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## **Demography of Early Entrepreneurship: Experience of Different Countries in Recent Years**

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### **Abstract**

The relevance of the study is due to the important role played by small and medium-sized businesses in the vast majority of modern national economies. The aim of the study is to assess the indicators describing the share of early-stage entrepreneurs belonging to five age groups in the total population of the respective age groups in different countries. The baseline data were the results of the Global Entrepreneurship Monitor project for 2018 among 48 countries and for 2017 among 54 countries. The estimation of differentiation of the considered indicators was carried out with the use of mathematical models representing density functions of normal distribution. The test showed that the developed functions well approximate the empirical data. On the basis of these functions, the average values and intervals of changes in the rates of early-stage entrepreneurial activity for most countries were determined. The study showed that the largest share of early-stage entrepreneurs in the total population is typical for people aged 25 to 44 years. The share of start-up entrepreneurs belonging to the group from 55 to 64 years is significantly lower. The study allowed to identify the countries, which are characterized by high and low values of indicators of early-stage entrepreneurial activity for these age groups.

**Keywords:** Entrepreneurial activity, Age categories, Countries, Starting entrepreneurs, Global entrepreneurship monitoring.

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## 1. Introduction

The problems of entrepreneurship development began to attract particular attention in the late twentieth and early twenty-first centuries. As shown by studies, the results of which are described in articles (Chepureno, 2017; Decker et al., 2014), it is the business sector that is the main accelerator for the development of the economy of most countries and contributes to the efficiency of production of a variety of goods and services. The greatest contribution to job creation comes from young and growing enterprises (Litan & Schramm, 2012). According to (Wiklund & Shepherd, 2003; Zahra, 1991) entrepreneurship has become an important factor in gaining a sustainable competitive advantage in today's complex global economy. This is especially true for enterprises operating in industries with rapidly changing market conditions. The business sector is able to respond effectively to emerging challenges, including the ones during economic crises that generate high rates of market volatility (Grewal & Tansuhaj, 2001). Compared to larger companies, entrepreneurs can adapt flexibly and quickly to environmental changes (Lopez & Hiebl, 2015). The work (Acs & Naudé, 2012) draws attention to the following phenomenon: if earlier economic policy provided for the creation of large corporations, including the ones with state participation, now more attention is paid to the partnership between medium and small entrepreneurs and the state.

There is thus an urgent need for accelerated growth in entrepreneurial sector in most countries, especially developing countries. This growth requires an understanding of the factors that influence entrepreneurial activity and, especially, the stimulation of new entrepreneurs in national economies. Therefore, among the vital issues of modern business development is the definition of reserves for the growth of the business sector in the country. To determine the potential for increasing the number of entrepreneurs, the problem of the age structure of the founders of new businesses seems to be topical. Therefore, this problem is considered in this article. The aim of the study is to assess the indicators describing the share of early-stage entrepreneurs belonging to different age categories in the total population of the respective age categories in different countries.

## 2. Literature review

Of great importance in the study of modern entrepreneurship are socio-economic studies conducted over the past 20 years on a wide range of indicators describing the activities of people who are the creators of their own enterprises or individual entrepreneurs in many countries, including the data on the age of early-stage entrepreneurs (Global Entrepreneurship Monitor 2018-2019, 2019). Such entrepreneurs are adults (18-64 years) who are at the time of the survey in the process of starting a business or owning a business for less than 3.5 years. To assess the level of early entrepreneurial activity, we use its indicator characterizing the share of early-stage entrepreneurs in adult population.

Over the past decade, a number of studies have been conducted to research the age characteristics of entrepreneurship. The most interesting among them are the following publications.

As shown by a number of empirical studies (e.g., Bates, 1995; Welter & Rosenblatt, 1998), there are two opposite trends in the influence of age on early-stage entrepreneurial activity. On the one hand, qualifications, professional experience, self-confidence, as well as the availability of necessary financial resources increase when people get older, which raises the likelihood of a person creating his own business. On the other hand, the habit of working for hire, family problems, reduced planning horizon for the rest of working life negatively affect the desire to become a budding entrepreneur. These trends lead to the fact that at early-stage entrepreneurial activity increases when people get older, reaches its peak around the age of 35-45 years, and then falls sharply towards the end of working life. Similar trends were found by the authors of the work (Azoulay et al., 2018). They draw attention to the fact that at a young age people are less busy with family or other responsibilities and are more open to innovation and business, better feel the opportunities for self-realization. However, when people get older, the objective prerequisites for starting a business significantly increase, since a

person accumulates necessary resources. These are business capital (knowledge and competence), financial capital and social capital (reputation, horizontal connections and social status). All this can contribute not only to the creation of a new company, but also its successful operation. The increase in entrepreneurial activity, according to these authors, until 50 years, and then this activity decreases. In general, the two opposite trends provide an inverse U-shaped relationship between age and entrepreneurial activity. The existence of such a connection was revealed more than ten years ago (Verkhovskaya, 2009; Bergman & Sternberg, 2007; Bosma et al., 2008), which pointed out that initially early-stage entrepreneurial activity increases when people get older, reaches its saturation, and then decreases as it approaches retirement age.

Most researchers agree that people more show their intentions to create their own businesses at the age of 25-44 years. This conclusion is made, for example, in the report (Reynolds, P. D., 2002). The authors of the study (Raposo et al., 2008) stated that for adults under the age of 24, the rates of early-stage entrepreneurial activity are relatively low. They argued that entrepreneurs get more opportunities when they get older, but their willingness to become an entrepreneur decreases after 44 years. It is interesting to note that similar conclusions from information describing entrepreneurship in developing countries. Thus, in Kazakhstan, according to the study (Shaikhutdinova, 2018), well-trained, with a sufficient professional competence and social ties budding entrepreneurs prevail. They are representatives of the middle age group - 35-44 years, and a little smaller age group of 45-54 years. In Turkey and developing countries according to the authors (Karadeniz & Ozfam, 2009) the peak of early-stage entrepreneurship is in the range of 25-34 years. People between 18 and 24 years start business much less often.

As for economically developed countries, the author of the monograph (Parker, 2018), come to the consensus that people who create their own firms are in the middle of a career, that is, between 35 and 44 years old. After 50 years, the number of early-stage entrepreneurs decreases. At the same time, in the US, entrepreneurial activity over the age of 50 years is concentrated in the age group from 51 to 55 years old. That is, more old people start entrepreneurial activity much less often. Note that similar patterns have been observed in the UK (Botham & Graves, 2009). In the article (Hipple, 2010), attention is drawn to such a pattern as the prevalence of self-employment in comparison with the firms created by older people (from 50 years and above) in the United States.

Studies (Reynolds et al., 2002; Bergmann & Sternberg, 2007) have shown significant differences in the age characteristics of early-stage entrepreneurial activity by countries and territories.

In the article (Verkhovskaya, 2009) some aspects of the age structure of early-stage entrepreneurs in Russia are considered. It was concluded that the structure would remain for a number of years. The work (Abrosimova, 2011) shows the existence of a relationship between the use of innovation and the age of the entrepreneur. Namely, innovations on a regular basis are most widely used by entrepreneurs aged from 30 to 44 years old. In the article (Potekhina & Chizhov, 2016) according to the study in the regions of the Central Federal District in Russia, it is shown that due to the lack of the vacancies in the labor market for older people, the most active part of these people become early-stage entrepreneurs. In the paper (Smirnova, 2019), attention is drawn to the expected significant increase in the influx of early-stage entrepreneurs of older age groups due to the increase in the retirement age in Russia after 2019.

### **3. Methodology and background**

The article is devoted to the analysis of age-specific features of early-stage entrepreneurial activity in the economy of modern countries. Authors use data from surveys conducted during the implementation of the Global Entrepreneurship Monitor projects (2018, 2019). The established methodology of this project divides early-stage entrepreneurs into five age groups (categories):

- from 18 to 24 years old;

- from 25 to 34 years old;
- from 35 to 44 years old;
- from 45 to 54 years old;
- from 55 to 64 years old.

The global monitor process collected data on a wide range of indicators, including the distribution of early-stage entrepreneurial activity values across 54 and 48 countries in 2017 and in 2018 respectively. Thus, the sample of countries considered in the study is much part of the total number of independent countries. 54 countries from the 2017 Report represent five geographic regions. The distribution of countries by region is as follows: Europe-20 countries, Latin America-11 countries, Asia and Oceania-17 countries, Africa-4 countries, North America-2 countries. The 2018 report provides information for 48 countries, representing the following regions: Europe-20 countries, Latin America-9 countries, Asia and Oceania-12 countries, Africa-5 countries, North America-2 countries. These countries belong to one of the three main income groups: high income-30 countries, middle income - 11 countries, low income -7 countries.

Earlier studies, an overview of which is given in the second section of the article, allowed to put forward four hypotheses, which were tested in the course of the study:

- hypothesis 1- currently there are significant differences in the values of the share of early-stage entrepreneurs in the total adult population in the above five age categories;
- hypothesis 2 - early-stage entrepreneurial activity is characterized by maximum values in the age groups from 25 to 34 years old and from 35 to 44 years old, and minimum values in the age group from 55 to 64 years old;
- hypothesis 3 - the values of early-stage entrepreneurial activity of the population have a significant differentiation across countries;
- hypothesis 4 - there are no significant time shifts in the average values of the share of early-stage entrepreneurs in the total adult population in the countries under consideration.

Hypotheses 1, 2, 3 were tested using mathematical models that represent the density function of normal distribution. The development of these functions, as shown by the previous work of the authors, allow obtaining unbiased characteristics of the studied economic processes. The methodology of using the density functions of the normal distribution for the evaluation of specific indicators is given in the articles (Pinkovetskaia, 2015; Pinkovetskaia et al., 2019).

The fourth hypothesis was tested using the transformation index proposed by Ryabtsev (Ryabtsev & Chudilina, 2001). This index reflects the ratio of the actual differences in the values of the components of the compared structures and the sums of these values. It belongs to composite indicators for assessing structural shifts.

#### **4. Results of a computational experiment**

This article presents the models developed by the authors. The development of these models was based on the data collected during the surveys on the Global Entrepreneurship Monitor Project for 2017 and 2018. As models, we have developed dependencies characterizing the normal distribution of the studied indicators in the countries under consideration. Such functions ( $y$ ), describing the proportion of entrepreneurs belonging to each of the mentioned above age groups ( $x, \%$ ) in the total population of the corresponding age group, are given below. According to data for 2017:

- from 18 to 24 years old

$$y_1(x_1) = \frac{175.5}{5.4 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_1-10.6)^2}{2 \times 5.4 \times 5.4}}; \quad (1)$$

- from 25 to 34 years old

$$y_2(x_2) = \frac{360.0}{8.2 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_2-15.4)^2}{2 \times 8.2 \times 8.2}}; \quad (2)$$

- from 35 to 44 years old

$$y_3(x_3) = \frac{277.7}{7.0 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_3-14.6)^2}{2 \times 7.0 \times 7.0}}; \quad (3)$$

- from 45 to 54 years old

$$y_4(x_4) = \frac{231.4}{6.2 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_4-11.3)^2}{2 \times 6.2 \times 6.2}}; \quad (4)$$

- from 55 to 64 years old

$$y_5(x_5) = \frac{252.0}{4.9 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_5-7.7)^2}{2 \times 4.9 \times 4.9}}. \quad (5)$$

According to the data for 2018:

- from 18 to 24 years old

$$y_6(x_6) = \frac{266.7}{7.7 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_6-11.8)^2}{2 \times 7.7 \times 7.7}}; \quad (6)$$

- from 25 to 34 years old

$$y_7(x_7) = \frac{312.0}{8.6 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_7-15.9)^2}{2 \times 8.6 \times 8.6}}; \quad (7)$$

- from 35 to 44 years old

$$y_8(x_8) = \frac{308.6}{8.2 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_8-4.17)^2}{2 \times 8.2 \times 8.2}}; \quad (8)$$

- from 45 to 54 years old

$$y_9(x_9) = \frac{202.7}{6.6 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_9-11.0)^2}{2 \times 6.6 \times 6.6}}; \quad (9)$$

- from 55 to 64 years old

$$y_{10}(x_{10}) = \frac{176.0}{5.1 \times \sqrt{2\pi}} \cdot e^{-\frac{(x_{10}-7.6)^2}{2 \times 5.1 \times 5.1}}. \quad (10)$$

The quality of the developed models was evaluated using three tests. A computational experiment showed that the calculated statistics by Kolmogorov-Smirnov test are in the range from 0.064 to 0.102. These values are lower than the tabulated value of 0.152 (significance level 0.05). The calculated values by Pearson test are from 0.166 to 4.720. That is lower than the tabulated value of 9.49. The calculated statistics by Shapiro-Wilk test exceed the tabulated value of 0.93 (significance level of 0.01). The econometric analysis by these 3 tests showed the high quality of each of the functions (1) - (10). Using the density functions of the normal distribution (1) - (10), characteristics were obtained that show significant spatial patterns of the prevailing industry preferences for early-stage entrepreneurship in the economies of different countries in modern conditions. The main indicators of functions (1) - (10) are shown in Table 1. The average values are shown in column 2, and column 3 of this table shows the change intervals of the values typical for most (68%) countries.

**Table 1.** The indicators characterizing the age of early-stage entrepreneurs, %

age groups	average values	change intervals of values typical for most countries
1	2	3
2017		
from 18 to 24 years old	10.6	5.2-16.0
from 25 to 34 years old	15.4	7.2-23.6
from 35 to 44 years old	14.6	7.6-21.6
from 45 to 54 years old	11.3	5.1-17.5
from 55 to 64 years old	7.7	2.8-12.6
2018		
from 18 to 24 years old	11.8	4.1-19.5
from 25 to 34 years old	15.9	7.3-24.5
from 35 to 44 years old	14.0	5.8-22.2
from 45 to 54 years old	11.0	4.4-17.6
from 55 to 64 years old	7.6	2.5-12.7

Source: own calculations

The information indicated in column 2 of Table 1 shows that the average countries-specific value of the share of entrepreneurs who started activities at the age of 18 to 25 years was 11.8% in 2018. The indicators more than the upper boundary of the change interval given in column 3 of the table, was observed in countries such as Brazil, Peru, Madagascar, Canada, Guatemala, Angola. The values of this indicator fewer lower boundary of the change interval occurred in Poland, Cyprus, Switzerland, Slovenia, France, Spain, Bulgaria.

The share of early-stage entrepreneurs between the ages of 25 and 34 years was 15.9% average for the countries in question. The values higher than the upper boundary of the change interval given in column 3 of Table 1, was in 2018 in Peru, Colombia, Lebanon, Sudan, Guatemala, Chile, Angola. Low values (less than 7.3%) were observed in Greece, Italy, Russia, Sweden and Cyprus.

The average value of early-stage entrepreneurs between the ages of 35 and 44 in 48 countries was 14%. The values above the upper boundary of the change interval given in column 3 was noted in Peru, Colombia, Lebanon, Sudan, Guatemala, Chile, Angola. The values beyond the lower boundary of the range were observed in Greece, Cyprus, Italy, Russia, Sweden.

The average share of entrepreneurs aged 45 to 54 years amounted to 11% in 2018. The higher values of this indicator were noted in Peru, Colombia, Lebanon, Chile, Angola. Low values (less than 4.4%) were in Poland, Sudan, Russia, Italy, and Japan.

The share of early-stage entrepreneurs between the ages of 55 and 64 years was 7.6% average for the countries in question. The value of this indicator, which is higher than the upper boundary of the

interval given in column 3 of Table 1, occurred in 2018 in Guatemala, Thailand, Sudan, Lebanon, Peru, Chile, and Angola. Low values were noted in Russia, Italy, Poland, Croatia, Bulgaria, Germany.

The assessment of similar indicators according to the data for 2017 is given below.

The data given in column 2 of Table 1 shows that the average country-specific share of entrepreneurs who started activities at the age of 18 to 25 was 10.6% in 2017. The value of this indicator higher than the upper limit of the interval given in column 3 of the table, was noted in countries such as Latvia, Colombia, Brazil, Peru, Vietnam, Lebanon, Guatemala, Estonia. The values of this indicator less than the lower limit of the interval occurred in Switzerland, Cyprus, South Korea, Bulgaria, Germany, Poland, Japan, Italy.

The average share of early-stage entrepreneurs aged 25 to 34 in the countries under review was 15.4 %. The value of this indicator above the upper limit of the interval shown in column 3 of Table 1 occurred in Malaysia, Peru, Chile, Lebanon, Canada, Brazil, Vietnam, Ecuador. Low values were observed in Japan, Bulgaria, France.

The average share of early-stage entrepreneurs aged 35 to 44 in 54 countries was 14.6%. The share above the upper limit of this range was observed in Peru, Colombia, Lebanon, Sudan, Guatemala, Chile, Angola. The values lower than the lower limit of the range were noted in Bosnia and Herzegovina, Bulgaria, Italy, Japan, Qatar, Algeria, France, Germany.

The average share of entrepreneurs aged 45 to 54 years was 11.3%. Canada, Chile, Colombia, Madagascar, Malaysia, Thailand, Lebanon, Viet Nam had a high value of this indicator. The values lower than the lower limit of the change interval were in Greece, Bulgaria, France, Japan, Taiwan, Germany, Slovenia.

The average share of early-stage entrepreneurs aged 55-64 in the countries under review was 7.7%. The value of this indicator above the upper limit of the interval shown in column 3 of Table 1 occurred in Slovakia, Chile, Guatemala, South Korea, Thailand, Lebanon, Peru, Viet Nam. Low values were observed in Bulgaria, France, Japan, Taiwan, Germany, Slovenia.

The obtained information allows us to conclude that hypotheses 1 and 3 put forward earlier have been confirmed.

The assessment of the time shifts inherent in the average values of early-stage entrepreneurs' shares in all countries by age groups was made on the basis of Ryabtsev index.

The calculation formula for determining the index value is given below:

$$I_r = \sqrt{\frac{\sum_{i=1}^n (d_i^{2018} - d_i^{2017})^2}{\sum_{i=1}^n (d_i^{2018} + d_i^{2017})^2}}, \quad (11)$$

where  $d_i^{2018}$ ,  $d_i^{2017}$  - the shares of early-stage entrepreneurs in the total population of the corresponding age group according to the data for 2018 and 2017, %;

$i$  - conditional age group number;

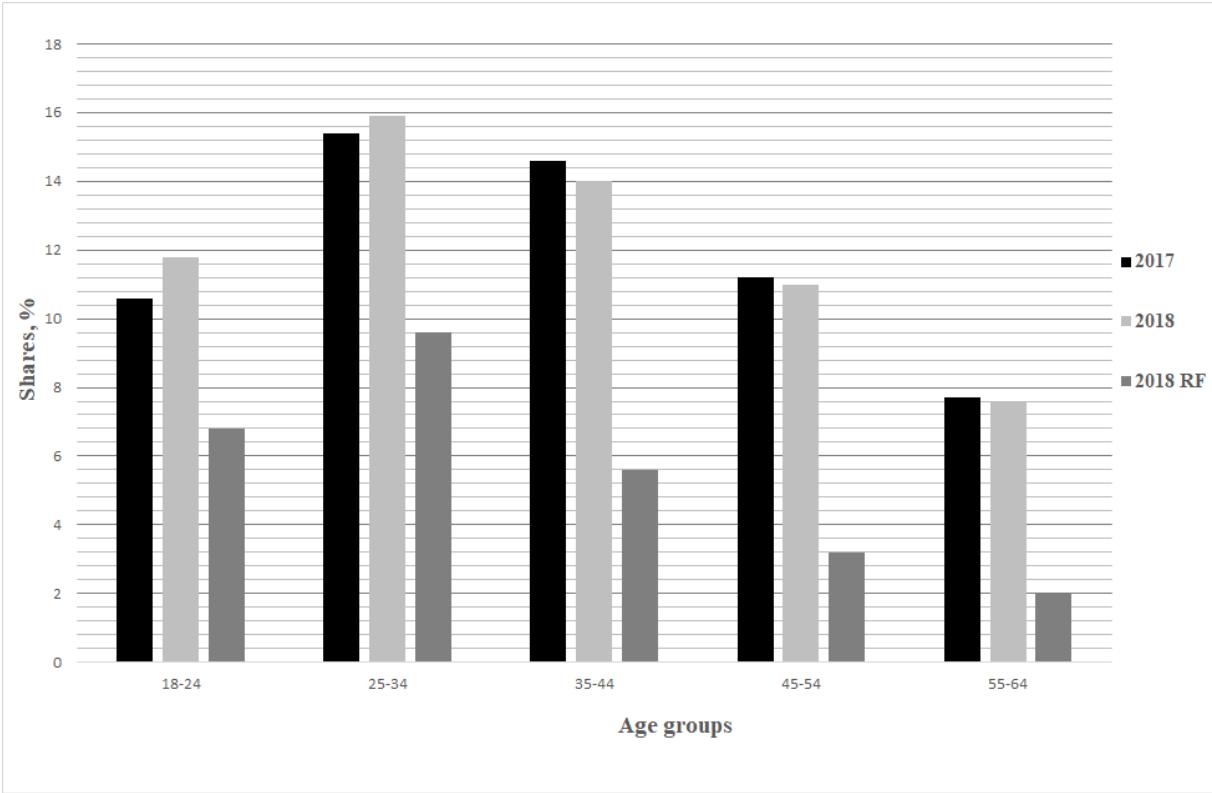
$n$  - number of age groups.

Assessment of the significance of differences in the indicators for 2017 and 2018 showed the identity of these indices on the adopted scale. The calculated Ryabtsev index was 0.001, which is less than the tabulated value of 0.030. Thus, hypothesis 4 about the absence of significant structural changes in the average values of the shares of early-stage entrepreneurs in the total adult population for the period from 2017 to 2018 was confirmed. That is, that the indicators characterizing the shares of early-stage

entrepreneurs differ by five age groups, as well as that the shares of early-stage entrepreneurs in the total population for each of the age groups have a significant differentiation by country.

**5. Analysis of the distribution of early-stage entrepreneurs by age groups**

To analyze the distribution of the shares of early-stage entrepreneurs in the total population for the five age groups, the corresponding diagrams were constructed (Fig. 1). They reflect the average values of the share of entrepreneurs by age groups for 2018 and 2017. Analysis of the charts shows the similarity of the considered indicators by year. The highest values occur in the age groups covering the range from 25 to 44 (values from 14% to 16%). At the same time, the maximum level of activity of nascent entrepreneurs is noted in the age group from 25 to 34 years. Lower values (from 10% to 12%) are observed in the groups of 18-24 years and 45-54 years. Significantly lower values are typical for the oldest age group (from 7% to 8%). Thus, the analysis of the data for 2017 and 2018 confirms the preservation of the inverse U-shaped relationship between age and entrepreneurial activity during these years. Our previous studies mentioned this pattern, as typical for most countries. Note that this pattern has been preserved for more than 10 years.



**Fig. 1.** The distribution of shares of early-stage entrepreneurs by age groups.

For comparison, fig.1 also presents data for Russia (RF) in 2018. Note that in 2017 there are no similar data for Russia. A comparative analysis shows that the distribution of the shares of early-stage entrepreneurs by age groups in Russia differs significantly from the distribution of average values for the countries under consideration. First, the indicators for Russia in all five age groups are significantly lower than the average countries values, both in 2017 and in 2018. Secondly, Russian data show the absence of an inverse U-shaped relationship between age and entrepreneurial activity, typical for most countries. Chart 1 on the share of early-stage entrepreneurs in Russia show the only maximum of 9.7% (in the group of entrepreneurs aged 25 to 34 years). Early-stage entrepreneurial activity in the age



group of 18-24 is 1.4 times lower (6.9%). This figure is even lower for middle-aged entrepreneurs - from 35 to 44 years (5.6%). In the following age categories, there is a sharp decline in entrepreneurial activity (3.3% and 2%, respectively). As indicated in the work (Verkhovskaya & Alexandrova, 2017), similar trends in the distribution of the shares of early-stage entrepreneurs by the five age groups were observed in Russia in 2014 and 2016. In our opinion, the low value of the indicator in the range from 45 to 64 years in Russia is due to the lack of necessary entrepreneurial knowledge typical for the majority of the population of these age groups, as well as the prevailing mentality. It can be assumed that most of the older people who grew up in a socialist (non-market) economy, where the initiative was punishable, are not only mentally unprepared to create their own business, but also have a negative impact on their younger relatives.

The above analysis shows that hypothesis 2 receives partial confirmation. It is well performed for the average values of early-stage entrepreneurial activity in the countries under consideration. However, it has not received confirmation with the data characterizing the age groups distribution of start-up entrepreneurs in Russia.

## 6. Conclusion

In general, the study has a certain originality and novelty. It contributes to the understanding of the current patterns and trends of early-stage entrepreneurial activity in different age categories.

Economic and mathematical modeling of empirical data using normal distribution functions was carried out to provide unbiased estimates of the average values and intervals of change in early-stage entrepreneurial activity in the countries under consideration.

The results of the research, which have scientific novelty, are as follows:

- an assessment of the prevailing shares of early-stage entrepreneurs in the adult population by age groups using the normal distribution functions has been made;
- high quality approximation of empirical data by mathematical models is proved (1) - (10);
- average values of shares of early-stage entrepreneurs for five age groups according to data for 2017 and 2018 are determined;
- the range of changes in the shares of start-up entrepreneurs in the total population, which is typical for most countries, is determined;
- the prevalence of early-stage entrepreneurs, aged from 25 to 44 years old is shown;
- significant differentiation of the considered indicators by the countries is proved;
- the countries were ranked according to the current rates of early-stage entrepreneurial activity, countries with high and low shares of early-stage entrepreneurs in the total population of the five age groups were identified;
- a significant difference in the distribution of the considered indicators according to Russian data from the average values of other countries is shown;
- the absence of significant structural changes in the average values of the share of early-stage entrepreneurs in the total adult population for the period from 2017 to 2018 has been proved.

The methodological approach and tools for assessing early-stage entrepreneurial activity by age categories proposed in the article can be used in scientific research on entrepreneurship problems, as well as in substantiating development programs for this sector of the economy at the federal, regional, and municipal levels.

The practical significance of the research is associated with the use of the obtained information in the activities of the authorities and the business sector of the national economy. The results of the

research can be used by government bodies to develop policies for the growth of entrepreneurship based on the age structure of the population in Russia and specific regions.

We mean the implementation of measures under the Strategy for the development of small and medium enterprises in the Russian Federation for the period until 2030, among them assistance to certain categories of start-up entrepreneurs, including provision of grants, subsidies, and reduction of loans interests. For start-up entrepreneurs, it is of interest to learn about factors that influence the ability to start business.

The new knowledge can be used in higher and secondary educational institutions, as well as in further training of government officers who deals with the regulation of entrepreneurship in the country.

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