



Structure of Small and Medium-Sized Business: Results of Total Statistic Observations in Russia

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ABSTRACT

The aim of the research is estimation of regularities and tendencies, characteristic for modern sectoral structure of small and medium-sized business in Russia. The subject of the research is a set of processes of structural changes on the types of economic activities of such enterprises, as well as the differentiation of the number of employees in enterprises. The research methodology included consideration of aggregates of subjects of small and medium-sized business, formed according to sectoral and territorial features. As the initial data used the official statistical information, which was obtained in the course of total observation of the activities of small and medium-sized businesses in 2010 and 2015. The study was conducted on indicators characterizing the full range of legal entities and individual entrepreneurs in the country. The materiality of structural changes was carried out on the basis of the Ryabtsev index. Modeling the differentiation of the values of the number of employees per enterprise was based on the development of density normal distribution functions. According to the hypothesis it is assumed that the differentiation of the number of employees working in enterprises depend on six main types of economic activity and on the subjects of Russia. Based on the results of the study was proved that there are no significant structural changes for the period from 2010 to 2015, both in terms of the number of enterprises and the number of their employees. Based on the results of the simulation, the average values of the number of employees for the six main types of activity were established, as well as the intervals for changing these indicators for the aggregates of small and medium-sized enterprises located in the majority of the country's subjects. The results of research can be used in the performance of scientific works related to the justification of the expected number and number of employees of enterprises, the formation of measures to improve the efficiency of the business sector. The practical significance of the research results is related to the possibility of using them directly by entrepreneurs (especially beginners) when assessing the possibilities for setting up enterprises and determining the estimated number of employees. Further research in this area, using detailed data from official municipal statistic will improve our understanding of distribution number of employees among sectors of small and medium-sized business and will help to draw practical conclusions.

INTRODUCTION

The federal strategy for the development of small and medium-sized businesses for the period until 2030 (Development strategy of small and medium entrepreneurship, 2016) is expected to increase the proportion of small and medium-sized enterprises in the gross domestic product by 2 times (up to 40%). It is planned to increase the share of workers in small and medium-sized enterprises to 35 percent of the total number of employed. These goals, as foreign experience shows (Sollner, 2014; The development of small and medium-sized businesses, 2015), are real.

In Russia, a system of incentives is formed, both for the development of small and medium-sized businesses, so to involve government bodies and local governments in raising the level of entrepreneurial activity and increasing production of goods, works and services. The entrepreneurial sector, as experience shows, is an important factor in regional development, especially in underdeveloped areas, and creates conditions for economic restructuring (Acs et al., 2008; Balynin, 2015; Baumol, 2004; Decker et al., 2014; Simon-Moya et al., 2016).

Moreover, often the development of small and medium-sized businesses is viewed from the point of providing economic growth on an innovative basis (Dunne et al., 2016; Matlay, 2010; Moraes et al., 2014; Nakabayashi, 2013; Ylhäinen, 2017; Zahller, 2017; Krayneva et al., 2017; Gulicheva et al., 2017), which requires finding sources of financial support for their activities (Dai et al., 2017; Lee, 2018; Ramcharran, 2017; Tsuruta, 2016) and competently built risk management (Hess et al., 2016; Kolomiyets et al., 2017; Liu et al., 2013; Walaski, 2017).

Given the above, a study of the level of development of small and medium-sized businesses and, in particular, of its existing structure is relevant. In recent years, a number of works by Russian authors devoted to the study of the structure of small and medium-sized enterprises in Russia have been published. The articles of E.V. Sitnikova, V.V. Olabina and L. P. Pidoymo (2016), I. P. Zakirova (2015), S. N. Abdullina, K. G. Safiulina and L. R. Gataullina (2016), A. V. Dubynina and D. G. Demyanova (2015), M.M. Makhmudova and A. M. Koroleva (2015), M. V. Sorokina (2016).

Quite a lot of attention in foreign publications is devoted to the study of foreign experience (Ajibade et al., 2017; Chakravarty et al., 2013; Kato et al., 2018; Khan et al., 2017; Palmer-Rubin, 2016). At the same time, a comprehensive analysis of the structure of the number and number of employees, for all types of economic activity, has not received sufficient attention so far.

1. METHODOLOGICAL APPROACH AND ALGORITHM

The subjects of small and medium-sized businesses (hereinafter referred to as business structures, or briefly SMEs), in accordance with the current legislation (On the development of small and medium entrepreneurship, 2007) are legal entities and individual entrepreneurs with a staff of up to 250 people. The number of employees in small enterprises should not exceed 100 people, and for medium-sized enterprises in the range from 101 to 250 people. Among small enterprises, microenterprises are determined with the number of employees up to fifteen people. In addition, the criteria are the share of state, municipal property in the authorized capital and the marginal revenue from the sale of goods (works, services), as well as the book value of assets.

The purpose of the study, the results of which are given in this article, was to determine the patterns and trends characteristic of the current sectoral structure of small and medium-sized businesses in Russia. At the same time, the following tasks were solved: establishment of regularities and development tendencies characterizing the existing structure of small and medium-sized enterprises by types of economic activity and the number of their employees, determination of the specific indicators of the number of employees per enterprise.

The number of SMEs in the Russian economy is high. Formation of the values of indicators for each of the enterprises with subsequent consolidation of them is complex and time-consuming. In this regard, it is expedient to base the research methodology on the analysis of the perfor-

mance of indicators that characterize the aggregate of small and medium-sized enterprises as a whole. The evaluation of indicators on the aggregate of entrepreneurial structures located in different subjects of the country allows for taking into account the existing differentiation of these values. Formation of entrepreneurship in the subjects of the country had significant features, which was due to the frequent introduction of adjustments to regional laws and other regulatory documents, as well as the dynamics of the development of the regions of the country. The performance indicators of the aggregates of SMEs in specific territories depended on a significant number of subjective and objective factors.

The research methodology is based on consideration of the aggregates of small and medium-sized business entities, formed according to sectoral (economic activities) territorial (subjects of the country) characteristics. The study was based on data on the number of small and medium-sized businesses that carried out activities in 2015, as well as the number of employees employed by them. All indicators were taken based on the results of total observation of the activities of the business sector. In addition, when analyzing trends in structural changes, data from the results of total observation of the activities of small and medium-sized businesses for 2010 were used.

The study of the existing structure of SMEs was based on consideration of the shares, corresponding to each type of activity, in the total number of business structures and the number of their employees. Analysis of the structure change for the period from 2010 to 2015 included an assessment of the significance of structural changes using the Ryabtsev index (Ryabtsev et al., 2001). This index reflects the ratio of the actual discrepancies between the values of the components of the structures being compared and the sums of these values. Index is used to describe summary indicators of structural changes. Calculation formula of index is:

$$I_r = \sqrt{\frac{\sum_{i=1}^n (d_i^{2015} - d_i^{2010})^2}{\sum_{i=1}^n (d_i^{2015} + d_i^{2010})^2}}$$

where d_i^{2010} , d_i^{2015} - share of analyzing sectoral indicators in 2010 and 2015, %;

i - type of economic activity;

n - number types of economic activity.

The use of Ryabtsev index has received in recent years considerable distribution (Lee, 2018), because the index can be applied to any set of statistical data.

Proposed by Ryabtsev's scale of assessment of the measure of materiality of structural differences (from 0 to 1), allows us to interpret the results obtained. In particular, the following levels are distinguished, characterizing small structural differences:

- identity of structures (0.000 - 0.030);
- very low level of difference in structures (0.031 - 0.070);
- low level of difference in structures (0.071 - 0.150).

One of the important indicators of entrepreneurial activity is the specific number of employees per enterprise. This indicator is of great practical importance, since it is necessary for solving a wide range of tasks for the development of small and medium-sized businesses. It is used to justify the estimated needs for labor resources in planning and forecasting the development of the business sector in regions and municipalities.

As was shown in the work of one of the authors (Pinkovetskaia, 2009), it is expedient to carry out simulation of the distribution of the values of specific indicators characterizing the activity of the aggregates of enterprises formed according to a territorial feature using the density functions of the normal distribution. In this paper, a methodology and tools for estimating the parameters of such functions are presented, as well as the requirements for the initial data used in the modeling process.

The main stages of the work were:

- collection and processing of statistical data characterizing the number of small and medium-sized enterprises located in the constituent entities of the Russian Federation for each of the industries;
- collection and processing of statistical data characterizing the number of replaced jobs in small and medium-sized enterprises located in the subjects of the country for each of the industries;
- definition of indicators describing the sectoral structure of entrepreneurship in 2015 and 2010;
- assessment of the materiality of structural changes;
- formation of information files describing the specific number of employees per one enterprise;
- development of functions of the density of normal distribution, approximating the values of the specific indicators of the number of workers for the aggregate of small and medium-sized enterprises in the subjects of the country;
- analysis of patterns that are typical for the existing specific indicators of the number of employees per company by type of activity.

The initial information that was used in the research process included data on the number of small and medium-sized businesses and the number of their employees. Information was collected on 14 types of economic activity in 82 regions of Russia, including 22 republics, 9 regions, 46 oblasts, 1 autonomous region, 1 autonomous region and 3 cities of federal significance.

The study was based on official information from the Federal State Statistics Service. At the same time, materials were used, such as the results of total observations of the activities of small and medium-sized businesses in 2015 and 2010 (Federal service of state statistics, 2017). It should be noted that the data of total surveys conducted in accordance with the current legislation, once in five years, provide more accurate information compared with sample surveys, which are conducted annually.

2. THE NUMBER OF SMALL AND MEDIUM-SIZED ENTERPRISES AND THE NUMBER OF THEIR EMPLOYEES

First of all, it is necessary to assess the development of small business in the Russian Federation in 2010-2015. Data on the number of legal entities and individual entrepreneurs pertaining to SMEs on the 13 types of economic activities in question in 2015 are shown in Table 1. For comparison, columns 6 and 7 of this table show the results of comparison with data for 2010.

More than 3.5 million small and medium-sized businesses operated in Russia. The largest number of enterprises was in wholesale and retail trade (1.5 million).

In 2015, the total number of individual entrepreneurs was 1.4 times more than legal entities. Their number prevailed in such activities as agriculture, wholesale and retail trade, transport and communications, education, provision of communal, social and personal services. The number of legal entities more than individual entrepreneurs, took place in manufacturing industries, construction, production and distribution of electricity, gas and water, health care.

Table 1. Number of small and medium-sized businesses

Types of economic activity (TEA)	2010		2015		Change	
	legal entities	IE	legal entities	IE	legal entities	IE
1	2	3	4	5	6	7
agriculture (A)	47825	142726	34 184	101927	-13641	-40799
fishery, fish farming (B)	2078	2390	2 104	2322	+26	-68
mining (C)	3664	151	3 933	457	+269	+306
manufacturing industries (D)	122122	92368	145 681	107335	+23559	+14967
production and distribution of electricity, gas and water (E)	8243	833	9 503	1258	+1260	+425
building (F)	134564	44374	161 544	66 200	+26980	+21826
wholesale and retail trade (G)	480228	1049746	528 105	1005501	+47877	-44245
hotels and restaurants (H)	38740	26901	44 499	44 783	+5759	+17882
transport and communication (I)	75595	207995	101 375	256839	+25780	+48844
financial activities (K)	18248	9221	18 216	18700	-32	+9479
real estate transactions (L)	280898	203249	347 453	308 018	+66555	+104769
education (M)	3582	9785	4 463	14323	+881	+4538
health care (N)	19047	12568	28 354	14960	+9307	+2392
provision of communal, social and personal services (O)	31489	111639	38 062	136582	+6573	+24943
for all enterprises	1266393	1914157	1467476	2079205	+201083	+165048

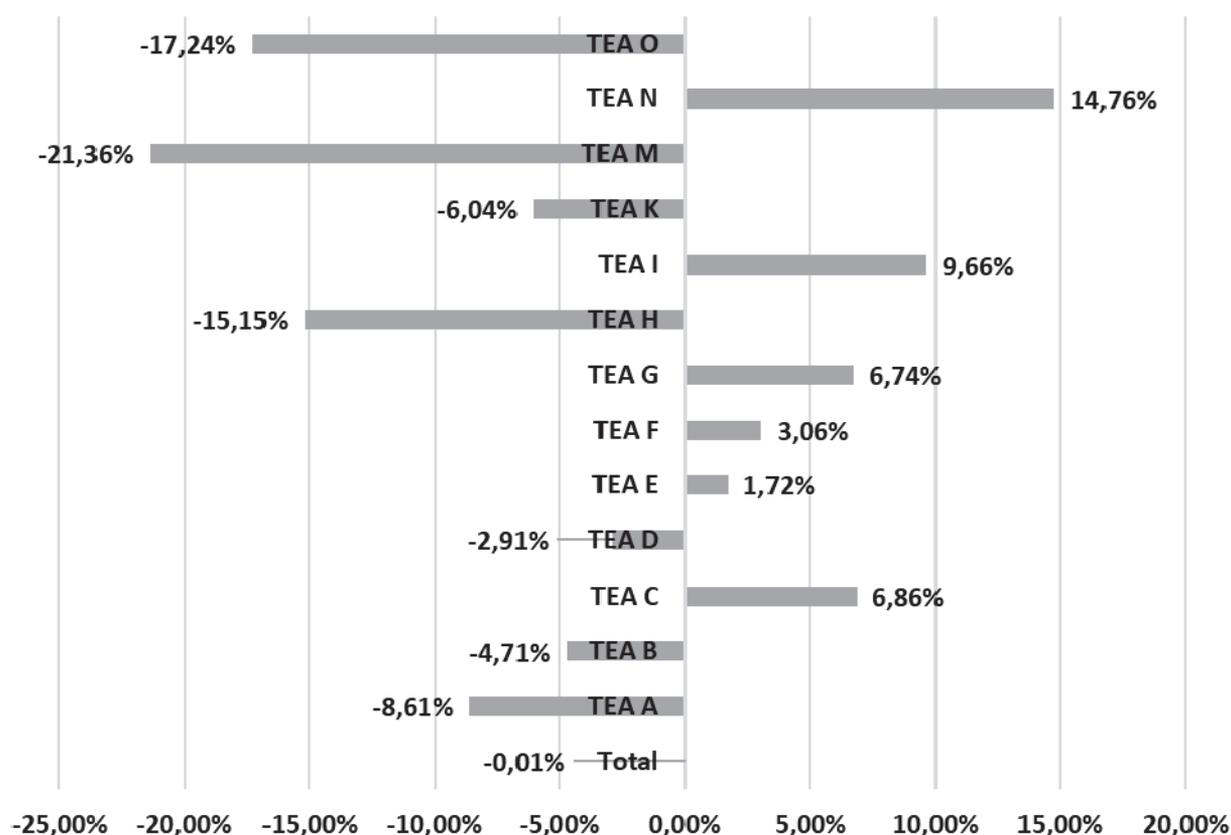
Source: compiled and calculated by the authors on the basis of data from the Federal State Statistics Service (Federal service of state statistics, 2017).

Note. IE - Individual entrepreneurs

Comparison of the number of small and medium-sized businesses that performed activities in 2015 and in 2010 shows their increase, both for individual entrepreneurs (8.6%) and for legal entities (15.9%). At the same time, there is a significant (by 40%) reduction in the number of SMEs specialized in agricultural production. This reduction, in our opinion, is due to the financial problems of small enterprises in agriculture and their displacement from the markets by larger organizations.

At the same time, special interest deserves to study the dynamics of the number of small enterprises in terms of types of economic activity (Figure 1).

Figure 1. Dynamics of the number of small enterprises in terms of types of economic activity



Source: compiled and calculated by the authors on the basis of data from the Federal State Statistics Service (Federal service of state statistics, 2017).

Thus, in particular, growth was detected in enterprises engaged in economic activities in the field of health and social services (+ 14.76%, in absolute terms, 537 enterprises), transport and communications (+ 9.66%, in absolute terms 1239 enterprises), wholesale and retail trade, repair of motor vehicles, motorcycles, household goods and personal items (+ 6.74%, in absolute terms, 5085 enterprises), construction (+ 3.06%, in absolute terms expression is 910), production and distribution of electricity, gas and water (+ 1.72%, which in absolute terms is 57 enterprises), mining (+ 6.86%, which in absolute terms is 74 enterprises).

At the same time, there was a decrease in the number of small enterprises engaged in economic activities in the sphere of agriculture, hunting and forestry (-8.61%, which in absolute terms is 935 enterprises), fisheries and fish farming (-4.71%, in absolute terms is 23 enterprises), processing industries (-2.91%, which in absolute terms is 1 017 enterprises), hotel and restaurant business (-15.15%, which in absolute terms is 1792 enterprises), operations with real estate, renting and (-6.04%, which in absolute terms makes up 2,971 enterprises), education (-21.36%, which in absolute terms is 69 enterprises), provision of other communal, social and personal services (-17.24% which in absolute terms is 1185 enterprises).

Data on the number of employees employed in small and medium business in 2015 are shown in Table 2. For comparison, columns 6 and 7 of this table show the results of comparison with data for 2010.

Table 2: Number of replaced workplaces, thousands of people

Types of economic activity	2010		2015		Absolute deviation, +/-	
	legal entities	IE	legal entities	IE	legal entities	IE
1	2	3	4	5	6	7
agriculture	989,5	399,6	722,1	278,1	- 267,4	-121,5
fishery, fish farming	32,2	6,3	35,9	5,2	+3,7	-1,1
mining	91,8	0,8	100,8	1,5	+9	+0,7
manufacturing industries	2259,2	470,6	2335,9	432,1	+76,7	-38,5
production and distribution of electricity, gas and water	220,1	3,6	213,9	3,2	+6,2	-0,4
building	1748,7	125,0	1637,2	145,6	-111,5	+20,6
wholesale and retail trade	3445,0	3032,0	3341,7	2536,4	-103,3	-495,6
hotels and restaurants	525,1	161,1	512,5	206,6	-12,6	+45,5
transport and communication	828,4	470,8	851,8	476,3	+23,4	+5,5
financial activities	127,4	14,5	129,3	24,8	+1,9	+10,3
real estate transactions	2870,9	390,6	2920,8	524,6	+49,9	+134
education	21,4	15,7	23,2	21,4	+1,8	+5,7
health care	227,8	20,5	342,9	26,8	+115,1	+6,3
provision of communal, social and personal services	343,3	238,5	349,4	249,7	+6,1	+11,2
for all enterprises	13731,9	5350,1	13517,3	4932,3	-214,6	-417,8

Source: compiled and calculated by the authors on the basis of data from the Federal State Statistics Service (Federal service of state statistics, 2017).

According to the data given in Table 2, the number of workers employed in small and medium-sized enterprises reached 18.5 million people.

In 2015, the total number of replaced jobs for individual entrepreneurs was 2.7 times less than for legal entities. And this pattern was fulfilled for all types of economic activity.

Comparison of the number of employees in 2015, compared with 2010 shows that their number has decreased, both for individual entrepreneurs (8.5%) and for legal entities (1.6%). The growth in the number of replaced jobs was observed in such activities as mining, transport and communications, financial activities, real estate transactions, education, health.

The reduction in the number of employees engaged in the business sector during the period under review is due, in our view, to both the crisis phenomena and institutional changes in the legislation with regard to allocations to extra-budgetary state funds.

3. THE EXISTING STRUCTURE OF SMALL AND MEDIUM-SIZED BUSINESSES

The structure of small and medium-sized businesses that formed in our country in 2015 and in 2010, referring to the types of economic activity in question, is shown in Table 3. It presents the specific weights of the number of enterprises in each of the branches in the total number of legal entities and individual entrepreneurs.

Table 3: Share of SMEs by types of economic activity, %

Types of economic activity	2010		2015		Absolute deviation, +/-	
	legal entities	IE	legal entities	IE	legal entities	IE
1	2	3	4	5	6	7
agriculture	3,78	7,46	2,33	4,9	-1,45	-2,56
fishery, fish farming	0,16	0,12	0,14	0,11	-0,02	-0,01
mining	0,29	0,01	0,27	0,02	-0,02	0,01
manufacturing industries	9,64	4,83	9,93	5,16	0,29	0,33
production and distribution of electricity, gas and water	0,65	0,04	0,65	0,06	0	0,02
building	10,63	2,32	11,01	3,18	0,38	0,86
wholesale and retail trade	37,92	54,85	35,99	48,36	-1,93	-6,49
hotels and restaurants	3,06	1,41	3,03	2,15	-0,03	0,74
transport and communication	5,97	10,87	6,91	12,35	0,94	1,48
financial activities	1,44	0,48	1,24	0,9	-0,2	0,42
real estate transactions	22,18	10,62	23,68	14,81	1,5	4,19
education	0,28	0,51	0,3	0,69	0,02	0,18
health care	1,5	0,66	1,93	0,72	0,43	0,06
provision of communal, social and personal services	2,49	5,83	2,59	6,57	0,1	0,74
for six main types of activity	90,12	90,95	89,85	88,76	-0,27	-2,19

Source: compiled and calculated by the authors on the basis of data from the Federal State Statistics Service (Federal service of state statistics, 2017).

Note. IE - Individual entrepreneurs

Among legal entities, the largest share in 2015 accounted for wholesale and retail trade. Their share in the total number of SMEs reached 43%. This situation is due to both objective needs and the specifics of the development of entrepreneurship in Russia, which began with trade. A relatively high proportion of enterprises carrying out real estate transactions (18%) and working in the transport and communications (10%) sector was also noted. More than 5% was the share of SMEs in activities such as manufacturing and construction. The least spread (0.12%) was received by enterprises specializing in the extraction of minerals, fisheries and fish farming. In our opinion, this is due to the need for significant investments for the creation and development of SMEs in such

industries, and for medium-sized and, especially, small businesses, the possibilities for raising funds are limited (Goncharova, 2015).

During the period from 2010 to 2015, the share of SMEs employed in such sectors as agriculture, wholesale and retail trade decreased.

During the computational experiment (using the Ryabtsev index), the total structural shift for the period from 2010 to 2015 was estimated. She showed that the corresponding indices were 0.033 for legal entities and 0.076 for individual entrepreneurs. Based on the scale of assessment of the measure of materiality of structural differences (given earlier), these values of the indices correspond to a very low level of difference in structures for legal entities and a low level of difference in structures for individual entrepreneurs. That is, despite a sufficiently long time interval, no significant structural shift was observed.

The specific weights of the number of employees of small and medium-sized businesses, belonging to 14 industries are given in Table 4.

Table 4: Share number of employees SMEs on types of economic activity, %

Types of economic activity	2010		2015		Absolute deviation, +/-	
	legal entities	IE	legal entities	IE	legal entities	IE
1	2	3	4	5	6	7
agriculture	7,21	7,47	5,34	5,64	-1,87	-1,83
fishery, fish farming	0,23	0,12	0,27	0,11	0,04	-0,01
mining	0,67	0,01	0,75	0,03	0,08	0,02
manufacturing industries	16,45	8,8	17,29	8,76	0,84	-0,04
production and distribution of electricity, gas and water	1,6	0,07	1,58	0,06	-0,02	-0,01
building	12,74	2,34	12,12	2,95	-0,62	0,61
wholesale and retail trade	25,09	56,68	24,73	51,42	-0,36	-5,26
hotels and restaurants	3,82	3,01	3,79	4,19	-0,03	1,18
transport and communication	6,03	8,8	6,3	9,66	0,27	0,86
financial activities	0,93	0,27	0,96	0,5	0,03	0,23
real estate transactions	20,91	7,3	21,62	10,64	0,71	3,34
education	0,16	0,29	0,17	0,43	0,01	0,14
health care	1,66	0,38	2,54	0,54	0,88	0,16
provision of communal, social and personal services	2,5	4,46	2,54	5,06	0,04	0,6
for six main types of activity	88,43	91,39	87,4	89,07	-1,03	-2,32

Source: compiled and calculated by the authors on the basis of data from the Federal State Statistics Service (Federal service of state statistics, 2017).

Note. IE - Individual entrepreneurs

Among legal entities, the largest proportion of the number of employees in 2015 accounted for the enterprises of such activities as wholesale and retail trade and real estate transactions. The

total share of employees of such SMEs was more than 45% of the number of employees employed in all legal entities. The specific weight of the number of employees of enterprises related to manufacturing and construction was 17% and 12%, respectively. Among individual entrepreneurs, there was an absolute predominance of the number of employees in wholesale and retail trade (more than 51%). About 10% was the share of jobs replaced by entrepreneurs specializing in transactions with real estate, transport and communications.

During the period from 2010 to 2015, the share of SME workers employed in such sectors as agriculture, wholesale and retail trade decreased.

The assessment of the overall structural shift for the period from 2010 to 2015 showed that the corresponding indices were 0.031 in terms of the number of employees of legal entities and 0.059 in the number of employees employed by individual entrepreneurs, which in both cases corresponds to a very low level of difference in structures. That is, despite a sufficiently long time interval, no significant structural shift was observed.

The analysis of the number of SMEs and the number of their employees made it possible to identify six main types of economic activity. The main types of economic activity include wholesale and retail trade, construction, manufacturing, real estate, transport and communications, as well as agriculture. These types of activities in 2015 accounted for almost 90% of both the number of SMEs and the number of their employees (which follows from the last lines of Tables 3 and 4).

4. MODELING THE DISTRIBUTION OF THE SPECIFIC NUMBER OF SME WORKERS

Along with the absolute values of the number of small and medium-sized enterprises and the number of their employees, it is of considerable interest to estimate the current specific number of employees per enterprise. These indicators were determined during the computational experiment on the basis of statistical data in the context of each of the subjects of Russia for small and medium-sized enterprises that specialize in six main types of economic activity. Modeling the differentiation of the values of the specific number of workers was based on the development of density normal distribution functions.

The developed functions of the density of normal distribution, describing the specific number of employees (X) for the aggregates of SMEs, specialized in six main types of economic activity by the subjects of the country, are given below:

- for the aggregate of agricultural enterprises:

$$y_1(x_1) = \frac{277,71}{4,96 \times \sqrt{2\pi}} \cdot e^{\frac{-(x_1-11,10)^2}{2 \times 4,96 \times 4,96}}; \quad (1)$$

- for the aggregate of manufacturing enterprises:

$$y_2(x_2) = \frac{173,11}{2,79 \times \sqrt{2\pi}} \cdot e^{\frac{-(x_2-10,95)^2}{2 \times 2,79 \times 2,79}}; \quad (2)$$

- for the total number of construction enterprises:

$$y_3(x_3) = \frac{107,63}{1,43 \times \sqrt{2\pi}} \cdot e^{\frac{-(x_3-6,33)^2}{2 \times 1,43 \times 1,43}}; \quad (3)$$

- for the aggregate of wholesale and retail trade enterprises:

$$y_4(x_4) = \frac{50,11}{0,85 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_4-4,32)^2}{2 \times 0,85 \times 0,85}}; \quad (4)$$

- for the aggregate of transport and communications enterprises:

$$y_5(x_5) = \frac{127,56}{1,48 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_5-5,82)^2}{2 \times 1,48 \times 1,48}}; \quad (5)$$

- for the aggregate of enterprises specialized in operations with real estate:

$$y_6(x_6) = \frac{109,33}{1,34 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_6-6,00)^2}{2 \times 1,34 \times 1,34}}. \quad (6)$$

The quality of the developed models was tested according to the criteria of Kolmogorov-Smirnov, Pierson and Shapiro-Wilk. Table 5 shows the actual values of statistics based on the results of the computational experiment.

Table 5: Estimated statistic values

Number of function	Estimated value by quality criterion		
	Kolmogorov-Smirnov	Pearson	Shapiro-Wilk
(1)	0,04	2,40	0,97
(2)	0,02	1,25	0,99
(3)	0,05	1,30	0,98
(4)	0,03	1,78	0,98
(5)	0,05	2,04	0,96
(6)	0,05	2,06	0,97

Source: Calculated by authors

The actual values of the statistics for the first of the criteria (given in the second column of Table 5) are less than the tabulated value, which at the significance level of 0.05 is 0.152. Similarly, a comparison of the actual values (shown in the third column of Table 5) with a table value of the Pearson test of 9.49 showed that they are all less than the table value of the criterion. Statistics based on the Shapiro-Wilk criterion (cited in the fourth column of Table 5) are close to one and exceed the tabulated value of 0.93 with a significance level of 0.01. In addition, a logical analysis of the developed functions was carried out, which showed a high level of approximation of statistical data. On the whole, it can be concluded that the functions obtained are of high quality and describe well the investigated regularities.

The functions of the density of normal distribution make it possible to determine the average values of the existing specific number of workers according to the aggregate of SMEs belonging to different types of economic activity. Corresponding indicators are given in Table 6. The same table shows the intervals of change of the indicators under consideration (column 3), characteristic for the majority (68%) of the subjects of the country. Intervals are calculated based on the average values of indicators and standard deviation values. In this case, to calculate the boundaries of the interval to the average value of the indicator, respectively, this deviation is added and subtracted.

The average values and intervals of change in the indices in these tables correspond to the functions of the density of the normal distribution (1) - (6).

Table 6: Characteristics of the specific number of SME workers in 2015, persons

<i>Aggregate SMEs</i>	<i>Average value</i>	<i>Change interval</i>
aggregate of agricultural enterprises	11,10	6,14-16,06
aggregate of manufacturing enterprises	10,95	8,16-13,74
aggregate of construction enterprises	6,33	4,90-7,76
aggregate of wholesale and retail trade enterprises	4,32	3,47-5,17
aggregates of transport and communication enterprises	5,82	4,34-7,30
aggregates of enterprises specialized in transactions with real estate	6,00	4,66-7,34

Source: Calculated by the authors

Analysis of the data given in Table 6 shows that the average number of employees employed in the same enterprise is significantly differentiated depending on the specialization of enterprises in various types of economic activity. Thus, for the six main types of activity, the corresponding indicators take values from 6.0 to 11.1 people. The average number of employees more than 10 people is typical for the aggregate of enterprises in agriculture and manufacturing industries. This seems logical in connection with the relatively complex technological processes characteristic of most enterprises in these activities. The lowest values of the average number of employees in enterprises were recorded in the sphere of trade, which is natural, since many of them are small retail outlets. According to the business structures belonging to the other three industries, the average number of employees per enterprise is about 6 people.

As shown above, the values of the average number of employees of aggregates of SMEs located in the subjects of the country are well described using the obtained functions of the density of normal distribution (1)-(6). This makes it possible to conclude that there are differences in the average values of the number of workers employed in the same enterprise for specific subjects of the country. This conclusion follows from the meaning of the normal distribution. Intervals for changing the average number of employees by the aggregate of SMEs, characteristic for the majority of the subjects of the country, are shown in column 3 of Table 6. In addition, in a number of the country's subjects the average values of the number of employees of enterprises are less than the lower bounds of intervals, or more than the upper limits of intervals. Therefore, it is of particular interest to identify such subjects of the country. The results of this analysis are given below.

According to the aggregates of enterprises specialized in agricultural production, the values of the number of employees less than the lower limit of the interval (6.14) occurred in 2015 in the following subjects of the country: the republics of North Ossetia-Alania, Ingushetia, Karachaevo-Cherkessia, Buryatia, Tyva, Dagestan, Kabardino-Balkaria, Karelia, Altai.

According to the aggregates of enterprises specialized in processing industries, the values of the number of employees less than the lower limit of the interval (8.16) were noted in the following subjects of the country: the republics of Khakassia, Buryatia, Tyva, Ingushetia, Karelia, Altai, Tyumen, Magadan regions, Khabarovsk Territory.

The aggregate number of enterprises in construction is less than the lower limit (4.90) of the interval indicated in Table 6, the values of the number of workers for such subjects of the country

as the Kaliningrad Ivanovo Region, the Republics of Karelia, Chechen, Ingushetia, Sakha (Yakutia), Buryatia Kamchatsky Perm, Altai edge, and also the city of Sevastopol.

According to the aggregates of enterprises specialized in wholesale and retail trade, the values of the number of employees less than the lower limit of the interval (3.47) were recorded in the following subjects of the country: the Kaliningrad, Astrakhan, Novosibirsk, Chelyabinsk regions, the republics of Tatarstan, Ingushetia, Karachayevo-Cherkessia, Altai, Perm Territory.

According to the aggregates of transport and communication enterprises, the values of the number of employees are lower than the lower limit of the interval (4.34) occurred in such subjects of the country as the Kirov region, Novosibirsk region, the republics of Buryatia, Ingushetia, North Ossetia - Alania, Mari El, Karelia, Altai, Perm Territory.

A similar situation is noted for the aggregates of enterprises engaged in real estate transactions in the following subjects of the country: the Kaliningrad, Novosibirsk, Murmansk regions, the republics of Ingushetia, Altai, Karelia, the Crimea, and Primorsky, Perm and Kamchatka Territories.

Regions in which the number of employees per enterprise is greater than the upper bounds of the intervals given in column 3 of Table 6 for the main activities are listed below.

According to the aggregates of enterprises specialized in agricultural production, the values of the number of employees greater than the upper limit of the interval (16.06) occurred in 2015 in the following subjects of the country: republics of Tatarstan, Mordovia, Udmurtia, Ryazan, Kursk, Vologda, Kirov, Tambov, Nizhny Novgorod, Novosibirsk, Voronezh, Belgorod regions, the Altai and Stavropol Territories.

According to the aggregates of enterprises specialized in processing industries, the values of the number of employees greater than the upper limit of the interval (13,74) were recorded in the following subjects of the country: the republics of Chuvash, Mordovia, Tula, Tambov, Ryazan, Voronezh, Vladimir regions, Moscow, Leningrad region, Kaluga region, Tver region, Smolensk region.

According to the aggregates of enterprises in construction, there are more than the upper limit (7.76) of the interval indicated in Table 6, the values of the number of workers for such subjects of the country as the Chuvash, Mordovia, Adygea, North Ossetia-Alania, Bryansk, Nizhny Novgorod, Sakhalin, Tambov, Lipetsk regions.

According to the aggregates of enterprises specialized in wholesale and retail trade, the values of the number of employees greater than the upper limit of the interval (5.17) were noted in the following subjects of the country: the Trans-Baikal Territory, the republics of the Chechen, Mordovia, Crimea, Bashkortostan, Pskov, Nizhny Novgorod, Novgorod, Arkhangelsk, Voronezh regions.

According to the aggregates of transport and communications enterprises, the values of the number of employees are greater than the upper limit of the interval (7.30) in the following subjects of the country: Orenburg region, Pskov region, Sakhalin region, Tambov region, Novgorod region, Kurgan region, Rostov region, Smolensk region, the republics of Adygeya, Crimea, Chechen.

A similar situation is noted for the aggregates of enterprises engaged in real estate transactions in the following subjects of the country: the Kemerovo, Novgorod, Nizhny Novgorod regions, the republics of Tyva, Chechen, Mordovia, Dagestan, and the Trans-Baikal Territory.

This situation is due to the specifics of the activities of small and medium-sized enterprises in the respective regions, and should be taken into account when developing programs for the development of entrepreneurship in these regions of Russia.

CONCLUSIONS

The results of the study allow us to draw the following conclusions:

In 2015, more than 3.5 million small and medium-sized businesses operated in Russia, and their total number of employees reached 18.5 million people. Among the subjects of small and medium-sized businesses, individual entrepreneurs predominate, the number of which is 1.4 times more than legal entities. This situation was noted in agriculture, wholesale and retail trade, transport, education, and provision of services. Over the period from 2010 to 2015, the number of individual entrepreneurs increased by 8.6% and legal entities by 15.9%. At the same time, the number of SMEs in agriculture decreased by 40%.

The total number of employees of legal entities was 2.7 times greater than that of individual entrepreneurs, and this pattern was fulfilled for all types of economic activity. During the period from 2010 to 2015, the number of employees decreased, both for individual entrepreneurs (8.5%) and for legal entities (1.6%). However, in such activities as extraction of minerals, transport and communications, financial activities, real estate operations, education, healthcare, there has been an increase in the number of replaced jobs.

It was established that among legal entities the largest share was the enterprises of wholesale and retail trade and operations with immovable property, which accounted for almost 60% of all SMEs. Among individual entrepreneurs there was a predominance of trade enterprises (more than 48%). It is proved that for the period from 2010 to 2015 the difference in the structure of the number of SMEs and the number of their employees corresponds to a low level (according to the classification proposed by Ryabtsev), that is, there was no significant structural shift during this time. At the same time, there was a decrease in the share of SMEs in such activities as agriculture and trade.

The 6 main types of economic activity (wholesale and retail trade, construction, manufacturing, real estate, transport and communications, agriculture) accounted for about 90% of the number of SMEs and the number of their employees.

The functions of the density of normal distribution, describing the values of the number of employees per enterprise for the aggregate of SMEs, related to the six main activities for each of the subjects of the country, are developed. Using these functions, the average values of the specific number of SMEs by 6 types of activity are established.

The average number of employees more than 10 people is typical for the aggregate of enterprises in agriculture and manufacturing industries. The lowest values of the average number of employees (4.32) were recorded in the sphere of trade.

It was proved that there are differences in the average number of employees in the aggregate of SMEs for the subjects of the country. The lists of regions in which high and low values of the average number of SME workers by types of activity were identified.

The results of research can be used in the performance of scientific works related to the justification of the expected number and number of employees of enterprises, the formation of measures to improve the efficiency of the business sector. The functions of the density of normal distribution presented in the article can be used to substantiate concepts, plans and programs for the development of small and medium-sized enterprises in regions and municipalities.

The practical significance of the research results is related to the possibility of using them directly by entrepreneurs (especially beginners) when assessing the possibilities for setting up enterprises and determining the estimated number of employees. In addition, the results of the work can be applied by subdivisions of regional and municipal government bodies that carry out the formation of projects and programs for the development of entrepreneurship, including the development of entrepreneurship in those regions and municipalities.

REFERENCES

- Abdullina, S. N., Safiullin, K. G., Gataullina, L. R. (2016), "Small and medium business of the Republic of Tatarstan in the conditions of crisis", *Economic Bulletin of Kazan*, No. 4(24), pp. 80-87.
- Acs, Z., Desai, S., Hessels, J. (2008), "Entrepreneurship, economic development and institutions", *Small Business Economics*, No. 31, pp. 219-234.
- Ajibade, P., Khayundi, F. E. (2017), "The Role of Records Management in Small Micro and Medium Enterprises (SMMEs) in South Africa and Its Implications for Business Sustainability", *African Journal of Library, Archives & Information Science*, Vol. 27, pp. 175-188.
- Balyinin, I. V. (2015), "Development of small business in the Russian Federation for 2011-2013", *Theoretical & Applied Science*. No. 1 (21), pp. 184-189.
- Baumol, W. J. (2004), "Entrepreneurial enterprises, large established firms and other components of the free-market growth machine", *Small Business Economics*. Vol. 23, pp. 9-21.
- Chakravarty, S., Xiang, M. (2013), "The international evidence on discouraged small businesses", *Journal of Empirical Finance*, Vol. 20, pp. 63-82.
- Dai, N., Ivanov, V., Cole, R. A. (2017), "Entrepreneurial optimism, credit availability, and cost of financing: Evidence from U.S. small businesses", *Journal of Corporate Finance*, Vol. 44, pp. 289-307.
- Decker, R., Haltiwanger, J., Jarmin, R., Miranda, J. (2014), "The Role of Entrepreneurship in US Job Creation and Economic Dynamism", *Journal of Economic Perspectives*, Vol. 28, No. 3, pp. 3-24.
- Development strategy of small and medium entrepreneurship in the Russian Federation for the period till 2030: order of the Government dated 2 June 2016, No. 1083-R, gathering of the legislation of the Russian Federation, 2016, No. 24, pp. 35-49.
- Dubynina, A.V., Demyanov, D. G. (2015), "Structural potential of small and medium enterprises: trends and vectors of development", *Regional economy: theory and practice*, No. 4 (379), pp. 47-60.
- Dunne, T. C., Aaron, J. R., McDowell, W. C., Urban, D. J., Geho, P. R. (2016), "The impact of leadership on small business innovativeness", *Journal of Business Research*, Vol. 69, No. 11, pp. 4876-4881.
- Federal service of state statistics: official page, available at: <http://www.gks.ru/> (accessed 23 December 2017).
- Goncharova, O. Yu. (2015), "Loaning of small business in the modern Russia: problems and perspectives", *Russian entrepreneurship*. No. 16(14), pp. 2125-2138.
- Gulicheva, E., Lisin, E., Osipova, M., Khabdullin, A. (2017), Leading factors in the formation of innovative education environment, *Journal of International Studies*, Vol. 10, No. 2, pp. 129-137.
- Hess, M. F., Cottrell, J. H. (2016), "Fraud risk management: A small business perspective", *Business Horizons*, Vol. 59, No. 1, pp. 13-18.
- Kato, M., Charoenrat, T. (2018), "Business continuity management of small and medium sized enterprises: Evidence from Thailand", *International Journal of Disaster Risk Reduction*, Vol. 27, pp. 577-587.
- Khan, M., Abasyn, J. (2017), "An Exploratory Evidence of the Types of Challenges and Opportunities Perceived by the Small and Medium Enterprises (SMEs) in the Apparel Export Sector of Pakistan", *University Journal of Social Sciences*. Vol. 10, No. 2, pp. 373-395.
- Kolomiyets, G. M., Soboliev, V. M., Melentsova, O. V. (2017), "Hedging Financial Risks in the Economic Practices of Small Business: Current Imperatives", *Biznes Inform*, Vol. 4, pp. 274-278.
- Krayneva, R., Bugaev, A., Zhuravleva, T., Vojtovič, S. (2017), Management and promotion of economic innovation potential. *Journal of International Studies*, Vol.10, No. 1, pp. 146-158.
- Lee, Y. S. (2018), "Government guaranteed small business loans and regional growth", *Journal of Business Venturing*, Vol. 33, No. 1, pp. 70-83.
- Liu, P., Shao, Y. (2013), "Small business loan securitization and interstate risk sharing", *Small Business Economics*, Vol. 41, No. 2, pp. 449-460.

- Makhmudov, M. M., Korolev, A. M. (2015), "Analysis of the current state of small entrepreneurship in the Tyumen region", *Vestnik of Perm University. Ser. "The economy"*. No. 1(24), pp. 69-78.
- Matlay, H. (2010), "Training in Small Businesses", *International Encyclopedia of Education*, pp. 337-342.
- Moraes, C., Philippsen, L., Lirani, H., Yamanaka, L., Rosim, D., Filho, E. E. (2014), "Systematic Mapping Study in Small Business: The Quest for Contemporary Understanding", *Procedia - Social and Behavioral Sciences*, Vol. 143, pp. 916-920.
- Nakabayashi, J. (2013), "Small business set-asides in procurement auctions: An empirical analysis", *Journal of Public Economics*, Vol. 100, pp. 28-44.
- On the development of small and medium entrepreneurship in the Russian Federation: Federal law no. 209-FL, 24.07.07.
- Palmer-Rubin, B. (2016), "Interest Organizations and Distributive Politics: Small-Business Subsidies in Mexico", *World Development*, Vol. 84, pp. 97-117.
- Ramcharran, H. (2017), "Bank lending to small business in India: Analyzing productivity and efficiency", *The Quarterly Review of Economics and Finance*, Vol. 65, pp.16-24.
- Ryabtsev, V. M., Chudilin, G. I. (2001). Regional statistics, *MID*, Moscow.
- Simon-Moya, V., Revuelto-Taboada, L., Ribeiro-Soriano, D. (2016), "Influence of economic crisis on new SME survival: reality or fiction?", *Entrepreneurship and Regional Development*, Vol. 28. No. 1-2. pp. 157-176.
- Sitnikova, E. V., Olabina, V. V., Pidoimo, L. P. (2016), "The Role of small business in development of economy of Russia", *News of southwest state University*, No. 4 (21), pp. 89-96.
- Sollner, R. (2014), "The economic importance of small and medium-sized enterprises in Germany", *Wirtschaft und Statistik*, pp. 40-51.
- The development of small and medium-sized businesses. Foreign experience (2015), *SME Bank*, Moscow.
- Pinkovetskaia, I. S. (2009), "The Number enterprises of small business in the Russian Federation: results of analysis", *Economy of region*, No. 2. pp. 224-229.
- Sorokina, M. V. (2016), "Modern state and tendencies of development of small business in the construction", *Bulletin of civil engineers*. No. 3(56), pp. 304-309.
- Tsuruta, D. (2016), "No lending relationships and liquidity management of small businesses during a financial shock", *Journal of the Japanese and International Economies*, Vol. 42, pp. 31-46.
- Walaski, P. (2017), "Rightsizing Risk Management: For Small & Medium Enterprises", *Professional Safety*, June, Vol. 62, No. 6, pp. 62-69.
- Ylhäinen, I. (2017), "Life-cycle effects in small business finance", *Journal of Banking & Finance*, Vol. 77, pp. 176-196.
- Zahller, K.A. (2017), "Truffle in paradise: Job costing for a small business", *Journal of Accounting Education*, Vol. 40, pp. 32-42.
- Zakirova, I.R. (2015), "Service business in the region at the present stage of development", *Modern problems of science and education*. No. 1 (part 1), pp. 1-8.