Comparative Analysis of the Level of Development of Entrepreneurial Competencies among Students in Russia and the Czech Republic

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Abstract. The role of universities in the development of entrepreneurship is increasing. Within this context, universities are introducing specialized programs and disciplines aimed at developing students’ innovative and entrepreneurial competencies. This article presents the results of a comparative analysis of the level of development of students’ entrepreneurial competencies in Russia and the Czech Republic. To implement the key task, the authors analysed approaches to the classification of entrepreneurial competencies. On the basis of relevance and objectivity, the authors selected the EntreComp classification from 2016, which subsequently formed the basis for the developed methodological tools for the empirical research. The method was tested in three universities in the Russian Federation and one in the Czech Republic. The total number of participants was 436. The results of the analysis of the entrepreneurial competencies revealed significant statistical differences between the respondents from the two countries for 10 out of 15 evaluated competencies. At the same time, 68% of respondents in the Russian Federation and 64% in the Czech Republic were found to have an advanced level of development of one entrepreneurial competence. This fact is indicative of the similarity of the vast majority of the final results for the respondents from both countries and confirms the hypothesis that most students participating in the test did not have a lower than average level of competence development. The results of the study may be of interest to scientists and practitioners who study the assessment and development of entrepreneurial competencies in students and specialists.

Keywords: entrepreneurial competence; higher education; students; supra-professional competencies

1 Introduction

At present, many scientists around the world are focusing on the development and assessment of entrepreneurial competencies. Effective entrepreneurs are important for the development of a society because they create jobs, improve the quality of life of the population, contribute to economic growth and increase the welfare of a country. The UNESCO Agenda for the period up to 2030 is based on 17 sustainable development goals, which describe the main problems of human development [1]. During this period of socio-economic and political upheaval and instability, and within the context of global environmental risks and catastrophes, the world’s scientific and political communities are focusing on the development of competencies in the field of sustainable development [2, 3, 4]. Cutting-edge research in the field of sustainability competencies has been conducted by scientists such as [2, 3] and others. It is on the basis of such research that the UNESCO document "Education for sustainable development goals: learning objectives" contained a list of key sustainable development competencies for education in 2017 [1, p.10]. Key competencies are "a set of knowledge, skills, and relationships that enable successful tasks and problem solving in relation to real world sustainability issues, challenges, and opportunities" [3, p. 204].

The focus on sustainable development competencies in the field of entrepreneurship is reflected in the works of researchers such as Ploum et al., etc. [5, 6].

Research is also focusing on "internal entrepreneurship". This not only implies the presence of creative abilities to search for new ideas, but also the willingness to implement these ideas and to take responsibility for their implementation from a wide range of company specialists [3, 7, 8, 9].

In this regard, the role of universities in the development of students’ entrepreneurial competencies in different fields is growing [10, 11, 12, 13]. Russian scientist Chepurenko [14] notes that the inclusion of the development of
this range of competencies in the professional educational "menu" will "provide the country's economy with qualified young personnel who are competent in creating and running a business". Analysis of the exchange of 20 European best practices shows that long-term relationships with stakeholders and a supportive entrepreneurial ecosystem of educational institutions are key factors in the success of entrepreneurship training [15].

The goal of this article was to conduct and present an assessment and comparative analysis of the entrepreneurial competencies of university students in Russia and the Czech Republic.

To achieve this goal, the following tasks were implemented within the framework of the study:

1. Analysis of the approaches to the classification of entrepreneurial competencies for sustainable development.
2. Development and testing of a methodology for assessing the development of the entrepreneurial competencies of students in Russia and the Czech Republic.
3. Presentation of the results of a comparative analysis of the level of development of entrepreneurial competencies of university students in Russia and the Czech Republic based on the results of the tested methodology.

The methods used included content analysis of publications on the research topic, modelling of test tasks based on competence indicators, online testing, comparative analysis and methods for visualizing the results of the research.

The assumption was made that there are no statistically significant differences in the level of development of entrepreneurial competencies of the university students from both countries. In addition, the assumption was made that most of the students participating in the test would not have a lower than average level of competence development.

**Approaches to the classification of entrepreneurial competencies (literature review)**

With regards to the issue of the classification of entrepreneurial competencies as a basis for their development and evaluation during university studies, there is still no well-established and generally accepted list of competencies.

The first attempt to study entrepreneurial competencies was made in a large-scale cross-cultural study conducted by the United States Agency for International Development (USAID) [16]. As a result, a set of competencies was compiled on the basis of highly successful entrepreneurs. These included: achievement competencies (initiative, sees and uses opportunities, concern for high quality of work, obligations under contract, focus on efficiency); thinking and problem solving competencies (systematic planning, problem solving); directivity and control (perseverance, control); orientation to others (recognition of the importance of business relationships) [16].

The competence model presented by Wei-Wen Wu [17] includes a list of 23 competencies, and the Kaur and Bains [18] model includes 12 competencies. Inyang and Enuoh [19] note that entrepreneurial competencies include the knowledge, attitudes, and skills that an entrepreneur must acquire through management training and development to contribute to the creation of outstanding products. Bird [20] combines entrepreneurial competencies into two groups: basic or threshold competencies (important for the implementation of a business idea), and high-level competencies that allow entrepreneurs to act effectively or successfully beyond the launch of a business, ensuring the survival and growth of the organization.

Within the context of internal entrepreneurship, Hayton and Kelly [21] propose four competencies: innovation (recognizing opportunities and further exploiting these opportunities); mediation (accessing and combining new sources of knowledge and information); advocacy (identifying with an opportunity and taking responsibility for promoting it); and sponsorship (helping to gain access to necessary resources). There are successful examples of Russian organizations (Sberbank, Beeline, Gazprom Neft, etc.) creating the conditions necessary for employees to display entrepreneurial initiative and search for new solutions in the form of products and services for clients.

Sustainable development competencies in the field of entrepreneurship are the basis of an empirical study conducted by Ploum, et al. [5] among 402 potential entrepreneurs. As a result of the research, the authors present 6 key competencies required for an agent of change in the field of entrepreneurship: strategic management competence and competence in actions; diversity acceptance and interdisciplinary competence; systematic thinking, normative competence; far-sighted thinking competence; interpersonal competence [5, p.119]. Ahmad [6] uses nine clusters of entrepreneurial competencies, including strategy, commitment, concept, opportunity, organization and leadership, relationships, learning, personality, and technical competencies.

As a result of analysing the structures and indicators of entrepreneurial competencies in various works, we chose the framework "EntreComp: The Entrepreneurship Competence Framework", prepared by the research team Bacigalupo, et al. [22]. This framework fitted the key requirements with regards to the choice of materials for the development of the assessment tools for analyzing the level of development of entrepreneurial competencies.
2 Methodology

To collect empirical research data, the authors developed and tested the test method "Development of students' entrepreneurial competencies" (Pesha and Shavrovskaya). As described above, the method is based on "EntreComp: The Entrepreneurship Competence Framework" [22].

The self-assessment of competencies is carried out in the methodology based on three interrelated clusters of competencies: ideas, opportunities and resources for action. In each of these clusters, 5 competencies are evaluated. The assessment is therefore carried out for 15 competencies.

The rating scale consists of 7 levels. In "EntreComp: The Entrepreneurship Competence Framework" there are 8 indicator levels. In our version, the basic level is 1 because in the process of working with the indicators, we did not find a critical difference in levels 1 and 2 in the authors' progress model.

The scale looks like this:
1. Basic. Competencies are not expressed.
2. Intermediate 1. The establishment of independence. Willingness to take action independently and together with others.
3. Intermediate 2. The establishment of independence. Willingness to accept and share responsibility.
4. Advanced 1. The acceptance of responsibility. Work under the guidance of and in collaboration with others.
5. Advanced 2. Take responsibility for making decisions and working with other people.
6. Expert 1. Encourage innovation, transformation and growth. Take responsibility for participating in complex developments in a specific area.
7. Expert 2. Encourage innovation, transformation and growth. Make a significant contribution to the development of a specific area.

The test consisted of 49 questions, each of them with 4 possible answers. Each response option correlates with one of the levels of competence development. Each answer is awarded from 0 to 8 points. 0-2 basic level; 2,1-3,9 intermediate level; 4-5,9 advanced level; 6-8 expert level.

The testing was conducted online using resources https://app.onlinetestpad.com and https://docs.google.com/forms. The invitation to take the test was sent via messenger. Upon completing the test, each participant automatically received a profile of their personal entrepreneurial competencies, with comments on each of the 15 components.

3 Results and Discussion

3.1 Participants

In total, 436 students took part in the survey, of which 195 from Russia and 241 from the Czech Republic.

In Russia, students from three universities took part in the testing: USUE (Yekaterinburg), The Ural Federal University (Yekaterinburg), Omsk State University (Omsk). All the test participants from the Czech Republic were students of the University of Technology and Business in České Budějovice. The test was completed by full-time and part-time students of bachelor's and master's degree programmes. The distribution of the participants by gender, location/residency and field of study is presented in Table 1.
Table 1. Distribution of participants by gender, location/residency and field of study

| Characteristics of respondents | Russia (m₁) (number of persons) | Czech Republic (m₂) (number of persons) |
|--------------------------------|---------------------------------|----------------------------------------|
| Gender                         |                                 |                                        |
| Male                           | 30                              | 72                                     |
| Female                         | 165                             | 169                                    |
| Location/residency             |                                 |                                        |
| Capital                        | 0                               | 12                                     |
| Megapolis                      | 138                             | 0                                      |
| Big city (over 25,000 inhabitants) | 0                 | 71                                     |
| Small town (up to 25,000 inhabitants) | 44                 | 81                                     |
| Countryside                    | 13                              | 71                                     |
| Field of study                 |                                 |                                        |
| Human resource management      | 158                             | 170                                    |
| Economics of business          | 37                              | 70                                     |
| Economics and management       | 0                               | 1                                      |

*Source: Authors*

Figure 1 shows the distribution of the test participants by age. The most represented age group in the study is young people aged 21-25 years, and the least the older age group 40-50 years (31 people). In future research, it will be interesting to compare the results obtained from the testing of these age groups, particularly in light of their different life experiences.

3.2 Main results of the research

At first glance, and as expected, the overall level of development of entrepreneurial competencies is approximately the same among the participants from both countries (see Figure 2). Nevertheless, a comparative analysis of the results using t-statistics showed the presence of statistically significant differences (p-value=0.018577), whereby the value of the student's t-test was 2.36. The critical value of the student's t-test was 1.972, at a significance level α=0.05. As a result, the hypothesis was confirmed that most of the students participating in the test do not have a lower than average level of competence development. As can be seen in Figure 2, most of the respondents have an Intermediate 2 or Advanced 1 level of entrepreneurial competence development. The Advanced 2 level of entrepreneurial competence development was found in 18 students from the Russian universities and in 15 students from the Czech Republic. In one student from Russia and two students from the Czech Republic, the development of entrepreneurial competencies was assessed at the Expert I level. The Russian student was a 22-year-old studying the master's degree programme "Human resources management", whereas the two Czech were 33 years old and 45 years old, respectively, and both studying "Business Economics". It is clear that achieving an expert level of development of sustainable development competencies in the field of entrepreneurship can be achieved at any age. No participants were identified as having a Basic or Expert 2 level of competence development. A Basic level of competence development assumes a lack of knowledge regarding the application of existing software in the field of resource management, a lack of initiative and
a lack of action in relation to the implementation of business ideas. An Expert 2 level of competence development reflects a level of experience that goes beyond the standard and is more dependent on the application of entrepreneurial competencies in practice. Therefore, while studying at university, the probability of achieving this level is low.

![Graph showing level of development of entrepreneurial competencies](image)

**Figure 2.** Level of development of entrepreneurial competencies of students in Russia and the Czech Republic (as a percentage of the total number of participants)

*Source: Authors.*

The main descriptive statistics for the assessment of the entrepreneurial competencies of the students in Russia and the Czech Republic are presented in Table 2. There is no mode in either sample (there are several indicators with the same frequency value). The sample has a close to normal distribution. The coefficient of variation \( \nu \leq 30\% \) \((Vm1=13.23\%; Vm2=15.08\%)\) means that the population is homogeneous, the variation is weak, and the data obtained can be trusted. The asymmetry is insignificant and the distribution curves are peaked.

**Table 2.** Main descriptive statistics for the assessment of the entrepreneurial competencies of the students in Russia and the Czech Republic

| Statistics         | Russia (m1) | The Czech Republic (m2) |
|--------------------|-------------|-------------------------|
| Average            | 234         | 227                     |
| Standard error     | 2.22        | 2.129074                |
| Median             | 235.5       | 226                     |
| Standard deviation | 30.92       | 33.05211                |
| Sample variance    | 956         | 1092.442                |
| Excess             | 0.12        | 0.211963                |
| Asymmetry          | -0.105      | 0.076684                |
| Interval           | 179         | 209                     |
| Minimum            | 140         | 122                     |
| Maximum            | 319         | 331                     |
| Reliability level (95.0%) | 4.405927 | 4.194057 |

*Source: Authors.*

Scope diagrams for the three key clusters are presented below, each of which includes 5 competencies (Figures 3-5). In the scope diagrams, the competency scores are arranged in pairs.

Innovative behaviour and creativity are important for creating new products, restructuring processes, and generating new types of services [23]. Innovativeness is inextricably linked to finding ways to meet the needs of innovation and decision-making [24, 25]. These competencies are combined in the cluster "Ideas and opportunities" (see Figure 3). The values for the observations of the relevant competencies range from 1.33 to 8 points, which reflects the wide range of respondents' assessments. Under "Vision", the largest interquartile range (IQR) is 2.6 points (M2). A slight asymmetry in the data is to be seen in the evaluated competencies. The closest ratings in both sample sets were achieved under "Valuing ideas". The diagram shows three outliers in terms of competence assessments: "Spotting opportunities" - 1.5 points (M2), "Creativity"- 7.2 points (M2), and "Ethical and sustainable thinking" - 7.5
Points (M2). The data for the span chart was checked using t-statistics, which showed the presence of significant statistical values in the assessments of the two groups for three competencies: "Creativity", value of student's t-test=3.94 (p-value=0.000095); "Vision", value of student's t-test=4.43 (p-value=0.000012); "Ethical and sustainable thinking", value of student's t-test=3.54. The differences are statistically significant (p=0.000451).

The average score for "Ideas and opportunities" among the Russian university students was 4.6 points, and among the Czech students 4.4 points. The average scores correspond to the Advanced 1 level of competence development. The participants are therefore likely to be able to analyse problems, identify opportunities for solving them, have the skills to generate ideas and make decisions, are able to develop a strategic vision for solutions, and maintain a sufficient degree of ethical thinking, as evidenced by actions to achieve goals.

![Box plot for competencies in the cluster "Ideas and opportunities"](image)

**Figure 3.** Box plot for competencies in the cluster "Ideas and opportunities"

*Source: Authors.*

It is assumed that entrepreneurial activity and the initiation thereof requires a fairly high level of investment with a high level of risk because the success of any initiative depends on entrepreneurial competencies in the field of resource management [24, 26]. For the cluster “Resources”, and based on the scope diagram in Figure 4, it can be said that the results of the assessments in the two populations is fairly similar. The values for the observations of the relevant competencies range from 0 to 8 points, which reflects the participants’ choice of all the possible answers. The diagram shows two outliers: "Mobilizing resources" (M1=1.33 points) and "Mobilizing others" (M1=0.66 points), the values of which are significantly different to the average values within the cluster. The most significant IQR for the assessment of "Financial and economic literacy" in both sample sets (3 points), as well as the widest range of observations, is for the same competence, which shows that the financial and economic abilities of the respondents in both sample sets is completely different. The interquartile range of assessments for this cluster in the two sample populations shows significant differences in the competencies "Motivation and perseverance", "Mobilizing resources" and "Mobilizing others". This fact indicates that there are statistically significant differences in the assessments of the respondents in the two countries. Statistically significant differences in the indicators of the two sample sets are also confirmed by the results of the t-statistics: "Motivation and perseverance", value of student's t-test=4.40 (p-value=0.000014); "Mobilizing resources", value of student's t-test=5.78 (p-value=0.000000); "Mobilizing others", value of student's t-test=3.49 (p-value=0.000537).
The average assessment of the students' competencies in this cluster was $M_1 = 4.74$ points, $M_2 = 4.83$ points. The average scores correspond to the Advanced 1 level of competence development and are slightly higher than the scores for "Ideas and opportunities". Most of the students who took part in the test are probably focused on success, have the ability to solve problems, and are able to manage and mobilize resources and people to achieve relevant goals.

Learning and developing as a person is an important component of entrepreneurial competence [6,27]. The same can be said about the manifestation of initiative [26], planning and management [5], risk management [21], and interaction with people [5, 6]. For the competencies in the cluster "Into action", the assessment focuses on the students' ability to act and apply their knowledge and skills in various situations (see Figure 5). In the span diagram, there are a large number of outliers, which means a large variety of data estimates for the students' 5 entrepreneurial competencies.

There are only statistical differences with regards to the assessment of "Learning through experience". In general, students from both countries gave similar answers to the questions in this block, with identical values accordingly. For the other 4 competencies, the values of the ratings show statistically significant differences: "Taking the initiative", value of student's t-test=2.07, (p-value=0.038762); "Planning and management", value of t-criterion=3.10 (p-value=0.002032); "Copying with uncertainty, ambiguity and risk", value of t-criterion=4.16 (p-value=0.000038); "Working with others", value of t-criterion=4.89 (p-value=0.000001). The interquartile ranges (IQR) for these four competencies also show significant differences in the two sample populations. The average values of respondents' ratings for this area of competence were: $M_1 = 4.9$ points, $M_2 = 4.7$ points. Indicators of average values, medians, and modes are close in value, and the sample population has a normal distribution. The difference in respondents' ratings in both sets is large enough to suggest that most of the respondents have a single level of competence development in this area. In terms of competencies, the scope of assessments is everywhere, from the minimum to the maximum. At the same time, the level of reliability (95.0%) varies from 0.14 to 0.26.
4 Conclusion

The research presented here involved the study of different approaches to the classification of entrepreneurial competencies, as proposed by scientists around the world [5, 16, 17, 18, 20]. The analysis was carried out to determine a universal model of entrepreneurial competencies as a basis for the development of a methodology for their assessment, in particular a model with the ability to track the dynamic development of university students. We chose "EntreComp: The Entrepreneurship Competence Framework", as prepared by Bacigalupo, et al. [22]. The prepared evaluation method, as presented in this article, was tested on university students in Russia and the Czech Republic.

Based on the test results, several conclusions were drawn and tasks identified for the psychometric debugging of the test in order to increase the reliability of its results. Additional elements should be added to the methodology to avoid choosing "socially expected responses" by participants, which cause serious distortions in the results. This issue is currently being addressed by adding a "lie scale" that includes "trick questions". In addition, while working on the assessment methodology, the conclusion was drawn that it was necessary to expand the list of indicators of certain competencies, as well as to include the possibility of choosing an answer if the participant did not understand the context and/or did not have any experience of the situation presented in the question.

When testing the methodology, the task was set to conduct a comparative analysis of the level of entrepreneurial competencies of students in higher education institutions in the Russian Federation and the Czech Republic.

As a result of the study, it was found that the students who participated in the study in Russia and the Czech Republic have a fairly high ability to actively participate in society. The hypothesis was confirmed that most of the participating students do not have a lower than average level of competence development. According to the analysis, and as is graphically presented in Figure 2 and the scope diagrams, most of the respondents have an Advanced 1 level of entrepreneurial competence development. Students are ready to take the initiative and promote ideas to create new products that meet the needs of the individual, the environment, the country and society as a whole. Students showed a sufficient level of competence in the field of managing their lives, motivation and career.

At the same time, during the study, the conclusion was drawn that the hypothesis that there are no statistically significant differences in the assessment of the level of development of students' entrepreneurial competencies in both countries was partially confirmed. Specifically, the respondents in the two sample groups received similar ratings for the 5 competencies: "Spotting opportunities", "Valuing ideas", "Self-awareness and self-efficiency", "Financial and economic literacy" and "Learning through experience". The level of development of these competencies among the students of universities in Russia and the Czech Republic was similar. On average, the listed competencies of the students were at the Advanced 1 level of development, as characterized by the ability to take responsibility and work under the guidance of others. At the same time, the level of development of "Financial and economic literacy" competencies produced average development indicators corresponding to the Average 2 level, and "Learning through experience" to the Advanced 2 level.

For the 10 competencies not included in the list above, there are significant statistical differences in respondents' ratings. The highest average scores were given to the competence "Motivation and perseverance" (M1=5.79 points, M2=5.26 points). Students are aware of their needs, aspirations and desires in the short, medium and long term, and are able to identify and evaluate their strengths and weaknesses, work in situations of uncertainty, and cope with failures.

Despite the revealed statistical differences in the assessments of students’ entrepreneurial competencies in Russia and the Czech Republic, it is possible to state that the results obtained are quite close. Students in both sample groups have approximately the same level of development of entrepreneurial competencies, which is clearly shown in Figure 2.

We agree with the conclusions of previous studies that higher education is one of the main platforms for the formation of the competencies required to be an entrepreneur in modern society [13,15]. We believe that the development of entrepreneurial competencies should be nurtured throughout the educational process in higher education institutions through the implementation of relevant academic programmes and disciplines. Where earlier it was put forward that entrepreneurship training should be implemented within the framework of special courses [28], now the development of a wide range of supra-professional competencies needs to be the focus of attention in every academic discipline [29, 30].

The results of the study presented in this article can form the basis of an international project aimed at developing the entrepreneurial competencies of students from two countries. In this regard, it will be interesting to analyse innovation and entrepreneurship training as part of the main bachelor's and master's degree programs in the two countries. The question of the application of technologies in the educational process and special courses for students on entrepreneurship, in particular in the study field "Human Resource Management", is also interesting from the point of view of trends in joint research between scientists from the Russian Federation and the Czech Republic.
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