

Chapter 11

Education and Innovation Growth: Establishing Entrepreneurial Universities

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Abstract

The current state and development of education system in Belarus are considered. It includes preschool, general secondary, vocational, secondary special and higher education, as well as supplementary education for children and further education for adults, including nonformal education. The gross enrollment rate in secondary education (ISCED Level 2 and 3) as a share to the population at the corresponding age was 102.9% in 2015, and the enrollment rate in tertiary education (ISCED Levels 5–8) showed 93.8%. The role of universities in creating the Belarus National Innovation System is shown. The main direction of improving the activities of higher education institutions based on the “University 3.0” model is considered. The Belarussian universities actively develop their innovation infrastructure (they form their own training and research centers, research and production laboratories, centers of cooperation with enterprises, career development centers for students and startup schools). During last years 14 sectoral laboratories and 6 science technological parks were established on the basis of Belarussian universities. Belarussian universities, while determining their own development trajectory, are guided by their main mission – to promote innovation and human capital formation – for the sustainable social and economic development of the country.

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Keywords: Belarus; education; entrepreneurial university

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11.1 Introduction: Scope and Structure of the Belarus Education System

The current multilevel education system in Belarus includes preschool, general secondary, vocational, secondary special and higher education, as well as

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supplementary education for children and further education for adults, including nonformal education. The legal framework for establishing the education system is defined by the Code “On Education” of the Republic of Belarus, adopted on January 13, 2011. The International Standard Classification of Education has also been adopted in Belarus (Revised version: ISCED 2011) and accordingly 8 ISCED levels are allocated and harmonized with international approaches. The development of the education system is one of the priorities of economic and social policies in Belarus. The gross enrollment rate in all levels of education (except for preschool education) was 98.5% in 2016 (Education in the Republic of Belarus, 2017, p. 23). As the international statistical data show, the gross enrollment rate in secondary education (ISCED Level 2 and 3) as a share to the population at the corresponding age was 102.9% in 2015, and the enrollment rate in tertiary education (ISCED Levels 5–8) showed 93.8%, which is rather a high value compared to some EU countries (Education in the Republic of Belarus, 2017, p. 207). The growth of this indicator is worth mentioning – in 2010 it grew at 80.1%. The consolidated budget expenditures on education in 2017 amounted to 17.7% (Science and Innovation in the Republic of Belarus, 2018, p. 32). Education significantly facilitates the development of human capital and creation of an innovative economy of the country. The scope and structure of training in the Republic of Belarus (ISCED Levels 5–8) are presented in Table 11.1.

The system of vocational education includes 182 institutions (vocational schools, vocational lyceums, vocational colleges). For the period of 2010–2017 the

Table 11.1. Dynamics of the Belarus Education System, 2010–2017.

	2010	2011	2012	2013	2014	2015	2016	2017
The number of students attending vocational education and training institutions (thousands)	106.0	98.6	79.9	74.6	72.8	72.2	70.3	66.9
The number of students attending secondary specialized education institutions (thousands)	167.6	162.9	152.2	138.4	129.0	121.3	117.8	114.1
The number of students studying in higher education institutions (thousands)	442.9	445.6	428.4	395.3	362.9	336.4	313.2	284.3

Source: Education in the Republic of Belarus (2017/2018, pp. 5–6).

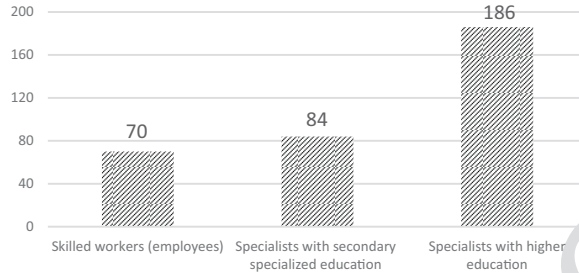


Fig. 11.1. Number of Specialists per 10,000 Employed in the Economy, 2017. *Source:* Education in the Republic of Belarus (2017/2018, pp. 5–6).

number of students in institutions providing vocational education declined from 106,000 to 66,900 people. It should be noted that Belarus has retained the system of vocational education at a fairly high level, despite the decline in the number of students in it. The system of Belarus secondary specialized education is represented by 231 educational institutions, including 12 private institutions (10.5% of students study in private institutions). The Belarus higher education is represented by 51 institutions. 290,900 students (90.5%) study in 42 state universities. The total number of students increased from 188,600 in 1990/1991 academic year up to 445,600 in 2011, then it declined up to 284,300 people by 2017. This amounts to 299 people per 10,000 population in 2017 (in 1990 it was 189 students) (Education in the Republic of Belarus, 2017/2018, pp. 29, 36). Number of specialists by level of education per 10,000 employed in the economy of Belarus are shown in Fig.11.1.

The Republic of Belarus has a developed system of **further education for adults**. In 2017, 9.4% of employees in the country's economy were trained in the system of further education for adults (calculated according to Labor and Employment in the Republic of Belarus, 2018). Belarus has also developed a system of nonformal supplementary education for adults. Systems of formal and nonformal education for adults complement each other, compensating for the gaps of each of them. To increase its efficiency is necessary in strengthening the potential of public-private partnership in the field of further education for adults.

11.2 The Role of Higher Education in Creating the Country's Innovative Economy

The idea of creating the Belarus National Innovation System was outlined at the third All-Belarusian National Assembly in 2005, where the Republic of Belarus identified innovative development of the economy as the main priority. One of the main resources of innovation development is the higher education system. The National Strategy for Sustainable Development of the Republic of Belarus – 2030

sets the goal of a transition to an economy based on knowledge, which transforms the role of higher education in the country (National Strategy, 2017).

According to the H. Etzkowitz's theory of triple helix (Etzkowitz, 2010; Etzkowitz & Chunyan, 2017), universities are the main players in the formation and implementation of innovations because, under the influence of external circumstances, they are the first to modernize their appearance, updating personnel, educational technologies, university infrastructure, which contributes to the transition from the "University 1.0" (training) and "University 2.0" concepts (training and research) to the concept of "University 3.0" (training, research, commercialization of knowledge), the latter is close to the concept of an entrepreneurial university (Bercovitz & Feldmann, 2006; Karpov, 2017, p. 71).

In Belarus, the need to form a "University 3.0" model was determined under the influence of the following factors:

- developing IT sector and digitization of economy,
- globalization of the world economic and educational environment,
- global competition in the educational services market,
- reduction of the state (budget) financing of scientific research.

Under these conditions, universities are faced with the need to become "entrepreneurial organizations" (Morozov, Khatskevich, & Apanasovich, 2017, p. 8), which not only create new knowledge but also introduce it into production, thus ensuring commercialization (Draghici, Baban, Gogan, & Ivascu, 2015; Guerrero, Urbano, Fayolle, Klofsten, & Mian, 2016). The entrepreneurial university's main idea is "to change the model of university organization and management: the transition from state budget funding to multi-channel funding based on independent sources of additional funds" (Shimov & Kryukov, 2015, p. 81). This implies increasing the role of science and research in universities, expansion of their interaction with business, the practice-oriented nature of scientific research and that of educational process (Huggins, Prokop, Steffenson, & Johnston, 2014). In Belarus, a model of an entrepreneurial university is in the early stages of development. Studying the experience of creation of entrepreneurial universities, experts rightly note the risks and contradictions of this process, the main of which being the risk of changing the goals and priorities of the university during the transition to an entrepreneurial model, since the university begins to give priority not to the basic sciences and fundamental education but to quick return on applications and commercially profitable training courses. The guidelines in state financing of science and education are changing in the direction of expanding extra-budgetary funds. In 2017 the share of the higher education sector in domestic spending on research and development was 9.4% (in 2014 it was 11.7%) (Science and Innovation, 2018, p. 32). At the same time, the status of university science is changing: enterprises, as customers, rarely finance fundamental R&D activity; they are interested in quickly implemented applied R&D projects, which, as a rule, are characterized by a tactical, cosmetic nature of innovation. The university's focus on extra-budgetary funds in educational activities entails a risk of changing the teacher and student statuses: the teacher

becomes a provider of the educational service, while the student becomes its customer, who dictates the terms, focusing on quick results. However, specialists trained in such a system are capable of solving tactical tasks, rather than strategic ones (since fundamental knowledge is necessary for strategic thinking). Therefore, “the direct introduction of such a model into the educational environment of our country is impossible because it is inconsistent with the economic and sociocultural realities, with the positive national traditions accumulated in this area” (Shimov & Kryukov, 2015, p. 84). Experts believe that at this stage there is no “deep understanding of the essence of an entrepreneurial university and awareness of its potential” (Morozov, 2019). The basic problems of higher education in Belarus in this respect are the following:

- insufficient level of innovation activity and interaction of the higher education system with economy branches, commercialization of scientific and technical applications of higher education institutions (Shimov & Kryukov, 2015, p. 80),
- insufficient relations between universities and labor market, insufficient involvement of employers into the educational process (Vankevich & Kastel-Branko, 2017).

Reforming the higher education system, Belarus, being well aware of such risks, seeks to find a balance between the need for universities to participate in the development of innovations, commercialization of scientific applications for the innovative development of regions and industries on the one hand, and, on the other hand, retaining traditions of fundamental research and education quality. The strategic goal of education development is defined in Belarus National Sustainable Development Strategy – 2030 – to form a quality education system that meets the needs of the information economy and the country’s sustainable development (Shimov & Kryukov, 2015, p. 97), integrating production, science, and vocational education.

For this purpose the Ministry of Education of the Republic of Belarus has initiated a pilot project “Improving the activities of higher education institutions based on the ‘University 3.0’ model (integrated development of the research, innovation and entrepreneurial infrastructure of a higher education institution in order to create innovative products and commercialize intellectual property)” (2018–2022). The seven national universities were chosen as basic universities for the implementation of this project. The pilot project is aimed at establishing facilities for the development of existing higher education institutions in accordance with the “University 3.0” model.

The implementation of the pilot project is based on the theoretical foundation of an entrepreneurial university model (Clark, 2011; Wissema, 2016) and provides for two directions of actions:

- introductions of amendments and additions to the curriculum documentation of the first and the second levels higher education programs;
- implementation of the Set of Measures for establishing subjects of innovation infrastructure in universities.

11.3 Directions of Establishing Entrepreneurial Universities in Belarus

Development of an entrepreneurial university model takes place in universities not only within the framework of the project of the Ministry of Education of the Republic of Belarus. It is rightful to note that this is a multichannel process that encompasses a lot of universities in the country. In universities of Belarus, the importance of scientific research as well as their applied nature increases, the structure of university science financing changes by sources, the share of state funding is reduced and extra-budgetary funding rises at the expense of enterprises – businesses of various forms of ownership and economic activities, including foreign ones. The innovation infrastructure is actively developing within universities, i.e. they form their own training and research centers, research and production laboratories, training and research and production complexes (in cooperation with enterprises). At present there are 16 sectoral laboratories operated in the structure of the Ministry of Education of the Republic of Belarus.

An important direction in the development of an entrepreneurial university model is the creation and development of innovation infrastructure agents – science and technology parks. At present, there are six science and technology parks established by universities in Belarus: the “Polytechnic” Technopark of Belarusian National Technical University (1992), the Technopark of Vitebsk State Technological University (NTPVSTU) (2010), the Technopark of Polotsk State University (NTPPSU) (2010), the “Polesye” Technopark of Polesye State University (2011), the “Unitechprom BSU” Technopark of Belarusian State University (2017), the “Technolab” Technopark of Ya. Kupala State University (Grodno) (2017). Unlike the classical technopark, which is an exclusively commercial structure, university technoparks are actively involved in the educational process.

Technoparks operate in accordance with the Decree No. 1 of the President of the Republic of Belarus of January 3, 2007 “On Approval of the Regulations on the Procedure for Establishing Innovation Infrastructure Agents.” The first university technopark, the “Polytechnic”, was established by Belarusian National Technical University in 1992, especially for ideas and technologies born in the university departments and laboratories to be transferred to production and commercialization. In the course of time the Technopark managed to attract 20 residents and launched 50 unique projects (Nikolaeva, 2019). Another example of a university technopark is the Science and Technology Park of Vitebsk State Technological University (NTPVSTU), which was established by the University in 2010. Its activities are focused on promotion of the development of industries with new technologies that produce finished high-tech products to be introduced in the market. During the period of its operation NTPVSTU has performed a number of design and technological projects ordered by enterprises, individual entrepreneurs, and individuals. By the end of 2018, 10 residents have registered in it among them being small and medium enterprises, individual entrepreneurs who are engaged in innovative activities and actively involved in the educational

process of the university. In 2017, the University and the Technopark jointly established an educational, research, and production laboratory “Center for Additive Technologies”, which is equipped with specialized 3D printers, 3D scanners, and other special tools. The purchase was funded by the Belarus State Committee for Science and Technology.

An important direction to improve the performance of university technology parks is the need to promote the development of innovative entrepreneurship for teachers and students, for example, through establishment of a minimum lease for residents who commercialize university applications; introducing benefits for attracting new residents established by the university or technopark; reduction of taxes for scientists and university teaching staff, for the period of introduction of innovative application. Experts agree that Belarusian universities “can and should play a key role in the development of entrepreneurship, relying on their material and technical base, experience and competence, as well as international relations” (Morozov et al., 2017, p. 14).

11.4 Social Guidelines in the Establishment of Entrepreneurial Universities

It should be noted that the entrepreneurial university solves not only innovative tasks but also helps to achieve a number of social goals (Gelmanova, Butrin, & Garth, 2016, p. 447; Shimov & Kryukov, 2015, p. 88), for example, to reduce unemployment among graduates and to increase students’ employability in the labor market. Therefore, another direction for the development of university’s innovation activities is the introduction of new educational products and programs designed for students, as well as for the employed and unemployed for professional retraining, advanced training, distance learning (including e-learning) to the market of educational services. For this purpose universities independently form career development centers for students (or employment centers for graduates) to assist students in finding a job and employment, increasing their individual employability in the labor market. Focusing on the objectives of the Bologna process and the European strategy “Europe 2020: a strategy for smart, sustainable and inclusive growth,” and also taking into account the national program documents in the field of higher education (Program “Education and Youth Policy” for 2016–2020), as one of the priorities of the higher school development, Belarus has identified the improvement of the forecasting system of the future need for specialists, the expansion of the interaction of the education system with employers to eliminate imbalances at youth labor market and increase the employability of graduates. Currently, the country is developing the labor market information and skills anticipation system to “ensure the balance of the labor market and the system of personnel training in the short, medium, and long-term periods based on a comprehensive analysis and forecast of the current and prospective needs for skills, qualifications and the provision of its products to all stakeholders for independent decision-making” (Vankevich & Kastel-Branko, 2017).

The activity of universities in this direction is increasing; they establish centers of employment assistance for graduates. A separate activity is the development of startup schools to help students in the practical implementation of their business ideas. For example, a business incubator was organized at BSUIR, which is a platform for the creation and development of promising innovative projects and their further promotion to the market (Nikolaeva, 2019). Support for the startup movement in Belarus, as well as all over the world, has become one of the most significant tools for the development of innovative entrepreneurship. Since 2012, Belarus has been developing and approving a plan for conducting startup events annually. Belarusian startup market is currently experiencing growth: over 80% of national investors are ready to invest in startups and the same share of startups is ready to attract venture financing (Ruliova, 2018). At the same time, 40% of investors are ready to invest over 500,000 dollars annually, and this indicates a capacity of the Belarusian investment market of 100 million dollars a year. This figure is quite comparable with the market volume of neighboring countries, including Ukraine, Lithuania, and Latvia (Ruliova, 2018).

Scientific research is closely intertwined with the educational process, i.e. “research begins to be used as teaching methods, they shape the learning process...” (Karpov, 2017, p. 62). The educational curricula of all universities include academic disciplines aimed at developing the entrepreneurial culture of students, stimulating their entrepreneurial activity (Voitov, 2018, p. 13). The School of Business of Belarusian State University within the frame of the international research project GUESSS (Global University Entrepreneurial Spirit Student’s Survey) conducted a survey among students from 15 Belarusian universities to analyze the entrepreneurial potential of Belarusian students, which concluded that the university environment in Belarus positively affects the formation of students’ entrepreneurial aspirations and, in comparison with similar studies conducted in other countries, “Belarusian students demonstrated sufficiently high entrepreneurial potential” (Morozov et al., 2017, pp. 10–14). For example, the survey showed that 8.9% of Belarusian students intend to start their business after graduating from university, and 56.8% plan to do this in five years after graduation (the average level worldwide is 8.8% and 38.2%, respectively) (Morozov et al., 2017, p. 14).

11.5 Summary

The development of the education system is one of the priorities of economic and social policies in Belarus. The gross enrollment rates in secondary education and in tertiary education are rather a high value compared to some EU countries. The consolidated budget expenditures on education in 2017 amounted to 17.7%. The system of vocational education includes 182 institutions (vocational schools, vocational lyceums, vocational colleges) and 66,900 students. The system of Belarus secondary specialized education is represented by 231 educational institutions 114,100 students. The Belarus higher education is represented by 51 institutions. The total number of students consisted of 284,300 people by 2017.

One of the main resources of creating the Belarus National Innovation System is the higher education system. In Belarus, a model of an entrepreneurial university is in the early stages of development. The basic problems of higher education in Belarus in this respect are the following: insufficient level of innovation activity and interaction of the higher education system with economy branches, commercialization of scientific and technical applications of higher education institutions and insufficient relations between universities and labor market, insufficient involvement of employers into the educational process. Reforming the higher education system, Belarus, being well aware of such risks, seeks to find a balance between the need for universities to participate in the development of innovations, commercialization of scientific applications for the innovative development of regions and industries on the one hand, and, on the other hand, retaining traditions of fundamental research and education quality.

The main direction of improving the activities of higher education institutions is based on the “University 3.0” model. The Belarussian universities actively develop their innovation infrastructure (they form their own training and research centers, research and production laboratories, centers of cooperation with enterprises, career development centers for students and startup schools). During the last years 14 sectoral laboratories and 6 science technological parks were established on the basis of Belarussian universities.

Thus, there are many conditions of legal nature which have to be improved as well as various schools of thought, and viewpoints on the essence of the entrepreneurial university among the Belarussian scientific community should be anticipated. Belarussian universities, while determining their own development trajectory, are guided by their main mission – to promote innovation and human capital formation – for the sustainable social and economic development of the country. We believe that the role of the education system in Belarus will only increase, which relates to the dynamics of social and economic processes, changing requirements for employees, development of technologies and digitalization, all of which expands the list of necessary competences within the boundaries of their application. In this environment, the educational system itself must change its technologies and work closely with the labor market. Nevertheless, a specific model of an entrepreneurial university will be formed taking into account the Belarus national innovation system as a whole and the strategic vision of the future of higher education in it.

References

- Bercovitz, J., & Feldmann, M. (2006). Entrepreneurial universities and technology transfer: A conceptual framework for understanding knowledge-based economic development. *The Journal of Technology Transfer*, 31(1), 175–188
- Clark, B. R. (2011). *Creating entrepreneurial universities: Organizational pathways of transformation* (p. 240). Milton Keynes: The Publishing House of State University of Higher School of Economics. [Translation from English. A. Smirnova].

- Draghici, A., Baban, C., Gogan, M., & Ivascu, L.-V. (2015). A knowledge management approach for the university-industry collaboration in open innovation. *Procedia Economics and Finance*, 23, 23–32.
- Education in the Republic of Belarus. (2017). *Statistical handbook* (p. 207). Minsk: National Statistical Committee of the Republic of Belarus.
- Education in the Republic of Belarus (2017/2018 academic year). *Statistical bulletin*. National Statistical Committee of the Republic of Belarus, Minsk, 5–6, 108–109, 134–135.
- Etzkowitz, H. (2010). In A. F. Uvarov (Ed.), *Triple helix: Universities-businesses-government innovations in action* (p. 238). Tomsk: The Publishing House of Tomsk State University of Control Systems and Radioelectronics. [Translation from English].
- Q2
- Etzkowitz, H., & Chunyan, Z. (2017). *The triple helix: University–industry–government innovation and entrepreneurship* (2nd ed., p. 342). Routledge. First Published 2017. eBook Published 25 September 2017. doi:10.4324/9781315620183.
- Q3
- Gelmanova, Z. S., Butrin A. G., & Garth, N. A. (2016). Entrepreneurial university in the context of the “triple helix” interaction. *International Journal of Applied and Fundamental Research*, 7, 444–449.
- Guerrero, M., Urbano, D., Fayolle, A., Klofsten, M., & Mian, S. (2016). Entrepreneurial universities: Emerging models in the new social and economic landscape. *Small Business Economics*, 47(3), 551–563.
- Huggins, R., Prokop, D., Steffenson, R., & Johnston, A. (2014). The engagement of entrepreneurial firms with universities: Network formation, innovation and resilience. *Journal of General Management*, 40(1), 23–51.
- Karpov, A. (2017). Modern university as a driver of economic growth. *Voprosy Ekonomiki*, 3, 58–76.
- Labour and Employment in the Republic of Belarus. (2018). *Statistical handbook* (pp. 91–169). Minsk: National Statistical Committee of the Republic of Belarus.
- Morozov, R. (2019). *Why does Belarus need an entrepreneurial university 3.0?* Retrieved from <http://news.21.by/other-news/2019/01/09/1697779.html>.
- Morozov, R. I., Khatskevich, G. A., & Apanasovich, V. V. (2017). Entrepreneurial potential of students of Belarusian universities. *Innovative Educational Technologies*, 2(50), 8–15.
- National Strategy. (2017). *National strategy for sustainable social and economic development – 2030*. Meeting of the Council of Ministers of the Republic of Belarus No. 10 of May 2, 2017. Retrieved from <http://www.economy.gov.by/uploads/files/NSUR2030/>.
- Nikolaeva, N. (2019). *University 3.0: How does the “landscape” of higher education change?* Retrieved from <http://zviazda.by/ru/news/20180201/1517471248-universitet-30-kak-izmenyaetsya-landshaft-vysshey-shkoly> 24.01.2019.
- Ruliova, A. A. (2018). Startups in Belarus: Current development issues. *Vestnik of Vitebsk State Technological University*, 1(34), 179–189.
- Science and Innovation Activities in Belarus.(2018). *Statistical handbook* (p. 32). Minsk: National Statistical Committee of the Republic of Belarus.

Shimov, V. N., & Kryukov, L. M. (2015). Prospects for development of higher school in Belarus: Searching for solutions to new challenges. *Belarusian Economic Journal*, 3, 79–103.

Vankevich, A., & Kastel-Branko, E. (2017). Labour market information and skills anticipation system: Content and development trends in Belarus. *Belarusian Economic Journal*, 2, 73–92.

Q4

Voitov, I. V. (2018). Development and implementation of the “University 3.0” concept in Belarusian State Technological University. *Higher School*, 6, 12–14.

Wissema, Y. G. (2016). *University of the third generation: University management in transition* (p. 498). Moscow: Olymp-Business.

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