

Funding of Technology-Driven Entrepreneurship and Innovation in Bulgaria

Sibel Ahmedova*

Technical University of Varna, Studentska 1, Bulgaria

Abstract. Technological entrepreneurship and innovation are becoming one of the main driving forces for the economic and sustainable development of national economies. Thoroughly analyzed, therefore, in the present paper are the sources of funding for the Bulgarian enterprises driven by technology-based entrepreneurship and innovation. Their role is equally considered on the basis of indicators such as: performed innovations and obtained sources of funding for the technological enterprises, the country's share of high technology exports, and others. Special focus is given on the barriers created to the enterprises associated with technological entrepreneurship and innovation in Bulgaria.

1 Introduction

Observed globally, over the past few decades, have been dynamic processes of scientific and technical development referred to as “scientific and technological revolution”. This process is the result of a growing awareness of their importance and a change in the focus now being shifted onto science and technology that are regarded as the most decisive factors of digital economy [1,3]. The development of science and technology is directly traceable to the provision of open access resources, the availability of different intellectual resources, the growing role of knowledge and education, the ever increasing widespread adoption of high-technological manufacturing and others [7,9]. These factors lead to the transformation of the countries' overall economic situation and bring forth the prevalence of products produced by highly technological and science-intensive enterprises [2,5]. Accordingly, both national and EU policies are aimed at promoting investment in technological production and innovation. An effective mechanism in that respect is the promotion and development of technological entrepreneurship and innovation [8,10,11]. Identifying their current state and opportunities for their development is therefore essential for refocusing the local authorities' attention onto the need of creating an environment conducive to their potential advancement. To that effect, the paper offers a detailed analysis of the main means of financial support available to technological entrepreneurship and innovation through multiple European Union (EU) programmes and funding instruments. The state of the Bulgarian technological enterprises and innovation activities has been explored on the basis of a survey conducted among 47 technology companies located throughout the country.

* Corresponding author: sibel8386@gmail.com

2 Funding opportunities for technological entrepreneurship and innovation in Bulgaria

The great number of studies reveal that the main barrier to the establishment and development of technological enterprises and the introduction of innovation is the shortage of financial resources. The sufficiency of financial resources is, however, only one of the most decisive factors for their prospective growth and notable success. Apart from the traditional sources of funding (retained earnings, depreciation, bank credit, etc.), the importance of EU financial instruments has also been increasing. The funds for the technological entrepreneurship and innovation in Bulgaria for the 2014-2020 programming period were provided through the programmes: “Innovation and Competitiveness”, “COSME”, INNOSUP and “InnovFin” initiatives. The “Innovation and Competitiveness” operational programme is the one ensuring the greatest contributions to the field of technological entrepreneurship and innovation. [4,6].The specific objectives within the programme priorities are set to:

- provide technical assistance in the development of innovative ideas, innovation implementation and technology transfer within the enterprises;
- promote the cooperation between business companies and research organisations through joint participation in initiatives that lead to successful innovation implementation, protection of intellectual property and effective research dissemination;
- encourage innovative infrastructure construction that reinforces and sustains the enterprise’s innovation activities.

Another programme giving prominence to the technological entrepreneurship and innovation in Bulgaria is the COSME (Competitiveness of Enterprises and Small and Mediumsized Enterprises) programme [4].The main priority sectors supported by the programme ascribed to high-tech industries are: the pharmaceutical industry, the production of information and communication equipment, information technology activities, information services, research and development. The initiative is designed to promote entrepreneurship among small and medium-sized enterprises (SMEs), create the conditions that facilitate the enterprises’ easier access to different financial instruments and help them gain competitive advantage.

Another possibility for the enterprises that add to the field of technological entrepreneurship and innovation is the INNOSUP initiative [4,6].The aim of the initiative is to provide opportunities for the Member States to exchange good practices through cooperation, mutual learning and application of new methods in pursuit of greater production efficiency. The programme addresses the creation of clusters and entrepreneurial networks in high value-added industries. Another priority of INNOSUP is the provision of experienced researchers to technology companies. This enables them to fully exploit the potential of their collaborator for one year and to implement their ideas and projects. The initiative also allows for the integration of innovative advanced manufacturing technologies through the right purchase of the required equipment or machinery.

“InnovFin” or the European funding for innovators is a joint initiative undertaken by the European Investment Bank in close cooperation with the European Commission [5].“InnovFin” refers to financial instruments and advisory services covering the entire process of scientific research and innovation. “InnovFin” aims at improving the financial feasibility and investment readiness of large projects that need substantial, long-term investment.

3 Analysis of the current state of the technological entrepreneurship and innovation in Bulgaria

As evidenced from Figure 1, technological entrepreneurship and innovation is concentrated mostly in high-tech sectors. 32% of the enterprises engaged with the production of

computerised and communication equipment, electronics and optical products develop innovation-based technological entrepreneurship. 27% are high technology enterprises producing pharmaceutical ingredients and drug (medicinal) products.

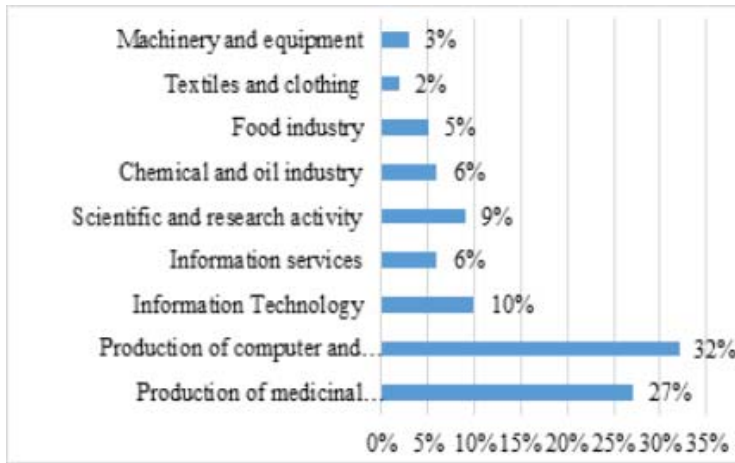


Fig. 1. Sectors giving priority to technological entrepreneurship and innovation [5]

10% of the enterprises implemented technological entrepreneurship and innovation activities within the information technology sector, and another 6% offered information services. 9% of the enterprises carried out research and development activities. The chemical, petroleum, and food and beverage industries are considered medium-tech industries. The machinery and equipment manufacturing, textiles and apparel sectors are within the group of low-tech industries.

Fig.2 presents the main financial sources the technological enterprises had taken advantage of to introduce the latest innovations in their businesses. The data captured through the enterprises' survey shows that 39% of the country's technological entrepreneurship is funded from the operational programme (OP) "Innovation and Competitiveness".

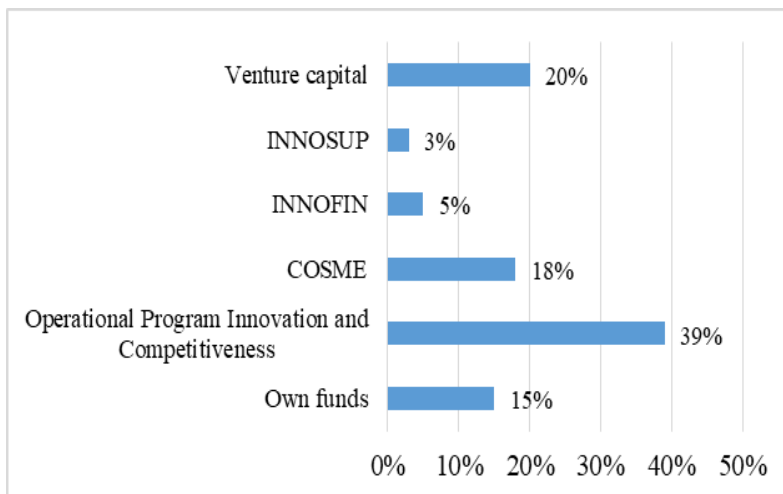


Fig. 2. Innovation funding sources for the technological enterprises in Bulgaria

Venture capital funds rank second as a source of financial resources with – 20%, and the support under the COSME programme – 18% - takes the third place. Moreover, there are some technology enterprises' managers who have secured 15% of the implemented innovations out of their own private finances. The relative share of the funded technological entrepreneurship and innovation activities under the “InnovFin” and “INNOSUP” initiatives is lower, 5% and 3%, respectively. The main reason for the lower share of funding under the two initiatives is that they are relatively new and practically unknown to Bulgarian technological enterprises.

The funding sources received by the technological enterprises were utilized for innovation implementation in the introduction of virtual and augmented reality applications in the manufacturing processes; manufacturing automation and robotization; Internet of Things deployment; 3D printing acquisition; installation of a customer service cybersecurity system (Fig.3).

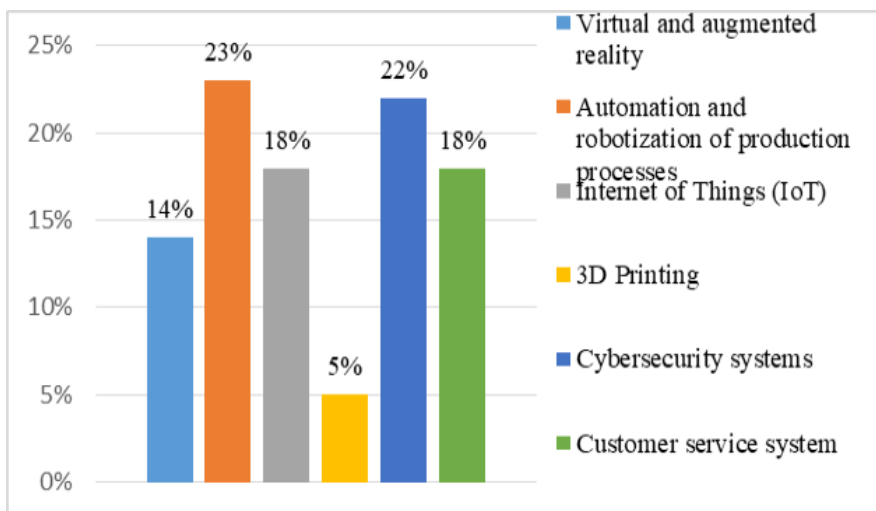


Fig. 3. Types of innovations performed by the technological enterprises in Bulgaria

Virtual and added reality is being increasingly incorporated into the manufacturing processes of the technological enterprises in Bulgaria. As regards the data in Fig. 3, 14% of the enterprises implemented a similar innovation in 2020. 23% of the technological enterprises made innovations related to their manufacturing automation and robotization processes and 18% introduced the “Internet of Things”. Observed, further, is a significant growth in the introduction of cybersecurity systems, on account of increased cyber threats or hacking by outside attackers breaking into the systems. 18% of the enterprises introduced new more sophisticated systems for better service of their customers. 3D printing implementation was carried out by 5% of the technological enterprises in the country.

The highest relative share of 39% of high-tech exports from Bulgarian technological enterprises pertains to the computerised and communication equipment manufacturing (Fig.4).

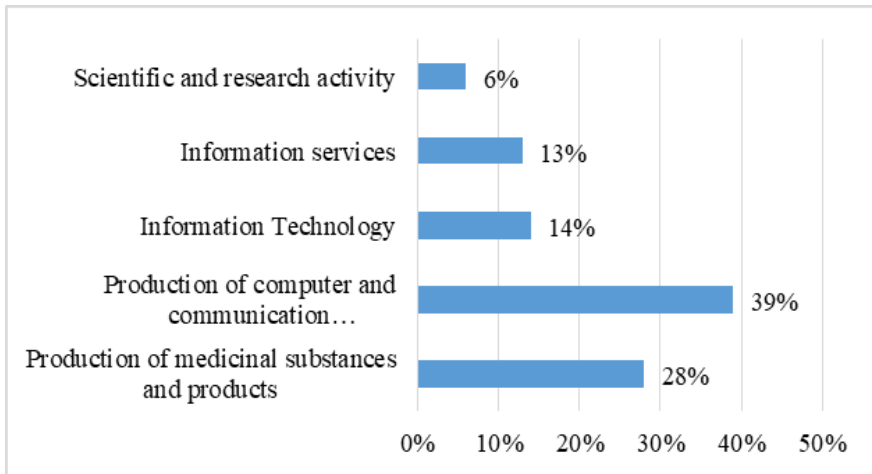


Fig. 4. Relative share of high-tech exports from the technological enterprises in Bulgaria

28% of Bulgaria's total high-tech exports are based on the production of pharmaceutical ingredients and drug (medicinal) products, and 14% of information technology. Information services account for 13% of the total exports of high-tech products. The lowest relative share refers to the export of high-tech products as a result of scientific research and development. Bulgarian technological enterprises face serious challenges. Thus, from their perspective—39%, the major barrier to the development of technological entrepreneurship and innovation is the inadequate funding or shortage of financial resources. Besides, the enterprises face further difficulties in dealing with the mandatory project documentation for acquiring and using financial resources from the EU funding programmes (Fig.5) .

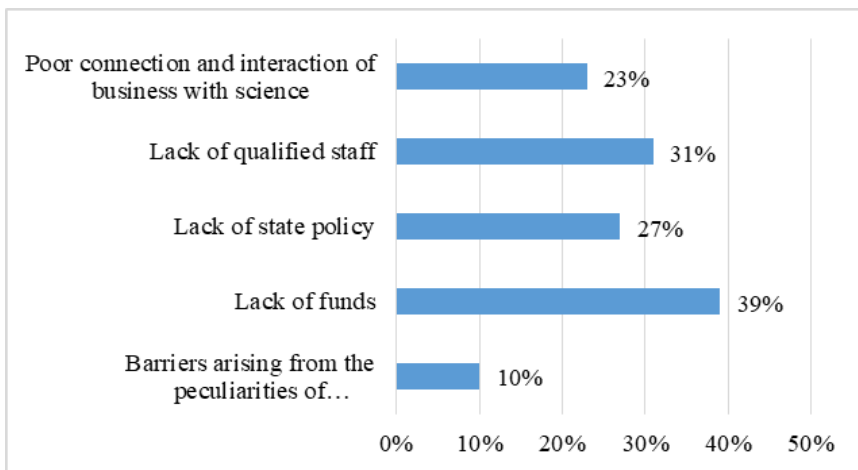


Fig. 5. Main barriers to the technological entrepreneurship and innovation in Bulgarian enterprises

Another significant problem is the complex and bureaucratic procedures, the lack of sufficient information about the programmes themselves and the low administrative capacity of governance and public administration. 31% of the technological enterprises report that there is a serious shortage of qualified work force. This, in practice, justifies the poor relationship and interaction between science and business. 23% of the technological enterprises stated that to be also the reason for the lack of qualified employees. The absence of a clear state policy in the field of innovations does not allow for a clear vision of their

probable impact on the country's economy. Accordingly, the absence of government policy was identified as another major barrier by 27% of the technological enterprises' leadership. 10% of the enterprises believe that a serious barrier to the technological entrepreneurship and innovation in Bulgaria are the barriers that stem from the specificities of the users or consumers of the newly- introduced innovations. These barriers could be addressed through the formulation of different strategies, but generally, the Bulgarian enterprises turn out to have neither the knowledge nor the expertise as to their proper implementation. The models and processes related to the development of new products and their introduction into the market are unfortunately very rarely observed in the Bulgarian reality.

4 Conclusions

The present-day economic situation, both in Bulgaria and in other member states of the EU, requires the mobilization of their efforts to adopt policies aimed at promoting and benefiting substantially from the introduction of cutting-edge technology and innovation. Currently, the country's economy is based on increased manufacturing expenses related to higher materials costs and greater percentage of labour associated with low value-adding enterprises of the low- technological intensity sector. The analysis conducted on the territory of Bulgaria reveals that there are some sectors and industries in the country that show considerable potential for developing technological entrepreneurship and innovation. They are closely related to: environmental technologies, healthcare innovations, cultural and creative industries, mechanical engineering and equipment, food processing and agriculture, etc. However, the development of these industries necessitates the establishment and maintenance of a flexible innovation system at a national level based on the implementation of the latest technologies and innovations. The Bulgarian Government should devote its efforts to:

- Facilitating the enterprises' access to EU funding programmes for the purposes of innovation implementation and technology deployment;
- reducing administrative burdens and bureaucracy;
- attracting more foreign direct investment flows into higher value-added sectors;
- building up a national innovation system based on a sustainable development;
- strengthening the enterprises' innovative and technological capabilities in a long- term perspective;
- increasing the expenditures on scientific and research activities;
- promoting the cooperation between the scientific community and businesses;
- encouraging the technology transfer in research organizations and enterprises.

This work was financially supported by grants from Bulgarian Science Fund and by the Bulgarian Ministry of Education and Science under the National Program for Research "Young Scientists and Postdoctoral Students"- 2021

References

1. Artie W. Ng, Benny C. F. Cheung, Peggy M. L. Ng, , *Encyclopedia of Information Science and Technology*, Fourth Edition, DOI: 10.4018/978-1-5225-2255-3.ch414, (Performance Measurement of Technology Ventures by Science and Technology Institutions 2018)
2. Bailetti T., *Technology Entrepreneurship: Overview, Definition, and Distinctive Aspects*, *Technology Innovation Management Review*, **2**, № 2, pp. 5-12, (2012)
3. *Global Entrepreneurship Monitor*, (GEM 2020)

4. European commission Financial instruments, 2014-2020, https://ec.europa.eu/growth/access-to-finance/cosme-financial-instruments_en
5. Jones-Evans D., *A typology of technology-based entrepreneurs: A model based on previous occupational background*, , **1**, № 1, pp. 26–47, (International Journal of Entrepreneurial Behavior & Research, 1995)
6. National Statistical Institute
7. Nichols S.P., Armstrong N.E., *Engineering Entrepreneurship: does entrepreneurship have a role in engineering education?*, **45**, № 1, pp. 134–138 DOI: 10.1109/MAP.2003.1189659, (IEEE Antennas and Propagation Magazine 2003)
8. Prodan I., *A model of technological entrepreneurship, Handbook of Research on techno-entrepreneurship*, (Northampton, MA, USA: Edward Elgar 2007)
9. Tzu-Hsin Liu, Yee-Yeen Chu, Shih-Chang Hung, Technology entrepreneurial styles: a comparison of UMC and TSMC, **29**, № 1–2, pp. 92–115, (International Journal of Technology Management 2005)
10. Venkataraman S., Sarasvathy S.D., *Strategy and Entrepreneurship: Outlines of an Untold Story: Darden Business School Working Paper*, № 01-06, DOI 10.2139/ssrn.275186, (2001)
11. Khairullina M.V. Technological entrepreneurship: constraints and conditions for development, *Russian entrepreneurship*,, **16**, pp. 1831-1848, DOI: 10.18334 / rp.17.16.36402, (2016)