the regions with business structures, especially in such activities as manufacturing, education, health care and the provision of public and social services should be envisaged;

- the provision of innovative services by SMEs, as well as individual entrepreneurs are to be stimulated.

The results obtained have a certain theoretical and practical significance, in particular, for conducting research on small business, substantiating proposals for its development, as well as providing

business structures with the necessary assistance and support at all government levels: federal, regional, municipal.

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