

How Entrepreneurship Education Programs Affect the Development of Small Businesses in Russia:

Empirical Analysis in Regional Contexts

A. Dukhon, K. Zinkovsky, O. Obraztsova, A. Chepurenko

Received in
September 2017

Anna Dukhon

Candidate of Sciences in Economics, Member of the Board of Directors of Moscow Department of the Russian Public Organization "Russian Association of Statisticians". Address: 3 Golyanovskaya St, 105094 Moscow, Russian Federation. E-mail: dukhon@post.ru

Kirill Zinkovsky

Candidate of Sciences in Economics, Associate Professor, Deputy Director, Institute for Educational Studies, Institute of Education, National Research University Higher School of Economic. Address: 20 Myasnitskaya St, 101000 Moscow, Russian Federation. E-mail: kzinkovsky@hse.ru

Olga Obraztsova

Candidate of Sciences in Economics, Associate Professor, Department of General Economics, Lomonosov Moscow State University. Address: building 61, 1 Leninskie Gory, 119234 Moscow, Russian Federation. E-mail: olga_obraztsova@rambler.ru

Alexander Chepurenko

Doctor of Sciences in Economics, Professor, Head, School of Sociology, Faculty of Social Sciences, National Research University Higher School of Economic. Address: 20 Myasnitskaya St, 101000 Moscow, Russian Federation. E-mail: achepurenko@hse.ru

Russians in supplementary entrepreneurship and business education programs, and investigates the influence of such engagement on small business development in the socioeconomic contexts of different regions of Russia. The study goes from comparing the number of students enrolled in supplementary entrepreneurship and business education programs of various duration across regions, through analyzing the correlations between the demand for specific types of programs and the development of different subsectors of private entrepreneurship under region-specific socioeconomic conditions, to analyzing entrepreneurship education as a growth driver for particular types of small businesses in specific contexts.

The study tests hypotheses about the engagement of Russians in entrepreneurship education being contingent on the regional context and about the influence of different forms of entrepreneurship education on the development of various types of business ventures. Empirical data on three types of region-specific socioeconomic contexts reveals a significant correlation between engagement in supplementary entrepreneurship and business education programs and the development level of small businesses, microbusinesses, and entrepreneurship (in its traditional and innovative versions). The three clusters of regional units homogeneous in their socioec-

*Translated from Russian
by I. Zhuchkova.*

Abstract. The article presents the results from studying the engagement of

onomic contexts were determined using a multidimensional typology.

The findings allow for evaluating the role of the national education system in promoting entrepreneurship among the population based on reliable and relevant statistical information consistent with the international standards as well as measuring the effectiveness of entrepreneurship education programs and promotion strategies in various regional contexts. The article puts forward recommendations on choosing the types of

entrepreneurship education to deliver at different levels of the education system in Russia.

Keywords: innovative entrepreneurship, traditional business, small entrepreneurship, micro entrepreneurship, supplementary professional education, offline entrepreneurship education programs, extramural entrepreneurship education programs, multivariate statistical methods, cross-regional comparison.

DOI: 10.17323/1814-9545-2018-2-139-172

The Logic of Studying the Effects of Participation in Continuing Education on Small Business Development in Specific Socioeconomic Contexts

Studies on the impact of education on entrepreneurial activity have revolved around two major aspects: how the overall level of education attainment affects entrepreneurial activity and its socioeconomic benefits [Lucas 1978; van Praag, Cramer 2001], and how entrepreneurship education—modules of various types and levels designed to develop competencies in leadership, project management, uncertainty management, etc.—affects the success rate of entrepreneurial activity [Walter, Block 2016].

It has been empirically shown that there are no universal ways covering every country and every level of education attainment in which entrepreneurship education affects entrepreneurial activity, yet the level of education attainment has a significantly positive influence on the outcomes of such activity. Education does not always promote or improve the quality of entrepreneurial activity even in entrepreneurship-friendly institutional environments [Ettl, Welter 2010; Giacomini et al. 2011; Sánchez 2011]. Meanwhile, the effect of education on earnings is greater among employees than entrepreneurs in Europe and equal or even greater among entrepreneurs in the United States. It has been established that all measurements of the influence of education on entrepreneurial success are potentially affected by outliers, and, more importantly, most studies detect a correlation but no causal relationship between education and entrepreneurial achievement [van der Sluis, van Praag, Vijverberg 2008]. At the same time, there is ample research devoted to the impact of entrepreneurship education on entrepreneurial intentions and success [Peterman, Kennedy 2003; Hytti, Kuopijärvi 2004; Moro, Poli, Bernardi 2004; Fayolle 2005; Souitaris, Zerbini, Al-Laham 2007; Oosterbeek, van Praag, Ijsselstein 2010; Naia et al. 2015]. Although studies on the relationship between entrepreneurship education and entrepreneurial activity conducted in different socioeconomic contexts yield different findings, such a relationship has been confirmed in a number of publications [Raposo, do Paço 2011]. For instance, an international study involving 42 countries has revealed significant correlations between entrepreneurship education and ac-

quisition of relevant components of human capital ($rw = 0.217$) as well as between entrepreneurship education and entrepreneurial performance ($rw = 0.159$), the latter correlations being more pronounced for academic degrees than for short-term courses [Martin, McNally, Kay 2013]. Another representative study that covered 32 countries revealed a strong positive effect of entrepreneurship education on entrepreneurial intentions, primarily in entrepreneurship-hostile institutional environments [Walter, Block 2016]. Enterprise education has been found to have a positive impact on the intentions of venture creation in cases where they were weak or absent prior to education, whereas a significant reverse effect was discovered for students with some previous entrepreneurial experience [Fayolle, Gailly 2015]. Entrepreneurship education has proved to be the most effective for students majoring in business, management and engineering [Maresch et al. 2016].

A brief overview of empirical findings demonstrates that the influence of a national education system on entrepreneurial activity should be measured with regard to specific regional contexts. To develop relevant recommendations, it is necessary to obtain detailed, credible and up-to-date statistical information, consistent with the international standards, on correlations between various forms of education, including business programs, as well as on the level and quality of entrepreneurial activity.

This study aims to evaluate the effective engagement of Russians in continuing education programs, including those in entrepreneurship, and to assess the effect of such engagement on the development of small businesses in specific socioeconomic contexts of Russia's regions.

To do this, empirical data was used to find out whether there is a significant relationship between the participation rate in education (continuing education programs and business education programs, in particular) and the level of development of small businesses, microbusinesses and entrepreneurship (in its traditional and innovative versions) for any specific regional socioeconomic context. The three clusters of regions with homogeneous socioeconomic contexts (advantaged or disadvantaged subjects of the Russian Federation, with predominantly social or investment problems, etc.) were identified using a multidimensional typology proposed by Olga Obratsova and Ekaterina Popovskaya [2017].

The first type of socioeconomic context of entrepreneurship is determined based on high human wellbeing indicators and insignificant variations in the other two latent context variables, innovative activity and sociodemographic characteristics. This type includes only six successful regions: Moscow, Saint Petersburg, Moscow and Tyumen Oblasts, Yamalo-Nenets and Khanty-Mansi Autonomous Okrugs. The rest of Russia's regions are characterized by low values of the "well-being" latent variable, so they cannot be distinguished by this latent factor. The second context type is determined based on high values

of the “investment problems” latent variable: 42 regions demonstrate low levels of investment activity (all with low values on the “wellbeing” axis and a considerable variance of the “social problems” variable). Contexts of the third type are observed in the regions with high values of the “social problems” latent variable: 35 subjects of the Russian Federation experience harsh social conditions, accompanied by low wellbeing indicators and almost average investment activity.

The study goes from comparing the number of students enrolled in continuing education programs (including business programs of varying scopes, both offline and online) of various duration across the regions, through analyzing the correlations between the demand for specific types of continuing education programs and the development of different entrepreneurship subsectors under region-specific socio-economic conditions, to analyzing business education as a growth driver for particular types of small businesses in specific contexts.

The following hypotheses are tested in the study:

- H1.1. The level of participation of Russians in entrepreneurship education is not affected by the type of regional context.
- H1.2. Differentiation of Russian regions by the demand for continuing education programs is statistically significant.
- H1.3. Differentiation of Russian regions by the demand for entrepreneurship education programs is statistically significant.
- H2.1. Development of online learning courses in entrepreneurship drives innovative microbusinesses in the regions with predominantly social problems.
- H2.2. Development of offline learning courses in entrepreneurship drives innovative microbusinesses in the disadvantaged regions of all types.
- H2.3. Development of online learning courses in entrepreneurship inhibits the development of traditional small and microbusinesses in the disadvantaged regions of both types.
- H2.4. Development of offline learning courses in entrepreneurship inhibits the development of sole proprietorship in the regions with predominantly investment problems.

**Database and the
Methodology of
Analyzing the
Education System
Impact on Entre-
preneurial Activity
in Russia**

To achieve the goal set, it is necessary to build a multidimensional thematic data collection and apply multivariate statistical analysis methods on the basis of universally adopted theories and the international standards of enterprise and entrepreneurship statistics and business demography [Reynolds et al. 2005; Obratsova 2017]. In order to ensure reliability of the databases used to test the above hypotheses, a complex analysis of the informative value of educational statistics, on the one hand, and small business and enterprise statistics in Russia, on the other hand, was conducted. The analysis revealed that the use of necessary information is essentially limited by the character-

istics of available statistical data: missing values, outdated statistics, impossibility to harmonize data from different sources due to fundamental methodological inconsistencies, low representativeness of microdata of required disaggregation. For this reason, the database was formed by harmonizing the information resources of the Russian Federal State Statistics Service (Rosstat)'s official statistics and the Ministry of Education and Science's administrative statistics for 2013–2016, including:

- 1) Current enterprise and entrepreneurship statistics¹, Rosstat small business continuous surveys;
- 2) Administrative statistics of the Ministry of Education and Science of the Russian Federation (open national and region-specific data on education and science in machine-readable formats of the portal [http://xn-80abucjiibhv9a.xn — p1ai/opendata](http://xn-80abucjiibhv9a.xn—p1ai/opendata)²);
- 3) Current administrative statistics on school and postsecondary education, statistical reports on public program performance benchmarks;
- 4) Results of classifying Russia's regions by their socioeconomic contexts based on a multivariate analysis of Rosstat's regional statistics [Obratsova, Popovskaya 2017].

The system of thematic data collection indicators based on the above sources of official statistics as well as labels of those indicators' values used for analysis and modeling in SPSS-21 are presented in the Supplement.

When doing cross-regional comparisons, disaggregation of the thematic data collection on small business, microbusiness and sole proprietorship as well as on the role of continuing education programs of various types and duration in entrepreneurship development was performed and justified with due regard for the availability of up-to-date official (national and administrative) statistics micro- and macro-data, the extent to which the information sources go into detail, the coverage and representativeness in terms of specific regions, and the

¹ Rosstat official business demography statistics is currently under implementation (see http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/reform/#); the full range of indicators is available for 12 subjects of the Russian Federation, in seven of them being based on pilot estimates produced by regional Rosstat offices in 2014, and in the other five on experimental estimates performed as part of research on the formation of business demography indicators in compliance with the OECD standards in the context of data incompleteness in 2013 and 2014 [Obratsova 2017; Dukhon 2013].

² The portal data is available for a limited period of time (beginning with 2013) and characterized by low quality and numerous errors, so it needs to be seriously improved by the responsible persons in the Ministry of Education and Science.

possibility of ensuring methodological consistence in both spatial and temporal aspects (including compliance with the international statistical standards).

The system of indicators for the developed thematic data collection was built using the method of statistical concretization of target and factor categories in accordance with the determined analytical goals and formulated hypotheses through analyzing the economic content of an indicator depending on its measurement or calculation method and its availability in open sources of information. Harmonization of data obtained from different information resources, statistical concretization of the determined analytical goals and calculation of the derived statistical indicators have resulted in a thematic data collection. This is a logically consistent system of target indicators of the development of small businesses (small and microenterprises in the case of legal entities; innovative businesses, which include enterprises classified as pursuing the “research and development” economic activity, are treated as an isolated category, according to the statistical methodology standard—see Section 2 of the Supplement Table) and factor indicators of the development of education programs (including continuing education programs of varying duration—see Section 3 of the Supplement Table) in Russia and its federal subjects. The innovative small business category was identified pursuant to the international statistical standard for classifying economic activities, so it includes institutionalized small businesses (legal entities of the market sector with fewer than 100 employees) with primary economic activities in at least one of the three fields of research and development in life sciences, technology, social sciences or humanities:

- 1) Fundamental research, i. e. experimental or theoretical research designed to obtain new knowledge about the key mechanisms in the human body, society and nature;
- 2) Applied research, i. e. research designed mostly to apply new knowledge to achieve practical goals and solve particular problems (excluding market research);
- 3) Experimental development, i. e. activity based on research findings or practical experience and designed to protect human life and health, and create and upgrade materials, products, processes, devices, services, systems or methods.

The number of students in entrepreneurship education programs was calculated based on Section 3 of the administrative form of the Ministry of Education and Science’s statistical report Information on Continuing Education of Specialists by Types of Education, Fields of Study and Specializations. Eurostat data³ was used as a methodological ba-

³ CODED (Eurostat’s Concepts and Definitions Database) and other online

sis to estimate the thematic data collection variables describing the number of students in entrepreneurship education programs, both with regard to the system of definitions and concepts characterizing the level⁴ and career structure of education⁵ in Russia and for the purpose of determining the participation rate in business education in Russia based on the Ministry's data mentioned above. According to the SDMX Metadata Common Vocabulary, business education included the following fields of study: crisis management; accounting, analysis and audit; land and property relations; innovation studies, marketing; management; occupational safety; quality management; human resource management; banking and finance; and taxation. The level of education attainment was measured by the most advanced education program successfully completed by an individual. Career categories of the education programs were identified based on the fields of study stipulated by the Ministry of Education and Science of the Russian Federation. Regrouping allowed for harmonizing the estimated indicators with Eurostat's SCL–ISCED Fields of Education and Training.

In order to enable cross-regional and temporal comparisons, the system of absolute thematic collection values was standardized. Data on the number of students in continuing and business education programs and that of small and micro businesses and sole proprietors was standardized by the size of the economically active population, while data on the number of people employed in small business sub-sectors, revenues of small businesses and sole proprietors and professional educational institutions' expenditure and funding was standardized by the number of relevant enterprises and organizations. In addition, a system of growth rates (chain-linked with a short-term lag of one year and fixed-based with medium-term lags of two, three and four years) for the target indicators of small business development in regions of Russia (available in Section 2 of the Supplement Table) was estimated in order to make dynamic comparisons possible.

The resulting thematic data collection includes factor and target indicators that are harmonized by the basic concepts and definitions, compliant with the international statistical standards and cleared of the size effect on both spatial and temporal scales, i. e. they allow for not only conducting cross-regional comparisons of participation in continuing education (and business education in particular) but also analyzing the role of continuing education programs of various types (classified by fields of study with entrepreneurship education

glossaries relating to survey statistics // SDMX Content-Oriented Guidelines (COG), annex 4 "Metadata Common Vocabulary" (MCV). SDMX Glossary, 2016. Eurostat, 2016.

⁴ International Standard Classification of Education. Eurostat Metadata, 2011 (ISCED2011).

⁵ SCL–ISCED Fields of education and training. Eurostat Metadata, 2013 (ISCED-F 2013).

programs as an isolated category and by duration: under 72 hours, 72–100 hours, 100–500 hours, professional conversion programs of 500 hours and longer, additional qualification courses of at least 1,000 hours, and apprenticeship programs as an independent type of training) in the development of the entrepreneurship sector—see Section 3 of the Supplement Table.

Empirical analysis and hypothesis testing were performed stage by stage using the thematic data collection variables.

At the first stage, the distribution of the subjects of Russia by the factor and target thematic data collection variables was analyzed. The findings served as a basis for testing hypotheses H1.1 and H1.2 as well as evaluating the distribution for normality in order to choose adequate methods for analyzing dependencies and modelling the impact of education programs on small business development in regions of Russia. Nonparametric tests and research methods had to be applied as statistically significant deviations from normal distribution were observed at the first stage.

At the second stage, k-means clustering of the regions made it possible to translate the target and factor relative indicators of the data collection into an ordinal scale which is not affected by normal distribution requirements or by the presence of outliers and extreme observations. As a result of clustering, a stable three-cluster structure of regions was obtained for each variable by the fifth iteration. This structure was interpreted as a set of spatial clusters with low, medium or high indicator values.

The third stage involved correlation analysis of the impact of entrepreneurship education programs of various types and duration on the development of traditional and innovative small business in the country (for the small and micro business subsector) designed to test hypotheses H2.1, H2.2 and H2.3. The structure of the official statistics used as an information basis inevitably results in a temporal lag between the variation series tested for relationships:

- The Ministry of Education and Science's administrative reporting forms Nos. 1FSN, 2FSN and 4FSN on continuing education delivered in Russia's institutions of vocational, higher professional and continuing education, which contain information on the factor variables of the number of students, are developed and published at the end of the academic year;
- Rosstat's reporting forms on the number and key performance indicators of enterprises are developed and published at the end of the accounting year (to show the results of the previous calendar year).

For example, the data obtained from the Ministry's 2013 statistics reflects the demand for education programs in the 2011/12 academic year, while the Rosstat 2013 statistics contain data on companies'

2013 accounting and their resources at the end of 2013. Therefore, there is a short-term time lag of 6 to 27 months between the two systems of 2013 reporting indicators. Consequently, correlations between the education and small business development variables should always be measured with a lag, whether short-term (6 to 12 months) or medium-term (two or three years). This is why the direction of the “cause—effect” relationship and, hence, the factor and target values in the models are uniquely defined and beyond doubt: only earlier facts can cause later ones, not vice versa. Nonparametric criteria were used to measure the strength of the relationship between the factor variables of participation in continuing education programs and the target variables of small business development in Russia, as statistically significant deviations from normal distribution had been confirmed.

Correlation analysis and transition to an ordinal measurement scale allowed for identifying at the fourth stage the factors of development of traditional and innovative small business and sole proprietorship in a region by using the Fisher’s Linear Discriminant Analysis (FLDA) model. This method of multivariate statistical analysis is less sensitive to outliers and extreme values as it deals with ordinal scale variables. Thus, it can be applied to model distributions that are significantly different from normal. Being nonparametric, the FLDA model can be used to identify the factors that determine with a pretty high degree of probability whether classification units belong to one of the predesigned clusters, i. e. the regions with low, medium or high level of small business development [Fisher 1936; McLachlan 2004]. Therefore, discriminant analysis is built around constructing discriminant function d , which describes in an n -dimensional attribute space a required plane dividing the designed clusters in the best possible way in terms of probability distribution. This function is interpreted as a complex latent factor that determines belonging to a cluster based on the target attribute value, as it takes the following form:

$$d = b_1 \cdot x_1 + b_2 \cdot x_2 + \dots + b_n \cdot x_n + a,$$

where: $(x_1, x_2, \dots, x_n)$ are values of the variables corresponding to the units analyzed;

$(b_1, b_2, \dots, b_n)$ are coefficients evaluated in the FLDA model; and a is a constant.

The general concept of FLDA is that for a particular number of observation units whose assignment to a specific cluster is already known (this is a training sample), a discriminant function is constructed based on the values of their predictor variables. Next, the model is verified using a control sample. Stratified cross-validation was used to verify the constructed models so as to reduce dispersion and thus obtain more stable and prognostically reliable models [McLachlan 2004; Efron 1988]. The significance of the differences identified (p-val-

ue < 0.05) confirms that the differences between the group means in the variables describing the development of traditional and innovative small and micro businesses and sole proprietorship in regions of Russia are not random.

Prognostic significance of the constructed FLDA models for specific regional socioeconomic contexts was assessed based on the proportion of classification units of the control sample for which belonging to a specific group had been predicted correctly based on the Fisher's discriminant function values (with the help of accuracy, sensitivity and specificity coefficients as well as predictability indicators) [Fawcett 2006; Powers 2011].

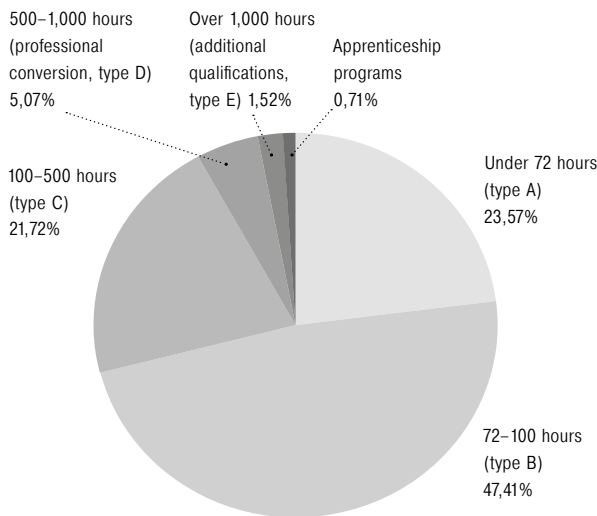
All the analytic operations were carried out in SPSS-21.

**Participation in
Entrepreneurship
Education in the
Socioeconomic
Contexts of the
Subjects of Russia**

Participation of Russians in continuing education as such and entrepreneurship education in particular remains abnormally low today, the annual enrollment rate in continuing education programs of all forms, types and specializations being less than 1.7 million, including a little over 800,000 in entrepreneurship education programs (about 274,000 offline and nearly twice as many online students). Analysis of the Ministry of Education and Science's empirical data demonstrates that the structure of students enrolled in continuing education programs of various duration (Fig. 1) has not undergone any statistically significant change since 2013 (assessed on the basis of the skewness coefficient). Short cycles (under 100 academic hours) prevail among continuing education programs, those of 72–100 hours being the most popular. Satisfied demand of the Russian population for additional qualification and professional conversion programs does not exceed 2 and 5 percent of the total student population, respectively. Apprenticeship programs as an independent type of continuing education involve less than 1 percent of all students.

The number of students in entrepreneurship education programs (per 10,000 of the economically active population) differs across subjects of the Russian Federation, the distribution being statistically significantly different from normal. Variations are the greatest in those regions with investment problems that achieve the highest results in their socioeconomic contexts. Figure 2 shows the number of students in offline and online entrepreneurship education programs in different socioeconomic contexts (1st cluster—advantaged regions, 2nd cluster—regions with predominantly social problems, and 3rd cluster—regions with predominantly investment problems). High values in both offline and online programs are observed in Khabarovsk Krai and Jewish Autonomous Oblast (about 70 and 135 per 10,000 of the economically active population, respectively), Tomsk Oblast showing a remarkably high result (90 and 175) and the Republic of Tyva breaking the record with its extremely high participation rates. Socioeconomic contexts of all those regions are characterized by a prevalence of investment

Fig. 1. Structure of students by duration of popular continuing education programs



problems. Among the advantaged regions, the highest participation rates in entrepreneurship education (especially in online programs) are provided in Moscow (80 and 130) and Saint Petersburg (55 and 100). The lowest participation rates are observed in the regions with predominantly social problems.

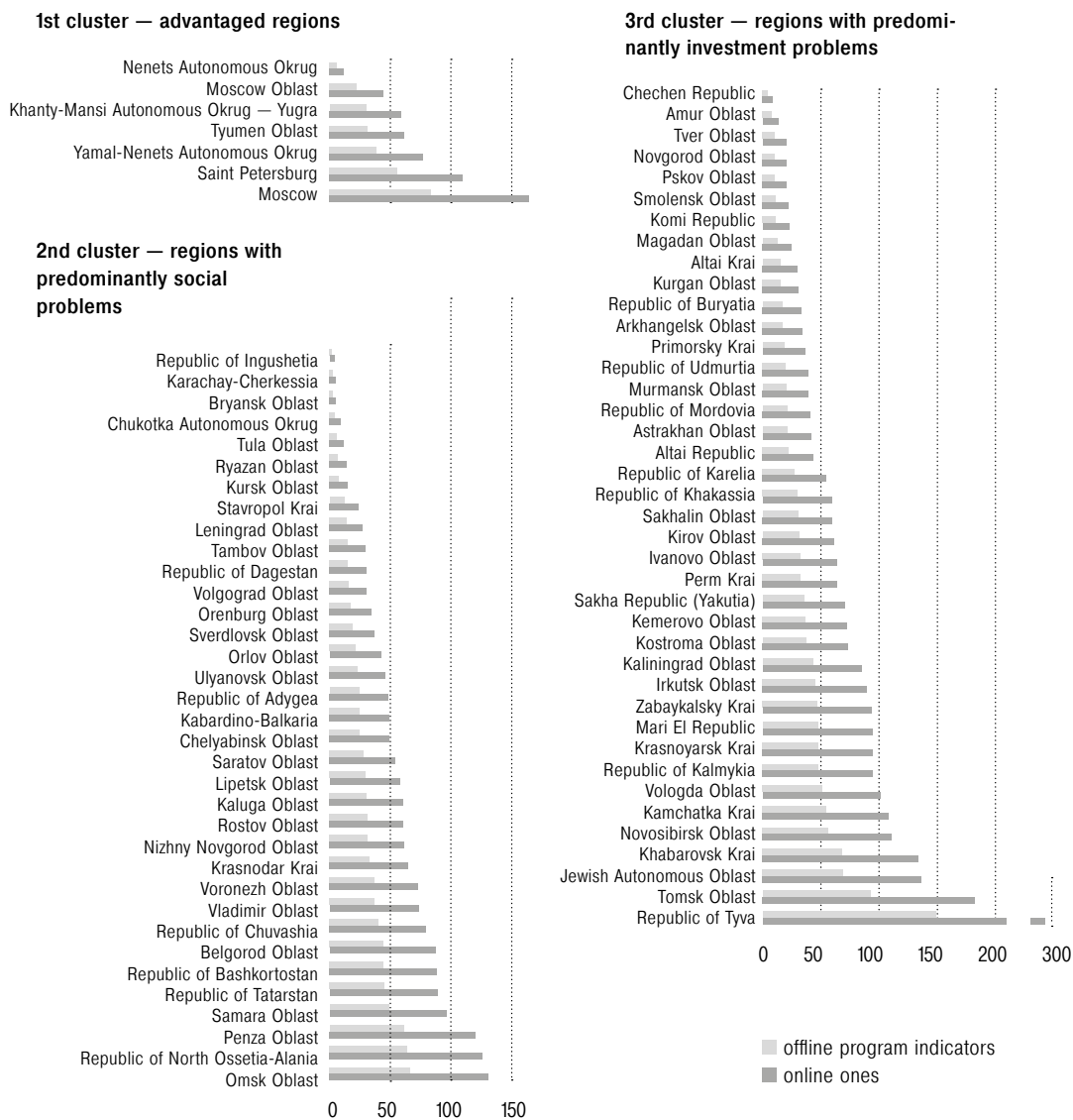
Distributions of the subjects of Russia by the number of offline and online programs are closely interrelated (Spearman's Rho 0.907, $p\text{-value} \leq 0.000$), the average indicator ratio being 1:2 for both entrepreneurship education programs and continuing education as a whole.

However, the analysis found no statistically significant differences between the median values and the distributions of participation in entrepreneurship education programs across regions of various contexts for either offline or online programs (the median test and the Kruskal–Wallis H test, respectively). Therefore, hypothesis H1.1. stating that the level of participation of Russians in entrepreneurship education is not affected by the type of regional context has been confirmed, so all the regions will be treated as a homogenous group at the subsequent stages of analysis.

Table 1 presents the results of analyzing the distribution of the regions of Russia by the level of participation in continuing education programs of various types and fields of study.

As the distribution indicators presented in the table demonstrate, all the distributions analyzed significantly differ statistically from nor-

Fig. 2. Number of students in entrepreneurship education programs in the subjects of the Russian Federation with different contexts



Source: Authors' calculations based on the Ministry of Education and Science's 2013–2016 administrative statistics.

Table 1. The distribution of the subjects of the Russian Federation by the level of participation in continuing education programs of various types and fields of study*

Indicator		Type A	Type B	Type C	Type D	Type E	Type F	Business education, offline programs	Business education, online programs
Mean		51.73	86.96	46.23	9.63	2.86	1.92	31.49	62.04
Standard error of the mean		7.60	7.40	4.15	0.86	0.33	0.44	2.58	5.08
Median		30.40	72.81	38.14	7.43	1.97	0.73	27.70	54.59
Standard deviation		68.79	67.39	37.82	7.83	2.69	3.49	23.78	46.86
RSD, %		132.97	77.49	81.81	81.24	94.15	181.45	75.53	75.53
Asymmetry		3.07	2.31	0.94	1.51	2.30	3.65	1.84	1.84
Standard asymmetric error		0.27	0.26	0.26	0.27	0.29	0.30	0.26	0.26
Excess		13.00	8.33	1.15	3.18	6.62	14.86	6.10	6.10
Standard excess error		0.53	0.52	0.52	0.53	0.57	0.59	0.52	0.52
Minimum		0.04	5.42	0.18	0.24	0.19	0.02	0.00	0.00
Maximum		441.48	436.23	186.45	42.54	14.01	19.67	148.56	292.69
Quantiles	10	2.24	25.04	4.51	1.38	0.58	0.06	6.59	12.99
	20	7.03	39.82	8.54	2.70	1.09	0.11	12.40	24.43
	25	10.05	41.83	11.45	3.76	1.18	0.16	15.35	30.24
	50	30.40	72.81	38.14	7.43	1.97	0.73	27.70	54.59
	75	64.66	106.37	74.19	13.37	3.52	2.39	44.53	87.74
	80	87.02	118.05	78.25	15.44	4.55	3.03	47.67	93.92
	90	117.94	182.84	94.86	21.13	5.89	4.03	62.18	122.51
DDC		52.67	7.30	21.01	15.34	10.12	68.55	9.43	9.55
IQR		54.61	64.54	62.74	9.61	2.34	2.23	29.19	57.51

* The level of participation is measured as a number of students per 10,000 of the economically active population.

Source: Authors' calculations based on the Ministry of Education and Science's 2013–2016 administrative statistics.

mal by their asymmetry characteristics, the excess particularly, and indicator variations are significantly high for all the types of programs (variation coefficient RSD varying from 75 to over 180 percent). That is, nonparametric methods and models have to be used to measure and model the relationship between participation in business education programs and small business development in a region. The level of cross-regional differentiation is very high too. Decile differentiation coefficients (DDC) show that the gap in the participation in continuing education programs between the 10 percent most active and the 10

percent least active regions is from seven-fold (for type B short-term programs) to 70-fold (for type F programs). Differentiation is somewhat lower for business education programs, but there is still an almost ten-fold gap between the extreme decile groups. The interquartile range (IQR) is also very high (as relative to the distribution median) for programs of all the types and fields of study, i.e. the central 50 percent of the regions demonstrate a statistically significant differentiation for continuing education as such and business education in particular. Therefore, hypotheses H1.2 and H1.3 have been confirmed.

Types and Forms of Continuing Education Programs Determining the Level of Small Business Development and Changes in its Quality Structure

At the stage of analyzing the actual impact of participation in continuing education, it was reliably established that this indicator is a moderately powerful factor of differences in not only the number of economic agents in the small business sector but also the key indicators of their activity, i.e. revenues and the number of employees. The greatest impact of the consolidated indicators of participation in continuing education on the number of people employed in small business (for all its forms in total) is observed with a lag of 2–3 years (Spearman's correlation coefficient $\rho \approx 0.5$, $p < 0.01$), and on the number and revenues of small and micro businesses with a lag of 1–2 years ($\rho \approx 0.7$, $p < 0.01$). When measuring the greatest effect of the cumulative demand for continuing education programs on the number and revenues of entrepreneurs, the lag is increased to 3 years and the relationship becomes weaker and less significant ($\rho \approx 0.4$, $p < 0.05$). As the lag grows further, the described relationship becomes insignificant for all the specified target indicators of business development. Therefore, it is not only the system of teaching to start and manage a small business, whether new or growing, but also the whole system of continuing education and basic professional training that contribute to small business development in a region.

A more detailed analysis with a breakdown by institutional types and quality structure of small enterprises also confirmed that the education system can be a significant driver of development and innovation in the small and microbusiness sector. An increase in the number of educational institutions as well as in institutions' and public expenditure on education has been found almost certain to determine consistent development of the entrepreneurship sector for all career fields and types of business entities. The correlation is a little weaker for the number of microbusinesses in "research and development" than for those pursuing traditional economic activities ($\rho \approx 0.71$ and $\rho \approx 0.84$, respectively), yet still indicative of a nearly reliable statistical relationship ($p < 0.01$). The most powerful and significant relationship is observed with a time lag of 2–3 years for traditional economic activities and 5–6 years for innovative ones. It appears that a greater lag in innovative entrepreneurship is conditioned by the need to obtain edu-

cation of a higher quality, which is more time-consuming, and longer average time to profitability for capital-intensive venture businesses.

Participation in professional training and continuing education programs at the stages of vocational, higher and postgraduate education appears to be a no less powerful factor ($p \approx 0.802$, $p < 0.01$), the closest relationship between the number and size of small and medium-sized businesses and the participation rate being observed with a lag of 2–3 years.

Empirical analysis of data on the distribution of students among continuing education programs of various duration revealed a situation similar to what can be observed today in Western business schools. First, it was established that continuing education programs exert a strong and statistically significant influence on the expansion of the entrepreneurship sector, i. e. on business survival rates ($p \approx 0.728$, $p < .01$). Second, short-term programs (from 72 to 100 hours—they are usually practice-oriented) are in higher demand among consumers of educational services, especially those with a gainful business or employment, and are closer related to the entrepreneurship indicators. Programs of 500 to 1,000 hours (the so-called leadership programs) have a much weaker effect on small and microbusiness activity indicators ($p \approx 0.32$, $p < 0.05$). However, such programs turn out to be the most powerful and significant driver for entrepreneurship development when analysis includes the unemployed sent to education programs by employment agencies (the most significant relationship of $p \approx 0.603$, $p = 0.000$ is observed with a one-year time lag). Third, correlation analysis confirmed that education and short-term training for teachers and specialists in the form of practice-oriented apprenticeships also play an essential role in improving the entrepreneurial landscape ($p \approx 0.369$ with a one-year lag and $p \approx 0.384$ with a two-year lag, $p < 0.01$). That is why continuing education programs at the influence of education and business—apprenticeship that combines traditional classroom-based teaching methods with participation in real-life projects—appear to be an effective way of promoting successful entrepreneurship and transfer of skills, knowledge and technology (*spin-off*).

The regularities revealed are observed for each type of small entrepreneurship unit. Meanwhile, the strength of relationship grows as the size of the entrepreneurship unit decreases. The described effects of education reveal themselves most prominently for sole proprietorship and a little less for microenterprises. For small businesses, the relationship is sometimes rendered weak or even completely insignificant due to heterogeneous employee structure. In the medium-sized business sector, only the effects of short-term continuing education programs and online education participation rates remain statistically significant ($p \geq 0.271$, $p \leq 0.021$). Obviously, this has to do with medium-sized businesses having less interest in individual employees (employers find it easier to hire a trained person than to train their own staff).

Allocation of public funds for lab equipment as part of initiatives to modernize schools and provide vocational schools with technology equipment has no impact on the development of entrepreneurship or its individual segments in the regions of Russia. There may be two reasons for this. First, such equipment is used by school and vocational school students, i. e. minors who will study or work as employees for some years before their cumulative level of general and field-specific knowledge and social capital will allow them to start a business of their own, let alone propel it to success and steady growth. Second, technical and technology skills that they acquire by learning on this equipment are obviously not sustained by an adequate amount of knowledge required to start and develop a business. Time lags are logical and inevitable here, so effort should be made to continue engaging school and vocational school students in various forms of business education and to build potent hubs on the basis of entrepreneurship universities or private companies willing to invest in the development of dual education and attract this cohort of youth to the industrial and entrepreneurship projects on their basis.

**Entrepreneurship
Education Programs as a Factor
of Small Business
Development in
Regional Contexts**

As the prepared database was disaggregated by the type of regional context for each of the two clusters of disadvantaged regions, grouping was performed by the classifying variable of small business development. Following this, the differences in the mean values of the suggested predictors between the three types of classification units—low, medium and high level of small business development—were assessed. As it was established, the differences among the groups cannot be treated as random in terms of either the small business and entrepreneurship categories or the entrepreneurship education indicators (see Section 3 of the Supplement Table).

Thus, the tuple of variables for which the differences between the group means are not random affects the number of small businesses, microenterprises and sole proprietors in traditional or innovative business with a probability near 1 ($p\text{-value} < 0.05$) in a region of a specific context type. Meanwhile, the λ_w value does not indicate a statistically significant contribution of relevant cross-group differences to the overall dispersion of discriminant function scores in any given controlled variable. Comparisons of the statistical structure of the tuple of variables varying significantly between the groups of classification units confirm that a specific type of socioeconomic context determines the specific set of development factors in each of the small business subsectors.

Therefore, the next FLDA stage suggested modelling complex latent factors for each type of socioeconomic entrepreneurship context. Such factors are in fact discriminant functions allowing us to predict the level of development of a specific small business segment that will be achieved in the region depending on the level of satisfied popula-

tion's demand for entrepreneurship education programs. Seven of the constructed FLDA models are significant ($p\text{-value} \leq 0.003$). For them, the standardized discriminant function predictor coefficients, which evaluate the vector and influence of a specific predictor on the probability of achieving low, medium or high values of the target variable of traditional or innovative business development in the region, allow for the following interpretation:

- 1) Development of both offline and online business education programs is an equally significant driver of innovative micro business development in the regions with predominantly social problems;
- 2) Development of offline business education programs is a significant driver of innovative micro business development in the regions with predominantly investment problems;
- 3) Development of offline business education programs is a significant negative factor for the development of traditional microbusinesses in the regions with predominantly social problems;
- 4) Development of offline business education programs and the growth in expenditure on continuing education institutions are significant negative factors for the development of traditional small enterprises in the regions with predominantly social problems;
- 5) Development of offline business education programs is a powerful negative factor and the development of apprenticeship programs is a weak yet significant positive factor for the development of traditional microbusinesses in the regions with predominantly investment problems;
- 6) Development of offline business education programs is a significant negative factor for traditional small entrepreneurship development in the regions with predominantly investment problems;
- 7) Development of offline business education programs is a negative factor for sole proprietorship development in the regions with predominantly investment problems.

Predictive efficiency of the models is pretty high: the minimum classification accuracy (AR—the proportion of correctly classified observations) is 77.1 percent; the effective sensitivity level (TPR—the proportion of true positive classification results) is at least 10 percent; the specificity level (TNR—the proportion of true negative classification results) in all the seven significant models is above 69 percent.

Hypotheses H2.1—H2.4 formulated in this study have been confirmed in the FLDA models. Thus, the results obtained appear satisfactory in the context of the goal set, as they are essential for developing a differentiated approach towards creating and sustaining entrepreneurship education programs in specific socioeconomic contexts of the subjects of the Russian Federation.

**Conclusion and
Suggestions on
Enhancing Russia's
Continuing Educa-
tion System to
Promote Small
Business Develop-
ment and
Innovation**

In the short term, it appears rational to promote investment in entrepreneurship education programs of innovative forms and content so as to increase their number and participation rates among students of various majors. Preference should be given to shorter continuing education programs and modules of university programs (from 72 to 100 hours), since students enrolling in these are very likely considering or creating startups already and such educational support will help them act faster and more cost-efficiently.

We suggest designing initiatives to invite active entrepreneurs as coaches or mentors for university students. This will be a win-win co-operation: entrepreneurs will regard the most promising teams as a venture investment opportunity, gradually shifting from mentorship to angel financing, and universities will acquire valuable human resources that will act not only as guest lecturers but also as consultants and coaches, thus encouraging a faster and more efficient building of startup teams.

In the long term, it makes sense for universities to develop, along with traditional business education, programs teaching innovation skills and promoting growth-oriented entrepreneurship. Focus should be placed on the "soft" factors of business creation and growth, the ability to recognize breakthrough technology and products, hedging, financial and organizational innovations.

It also appears productive to include the skills of creative thinking, turning ideas into projects and starting a business in the elementary, middle and high school education programs so as to develop entrepreneurial competencies and encourage the entrepreneurial intentions of school students, improve the status of entrepreneur and entrepreneurial careers in society, and create a system of social and cultural norms conducive to entrepreneurship.

While modernizing the education system, it is vital to take into account that business education in regions with challenging socioeconomic contexts will rather inhibit entrepreneurship development by increasing the drain of people with entrepreneurial intentions to more advantaged regions. A more productive strategy will be to promote the best practices by popularizing the most successful entrepreneurs through mass media and to organize student competitions in business plans, etc. with a view to providing intensive learning courses, grants and other types of support to target groups. Naturally, this should be coupled with measures to improve regional socioeconomic contexts encumbering engagement of the population in entrepreneurial activity.

In the face of the revealed positive effects of public servants' business education on the population's entrepreneurial activity in the context of the national policy designed to encourage the regions of Russia to develop the flagship universities, innovation infrastructure and children's technology education, it could be rational to introduce entrepreneurship education programs for public servants. The most effective formats will be short-term apprenticeships for government

executives of regional and national authorities in charge of entrepreneurship and innovative economy issues and innovative short-term advanced training courses (of no more than 70 academic hours) for mid-level public officials.

Timely and adequate assessment (monitoring) of resources spent and results obtained is required to ensure the efficiency of educational modernization incentives designed to promote entrepreneurship in the regions. For this purpose, it is crucial to make universities and education authorities disclose relevant open data and evaluate the performance of the education system and educational policy with due regard for a delayed start of business by university graduates. It would also be of use if Russian universities participated in the international comparative studies of students' entrepreneurial engagement (GUESS and others).

Supplement The List of Thematic Data Collection (TDC) Variables Used in the Study to Analyze the Effects of the Education System on Entrepreneurship Development

Nos. of variables in TDC	Name and type of variable, unit of measurement, and observation period covered in the study	Abbreviated name and example of variable labeling in TDC*
1. Territorial indices used to form regional TDC breakdowns		
1	Russian National Classifier of Municipal Territories (two digits)	region
2	FEDERAL DISTRICT	FO
2. Target indicators of entrepreneurship in Russia and subjects of the Russian Federation		
3–8	Gross regional product (annual gross value added, at basic prices) in 2010–2015	GRP10
9–14	Economically active population in 2010–2015, annual average	EAN10
15–20	Number of medium-sized enterprises in 2010–2015	ME10
21–26	Number of small enterprises in 2010–2015	SE10
27–31	Number of microenterprises in 2010–2014	MICROE10
32–36	Number of active sole proprietors in 2010–2014, thousand people	PE10
37–42	Revenues of medium-sized enterprises in 2010–2015, billion rubles	T_ME10
43–48	Revenues of small enterprises in 2010–2015, billion rubles	T_SE10
49–53	Revenues of microenterprises in 2010–2014, billion rubles	T_MICROE10
54–58	Revenues of sole proprietors in 2010–2014 (taxes and other obligatory payments included), million rubles	E_PE10
59–63	Average number of people employed on the payroll in medium-sized enterprises in 2010–2014 (thousand people)	EMPL_ME10

Nos. of variables in TDC	Name and type of variable, unit of measurement, and observation period covered in the study	Abbreviated name and example of variable labeling in TDC*
64–69	Average number of people employed on the payroll in small enterprises in 2010–2015 (thousand people)	EMPL_SE10
70–74	Average number of people employed on the payroll in microenterprises in 2010–2014 (thousand people)	EMICRE10
75–79	Number of people employed in the sole proprietorship sector in 2010–2014, thousand people	EMPL_PE10
80–84	Number of medium-sized enterprises pursuing the “research” economic activity in 2010–2014 (at the end of the year)	SCIENCE_ME10
85–89	Number of small enterprises pursuing the “research” economic activity in 2010–2014 (at the end of the year)	SCIENCE_SE10
90–94	Number of microenterprises pursuing the “research” economic activity in 2010–2014 (at the end of the year)	SCIENCE_MICROE10
95–99	Revenues of medium-sized enterprises pursuing the “research” economic activity in 2010–2014 (billion rubles)	T_SCIENCE_ME10
100–104	Revenues of small enterprises pursuing the “research” economic activity in 2010–2014 (billion rubles)	T_SCIENCE_SE10
105–109	Revenues of microenterprises pursuing the “research” economic activity in 2010–2014 (billion rubles)	T_SCIENCE_MICROE10
110–114	Average number of people (excluding external part-timers) employed in medium-sized enterprises pursuing the “research” economic activity in 2010–2014 (thousand people)	EMPL_SC_ME10
115–119	Average number of people (excluding external part-timers) employed in small enterprises pursuing the “research” economic activity in 2010–2014 (thousand people)	EMPL_SC_SE10
120–124	Average number of people (excluding external part-timers) employed in microenterprises pursuing the “research” economic activity in 2010–2014 (thousand people)	EMICRE_SC10
3. Factor variables of the impact of Russia’s education system on the level and quality of the Russian population’s entrepreneurial potential		
1	Expenditure of professional educational institutions preparing mid-level specialists in 2013 (thousand rubles)	EXP_SPO_2013
2	Size of federal grants received by professional educational institutions preparing mid-level specialists in 2013 (thousand rubles)	FINANS_SPO_2013
3–4	Number of business incubators in 2013–2014 (annual average)	BI_2013
5–6	Total surface area occupied by business incubators in 2013–2014 (sq. m, annual average)	SQ_BI_2013
7–8	Number of small businesses—residents of business incubators in 2013–2014 (annual average)	NUM_BI_2013

Nos. of variables in TDC	Name and type of variable, unit of measurement, and observation period covered in the study	Abbreviated name and example of variable labeling in TDC*
9–10	Total number of people employed in small businesses—residents of business incubators in 2013–2014 (annual average)	EMPL_BI_2013
11–19	Total number of students enrolled in general education institutions in 2004–2012 (annual average)	STUD_G_ED_2004
20–31	Total number of general education institutions in 2004–2015 (annual average)	ORG_G_ED_2004
32–38	Total public expenditure of general education institutions in 2009–2015 (thousand rubles)	EXP_ORG_G_ED_2009
39	Federal spending on lab equipment for vocational schools under the modernization program in 2013 (thousand rubles)	uch_lab_obor
40	Federal spending on technology equipment for vocational schools under the modernization program in 2013 (thousand rubles)	uch_proizv_obor
41	Number of students in offline business education programs as part of the continuing education system in 2013	A_F_all_stud_BUSINESS_FULLday
42	Number of students in online business education programs as part of the continuing education system in 2013	A_F_all_stud_BUSINESS_PARTtime
43	Total number of students in business education programs in 2013	A_F_all_stud_BUSINESS
44	Total number of students in continuing education programs in 2013	A_F_all_stud
45	Total number of students in continuing education programs of less than 72 hours (type A) in 2013, including:	A_all_stud
47	Executives	A_all_stud_head
48	Executives and specialists	A_spec
49	Executives and specialists** (including executives)	A_spec_head
50	Teachers employed in educational institutions of professional education (total)	A_prep
51	Teachers employed in educational institutions of professional education (including executives)	A_prep_head
52	Public officials (total)	A_official
53	Public officials (including executives)	A_official_head
54	Discharged from military service	A_military_service
55	Unemployed, sent by employment agencies	A_placement_service
56	Total students in continuing education programs of 72–100 hours (type B) in 2013, including:	B_all_stud
58	Executives	B_all_stud_head
59	Executives and specialists (total)	B_spec
60	Executives and specialists (including executives)	B_spec_head

Nos. of variables in TDC	Name and type of variable, unit of measurement, and observation period covered in the study	Abbreviated name and example of variable labeling in TDC*
61	Teachers employed in educational institutions of professional education (total)	B_prep
62	Teachers employed in educational institutions of professional education (including executives)	B_prep_head
63	Public officials (total)	B_official
64	Public officials (including executives)	B_official_head
65	Discharged from military service	B_military_service
66	Unemployed, sent by employment agencies	B_placement_service
67	Total students in continuing education programs of 100–500 hours (type C) in 2013, including:	C_all_stud
69	Executives	C_all_stud_head
70	Executives and specialists (total)	C_spec
71	Executives and specialists (including executives)	C_spec_head
72	Teachers employed in educational institutions of professional education (total)	C_prep
73	Teachers employed in educational institutions of professional education (including executives)	C_prep_head
74	Public officials (total)	C_official
75	Public officials (including executives)	C_official_head
76	Discharged from military service	C_military_service
77	Unemployed, sent by employment agencies	C_placement_service
78	Total students in professional conversion programs of 500 hours and longer (type D) in 2013, including:	D_all_stud
80	Executives	D_all_stud_head
81	Executives and specialists (total)	D_spec
82	Executives and specialists (including executives)	D_spec_head
83	Teachers employed in educational institutions of professional education (total)	D_prep
84	Teachers employed in educational institutions of professional education (including executives)	D_prep_head
85	Public officials (total)	D_official
86	Public officials (including executives)	D_official_head
87	Discharged from military service	D_military_service
88	Unemployed, sent by employment agencies	D_placement_service
89	Total students in professional conversion programs of at least 1,000 hours (type E) acquiring additional qualifications, including:	all_stud_E

Nos. of variables in TDC	Name and type of variable, unit of measurement, and observation period covered in the study	Abbreviated name and example of variable labeling in TDC*
91	Executives	E_all_stud_head
92	Executives and specialists (total)	E_spec
93	Executives and specialists (including executives)	E_spec_head
94	Teachers employed in educational institutions of professional education (total)	E_prep
95	Teachers employed in educational institutions of professional education (including executives)	E_prep_head
96	Public officials (total)	E_official
97	Public officials (including executives)	E_official_head
98	Discharged from military service	E_military_service
99	Unemployed, sent by employment agencies	E_placement_service
100	Total students in apprenticeship programs as an independent type of training (type F) in 2013, including:	F_all_stud
102	Executives	F_all_stud_head
103	Executives and specialists (total)	F_spec
104	Executives and specialists (including executives)	F_spec_head
105	Teachers employed in educational institutions of professional education (total)	F_prep
106	Teachers employed in educational institutions of professional education (including executives)	F_prep_head
107	Public officials (total)	F_official
108	Public officials (including executives)	F_official_head
109	Discharged from military service	F_military_service
110	Unemployed, sent by employment agencies	F_placement_service

* Numbers in abbreviated names of the variables denote the observation year if the period of observation exceeded one year. The table gives examples of labeling the variables of the initial observation year.

** Analysis involved the student population and structure indicators obtained from the Ministry of Education and Science's official reports and using Russia's National Classifier of Worker Occupations, Public Service Positions and Tariff Ranks OK 016–94 (OKPDTR) with amendments and additions as a basis for (dis)aggregating data on the demand for continuing education programs. The OKPDTR discriminates between the workers (total) and public servants (total), depending on the functions performed; subcategories of specialists and executives are identified among the latter.

References

- Bager T. (2011) The Camp Model for Entrepreneurship Teaching. *International Entrepreneurship and Management Journal*, vol. 7, no 2, pp. 279–296. doi:10.1007/s11365–010–0149–9.

- Bühl A., Zöfel P. (2005) *SPSS: Iskusstvo obrabotki informatsii. Analiz statisticheskikh dannykh i vosstanovlenie skrytykh zakonomernostey* [SPSS: The Art of Information Processing. Statistical Data Analysis and Mining], St Petersburg: DiaSoftYuP.
- Chepurentko A., Obratsova O., Popovskaya E. (2017) Cross-Regional Variations in the Motivation of Early-Stage Entrepreneurial Activity in Russia: Determining Factors. *Entrepreneurship in Transition Economies* (eds A. Sauka, A. Chepurentko), Cham: Springer International, pp. 315–342.
- Efron B. (1988) *Netraditsionnye metody mnogomernogo statisticheskogo analiza* [Unorthodox Methods of Multivariate Statistical Analysis], Moscow: Finansy i statistika.
- Ettl K., Welter F. (2010) Gender, Context and Entrepreneurial Learning. *International Journal of Gender and Entrepreneurship*, vol. 2, no 2, pp. 108–129.
- Fawcett T. (2006) An Introduction to ROC Analysis. *Pattern Recognition Letters*, vol. 27, no 8, pp. 861–874. doi:10.1016/j.patrec.2005.10.010
- Fayolle A. (2005) Evaluation of Entrepreneurship Education: Behaviour Performing or Intention Increasing? *International Journal of Entrepreneurship and Small Business*, vol. 2, no 1, pp. 89–98.
- Fayolle A., Gailly B. (2015) The Impact of Entrepreneurship Education on Entrepreneurial Attitudes and Intention: Hysteresis and Persistence. *Journal of Small Business Management*, vol. 53, no 1, pp. 75–93.
- Fisher R. A. (1936) The Use of Multiple Measurements in Taxonomic Problems. *Annals of Eugenics*, vol. 7, pp. 179–188.
- Giacomin O., Janssen F., Pruett M. et al. (2011) Entrepreneurial Intentions, Motivations and Barriers: Differences among American, Asian and European Students. *International Entrepreneurship and Management Journal*, vol. 7, no 2, pp. 219–238. doi:10.1007/s11365-010-0155-y.
- Hytti U., Kuopusjärvi, P. (2004) *Evaluating and Measuring Entrepreneurship and Enterprise Education: Methods, Tolls and Practices*. Turku: Turku School of Economics and Business Administration.
- Liñán F., Rodríguez-Cohard J.C., Rueda-Cantucho J.M. (2011) Factors Affecting Entrepreneurial Intention Levels: A Role for Education. *International Entrepreneurship and Management Journal*, vol. 7, no 2, pp. 195–218. doi:10.1007/s11365-010-0154-z.
- Lucas R. E. (1978) On the Size Distribution of Business Firms. *Bell Journal of Economics*, vol. 9, no 2, pp. 508–523.
- McLachlan G.J. (2004) *Discriminant Analysis and Statistical Pattern Recognition*. Hoboken, NJ: Wiley Interscience.
- Maresch D., Harms R., Kailer N., Wimmer-Wurm B. (2016) The Impact of Entrepreneurship Education on the Entrepreneurial Intention of Students in Science and Engineering versus Business Studies University Programs. *Technological Forecasting and Social Change*, vol. 104, pp. 172–179.
- Martin B. C., McNally J.J., Kay M. J. (2013) Examining the Formation of Human Capital in Entrepreneurship: A Meta-Analysis of Entrepreneurship Education Outcomes. *Journal of Business Venturing*, vol. 28, no 2, pp. 211–224.
- Moro D., Poli A., Bernardi C. (2004) Training the Future Entrepreneur. *International Journal of Entrepreneurship and Small Business*, vol. 1, no 1–2, pp. 192–205.
- Naia A., Baptista R., Januário C., Trigo V. (2015) Entrepreneurship Education Literature in the 2000s. *Journal of Entrepreneurship Education*, vol. 18, no 1, pp. 111–135.
- Nasledov A. (2011) *SPSS19: Professionalny statisticheskiiy analiz dannykh* [SPSS19: Professional Statistical Data Analysis], St Petersburg: Piter.
- Obratsova O. (2017) *Statistika biznes-demografii: mezhdunarodny standart i perspektivy razvitiya v Rossiyskoy Federatsii* [Business Demography Statistics: The International Standard and the Roadmap for Russia], St Petersburg: EKO-Vek.

- Obratsova O., Poliakova T., Popovskaya E. (2017) Vybor istochnika investitsiy rannim predprinimatelem v perekhodnoy ekonomike: vozmozhnosti prognozirovaniya [The Choice of Funding Sources for Start-Ups in a Transitional Economy: The Ability to Predict in a National Context]. *Foresight and STI Governance*, vol. 11, no 3, pp. 71–81. DOI: 10.17323/2500–2597.2017.3.71.81
- Obratsova O., Popovskaya E. (2017) Opyt primeneniya mnogomernogo statisticheskogo analiza dlya kharakteristiki kontekstualnykh usloviy predprinimatelskoy deyatel'nosti v regionakh RF [An Essay on the Multidimensional Statistical Methods to Characterize the Entrepreneurial Context in Russian Regions]. *Sotsiologicheskie issledovaniya*, no 4, pp. 93–106.
- Oosterbeek H., van Praag M., Ijsselstein A. (2010) The Impact of Entrepreneurship Education on Entrepreneurship Skills and Motivation. *European Economic Review*, vol. 54, no 3, pp. 442–454.
- Powers D. M. W. (2011) Evaluation: From Precision, Recall and F-Measure to ROC, Informedness, Markedness & Correlation. *Journal of Machine Learning Technologies*, vol. 2, no 1, pp. 37–63.
- Peterman N. E., Kennedy J. (2003) Enterprise Education Influencing Students' Perceptions of Entrepreneurship. *Entrepreneurship Theory and Practice*, vol. 28, no 2, pp. 129–144.
- Potter J. (ed.) (2008) *Entrepreneurship and Higher Education*. Paris: OECD Publishing. <http://dx.doi.org/10.1787/9789264044104-en>.
- Raposo M., do Paço A. (2011) Special Issue: Entrepreneurship and Education □ Links between Education and Entrepreneurial Activity. *International Entrepreneurship and Management Journal*, vol. 7, no 2, pp. 143–144. doi:10.1007/s11365–010–0152–1.
- Reynolds P., Bosma N., Autio E. et al. (2005) Global Entrepreneurship Monitor: Data Collection Design and Implementation 1998–2003. *Small Business Economics*, vol. 24, issue 3, pp. 205–231.
- Sánchez J. C. (2011) University Training for Entrepreneurial Competencies: Its Impact on Intention of Venture Creation. *International Entrepreneurship and Management Journal*, vol. 7, no 2, pp. 239–254. doi:10.1007/s11365–010–0156–x.
- Souitaris V., Zerbini S., Al-Laham A. (2007) Do Entrepreneurship Programmes Raise Entrepreneurial Intention of Science and Engineering Students? The Effect of Learning, Inspiration and Resources. *Journal of Business Venturing*, vol. 22, no 4, pp. 566–591.
- Van der Sluis J., van Praag C. M., Vijverberg W. (2008) Education and Entrepreneurship Selection and Performance: A Review of the Empirical Literature. *Journal of Economic Surveys*, vol. 22, no 5, pp. 795–841.
- Van Praag C. M., Cramer J. S. (2001) The Roots of Entrepreneurship and Labour Demand: Individual Ability and Low Risk Aversion. *Economica*, vol. 68, no 269, pp. 45–62.
- Walter S. G., Block J. H. (2016) Outcomes of Entrepreneurship Education: An Institutional Perspective. *Journal of Business Venturing*, vol. 31, no 2, pp. 216–233.
- Welter F. (2011) Contextualizing Entrepreneurship—Conceptual Challenges and Ways Forward. *Entrepreneurship Theory and Practice*, vol. 35, no 1, pp. 165–184.
- Welter F., Smallbone D. (2011) Institutional Perspectives on Entrepreneurial Behavior in Challenging Environments. *Journal of Small Business Management*, vol. 49, no 1, pp. 107–125.
- Zahra S., Wright M., Abdelgawad S. G. (2014) Contextualization and the Advancement of Entrepreneurship Research. *International Small Business Journal*, vol. 32, no 5, pp. 479–500.