



## Technology Transfer as the Development of Innovative Entrepreneurship

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### ABSTRACT

The development of the world economy at the current stage is a complex process of competition between companies and states, which are directly involved in the struggle to gain a leading position in the global market. For states, it is political influence, for companies - economic indicators. Overall, it allows the actors to gain significant weight - both political and economic - in the international exchange system, which directly provides the opportunity to influence the world community. The main condition of global competition in the 21st century is the technological factor. The innovation process is a key indicator of the economic growth and prosperity of companies and states.

The problem of intensive development, implementation, and dissemination of the latest technologies, due to the inefficient use of the scientific, technical, and personnel potential of existing mechanisms, is particularly relevant for entrepreneurs in countries with transition economies, including Georgian companies.

**KEYWORDS:** Innovative Entrepreneurship, technology transfer, development, high-tech products.

### I. INTRODUCTION

Technology transfer is one of the main factors in the development of both national entrepreneurship and hence the economy, as well as the world economy as a whole. In addition, the degree of participation of each country in the process of obtaining and realizing the results of intellectual activity significantly determines both the country's scientific and technological development prospects, as well as its competitiveness. The formation of a new type of economy, based on continuous innovative technological development, production, and transfer of high-tech products with high added value, is entering the main positions of industrialized countries. This type of entrepreneurship and economy is usually called innovation.

At the modern stage, in this regard, the main problems of Georgian companies are an acute shortage of qualified talented personnel, lack of new ideas, breakthrough technologies for production modernization and diversification, overloading of full-time employees with work and, as a result, lack of time to test interesting ideas and methods. In this regard, there is a need for a new mechanism for interaction between students, companies, and universities, involving students in solving tasks and problems faced by companies to create new innovative products and services.

**The scientific novelty of the paper is:** that the necessary conditions for the influx of technological transfer and its influence on innovative entrepreneurship were determined, and the trend of investment influx in technological sectors on a global scale.

**The paper aims** to analyze the impact of technology transfer on innovative entrepreneurship and the development of the country's economy.

**Research methodology.** The paper uses the works of Georgian and foreign scientists, research of international organizations, and statistical data in this regard. Such methods as observation, comparison, measurement, analysis and synthesis, induction, and deduction were used in the research process.

**Author's hypothesis:** despite the current crisis in the world economy, technological transfer had a positive impact on the development of innovative entrepreneurship and the national economy. Additional financial resources are being allocated around the world, aimed at developing new technologies and supporting innovative entrepreneurship and new start-ups. Many scientists, both foreign and local, believe that in modern conditions it is the level of innovative entrepreneurship and economic development, which is largely due to technological transfer, that creates the country's economic advantage. The innovative economy

becomes the next economic formation that replaces the industrial economy.

The essence of technology transfer - the principles of its organization are described in the works of foreign authors such as Grant Allard<sup>1</sup> [Allard, Allard, 2017, Pp. 614–616], John Butler and David Gibson [Butler, Gibson, 2011]<sup>2</sup>, Michael Porter (Porter, 1995, Pp. 97–118)<sup>3</sup>, Deepak Somaya and David Teece [Somaya, Teece, 2000]<sup>4</sup>, etc.

The works of many scientists have been devoted to the issues of the theory of innovation and their role in the development of the country's economy. For example, the systematization and classification of innovations are presented by Onzey Zizlavsky [Zizlavsky, 2014]<sup>5</sup>, Mark Dodgson and David Gann [Dodgson and Gann, 2018]<sup>6</sup>, Mario Coccia [Coccia, 2006]<sup>7</sup>, etc. papers.

Theoretical aspects of management of innovative processes and forms of integration of business structures, state bodies, and scientific and educational institutions are mainly studied by foreign scientists. The most famous scientists in this direction are U. Baumol, S. Walsten, P. Drucker, B.A. Lundval, R. Nelson, J. Schumpeter, and others.

However, despite significant progress in the study of the theoretical basis of innovation processes, there are still many

understudied and controversial issues. For example, the dynamics of innovative and technological development of countries and regions, the use of effective tools and mechanisms of knowledge and technology transfer, regulation of innovative processes using various institutional structures, etc.

## II. THEORETICAL OF TECHNOLOGY TRANSFER AND INNOVATIVE ENTREPRENEURSHIP ASPECTS

Technology transfer is an important and integral part of the innovation process. In the modern world, the development and progress of entrepreneurship are mainly based on the desire to be a leader in various fields of activity. The term "innovation" is used for the creation of new models, prototypes, technologies, and products, as well as for their transformation in the modern world. Technology transfer appears to be the main form of promoting innovation from the development stage to commercialization.<sup>8</sup>

An important component of the operational transfer of a new development or scheme between divisions of the holding or partner companies is technology transfer. The method of increasing the production capacity, as well as the speed of entering the market of products, increasing the competitiveness of the enterprise, etc. Allows.

Transfer ensures the movement of scientific developments from the research department to the production department, maintaining a rapid pace of invention integration. The method allows interaction between laboratory complexes, research institutes, and applied and academic departments, which, after transferring the results of scientific activities, allows for the correction of production processes, reduces production costs, etc.

Technology transfer in innovative entrepreneurship is a method of transferring concepts and schemes to another producer (company, individual). In large companies, the management of technology transfer processes is carried out with the help of departments that are responsible for the detection and accounting of developments, and legal protection of schemes and samples that have commercial value.

Technology transfer includes:

- transfer of patent rights to copyrighted inventions or measures of alienation of the invention using communication;
- Transfer of technical documentation to know-how based on the issuance of a license for innovative developments.
- Exchange of information within conferences and exhibitions;

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<sup>1</sup> Allard, Grant, and Suzie Allard. "Information Behavior in the Technology Transfer Process." *Proceedings of the Association for Information Science and Technology* 54, no. 1 (January 1, 2017): 614–16.

<https://doi.org/10.1002/ptra2.2017.14505401088>

<sup>2</sup> Butler, John Sibley, and David V. Gibson. "Global Perspectives on Technology Transfer and Commercialization." In *Edward Elgar Publishing eBooks*, 2011. <https://doi.org/10.4337/9781849809788>

<sup>3</sup> Porter, Michael E., and Claas Van Der Linde. "Toward a New Conception of the Environment-Competitiveness Relationship." *Journal of Economic Perspectives* 9, no. 4 (November 1, 1995): 97–118. <https://doi.org/10.1257/jep.9.4.97>

<sup>4</sup> Somaya, Deepak, Robert H. Smith, David J. Teece, and Walter A. Haas. "Combining Inventions in Multi-Invention Products: Organizational Choices, Patents, and Public Policy." *Social Science Research Network*, January 1, 2001. <https://doi.org/10.2139/ssrn.259889>

<sup>5</sup> Zizlavsky, Ondrej. "An Analysis of Innovation Classification and Typology: A Literature Review." ResearchGate, January 1, 2014. [https://www.researchgate.net/publication/280233077\\_An\\_Analysis\\_of\\_Innovation\\_Classification\\_and\\_Typology\\_A\\_Literature\\_Review](https://www.researchgate.net/publication/280233077_An_Analysis_of_Innovation_Classification_and_Typology_A_Literature_Review)

<sup>6</sup> Mark Dodgson Innovation: A Very Short Introduction by Mark Dodgson, Paperback | Indigo Chapters | Bramalea City Centre, Bramalea City Centre, n.d., <https://bramaleacitycentre.ca/theshoplist/product/innovation-a-very-short-introduction-by-mark-dodgson-paperback-indigo-chapters-coles-3c32f4?model=0>

<sup>7</sup> Coccia, Mario. "Classifications of Innovations: Survey and Future Directions." *Social Science Research Network*, January 1, 2006. <https://doi.org/10.2139/ssrn.2581746>

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<sup>8</sup> Ungureanu, Miorița, Nicolae Pop, and Nicolae Ungureanu. "Innovation and Technology Transfer for Business Development." *Procedia Engineering* 149 (January 1, 2016): 495–500. <https://doi.org/10.1016/j.proeng.2016.06.697>

## “Technology Transfer as the Development of Innovative Entrepreneurship”

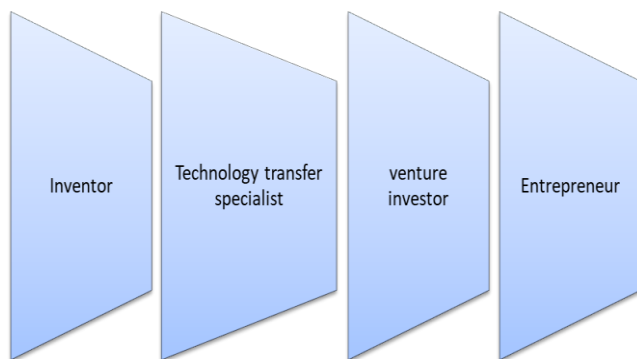
- Appointment of persons responsible for information transfer.

The innovative process is shown in a general form in the diagram (see Fig. 1).



**Fig. 1.1. Innovative process (FDieffenbacher, 2023)<sup>9</sup>**

Technological transfer takes place during each transition from stage to stage of the innovation cycle. The stages of the innovation cycle are shown in the diagram (see Fig. 1.2).



**Fig. 1.2. The main stages of the innovation cycle (FDieffenbacher, 2023)<sup>10</sup>**

The development of innovative entrepreneurship is impossible without close and effective interaction between entrepreneurs working in the real sector of the economy, higher education institutions, and government structures working in this regard, which ensure the process of creation,

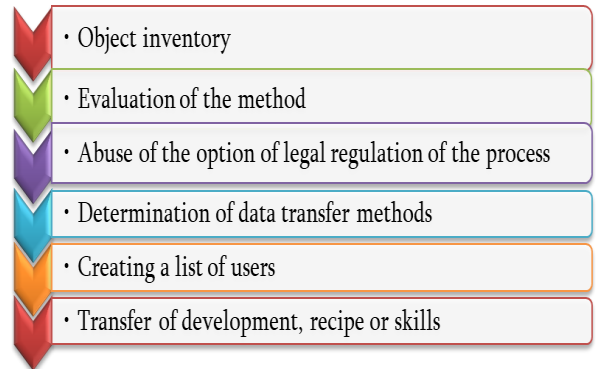
<sup>9</sup> FDieffenbacher, Stefan, and Stefan FDieffenbacher. “The Innovation Process: 10-Step Process to Successful Innovation.” *Digital Leadership* (blog), December 21, 2023. <https://digitalleadership.com/blog/innovation-process/>

<sup>10</sup> FDieffenbacher, Stefan, and Stefan FDieffenbacher. “The Innovation Process: 10-Step Process to Successful Innovation.” *Digital Leadership* (blog), December 21, 2023. <https://digitalleadership.com/blog/innovation-process/>

transfer, acquisition, and implementation of new knowledge and technologies. The technology transfer itself consists of several stages (see Fig. 1.3).

At the inventory stage, a description of the company's technical property is produced. The company registers patent data, and methods and carries out legal approval of the development.

During the evaluation of the innovation, the commercial perspectives of the introduction of the products are determined, the price is determined, etc.



**Fig. 1.3 Technology transfer stages (Welcome to Siddhast)<sup>11</sup>**

At the stage of determining the method of legal security of discovery, the optimal scheme is selected (copyright registration, patent registration, etc.).

When selecting the form of technology transfer and the push model under the contract, the reliability of data storage, the plans and capabilities of the developer, the amount of profit, etc. are taken into account.

Determining potential customers and drawing up a plan for bringing products to the market is carried out through special departments, communication at conferences, etc.

Technology transfer is completed by signing the contract and data translation, training of employees, and installation and commissioning of equipment.

### III. OVERVIEW OF THE MODERN STATE OF TECHNOLOGY TRANSFER AND DEVELOPMENT OF INNOVATIVE ENTREPRENEURSHIP

The development and economic growth of practically any country depends on several factors that contribute not only to the real volume of production but also to the growth of the quality and efficiency of growth. In the process of economic development, the list of these factors and the evaluation of their importance changes. It is becoming increasingly important not only to possess skills and technologies but also to have a certain potential for acquiring and realizing new skills/knowledge, for their effective use, which is the basis for increasing the activity of innovative entrepreneurship and the development of the economy as a whole.

<sup>11</sup> Welcome to Siddhast. “Technology Transfer,” n.d. <http://siddhast.com/service/technology-transfer/>

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Innovative activity, which in the conditions of a competitive market requires constant renewal and effective use, requires the creation of certain conditions, which, on the one hand, are stimulating and, on the other hand, create special requirements for organizations. Such conditions include: (Rajapathirana, 2018)<sup>12</sup>

- Acceleration of the pace of development of the latest technologies, which is caused by the need to realize new knowledge in the shortest possible time, due to the continuous release of new products by competitors.

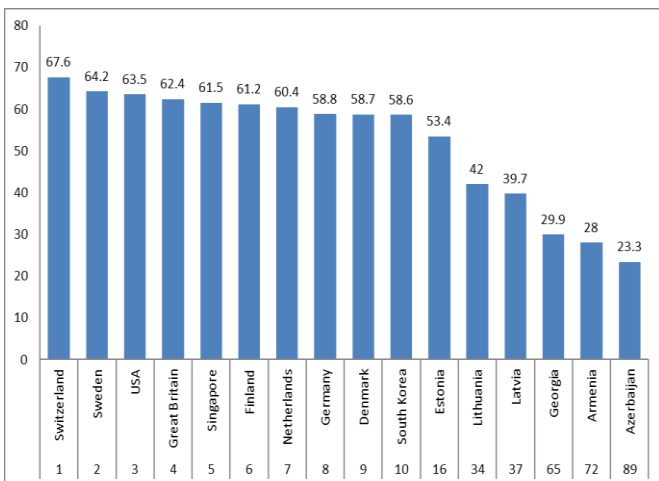
- Intercompany cooperation and development of network organizational structures related to the needs of organizations, conducting high-quality and often large-scale information research, and developing and selling new products on the market.

- Functional integration and cooperation within enterprises, which contributes to the rapid creation of new products and their successful sale on the market.

- Cooperation with knowledge production centers, in particular, establishing relations with both state and private research universities, scientific and educational centers, laboratories, etc.

- The growing share of services and the role of knowledge transfer, which is related to the formation of new ways of organizing economic activities, as well as changes in existing business models.

To assess scientific and innovative potential, the Analytical Division of the World Intellectual Property Organization (WIPO) annually reports the Global Innovation Index. (see diagram 2.1).



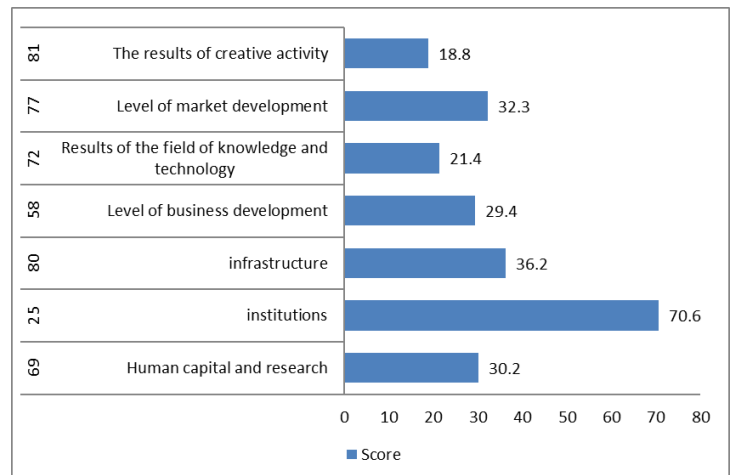
**Diagram 2.1. Global Innovation Index Ranking: Top 10 Transcaucasian and Baltic States (Global Innovation Index 2023)<sup>13</sup>**

<sup>12</sup> Rajapathirana, R.P. Jayani, and Hui Yan. “Relationship between Innovation Capability, Innovation Type, and Firm Performance.” *Journal of Innovation & Knowledge* 3, no. 1 (January 1, 2018): 44–55.

<https://doi.org/10.1016/j.jik.2017.06.002>

<sup>13</sup> WIPO. Global Innovation Index 2023. Innovation in the face of uncertainty. Pp. 19.

The results of Georgia according to individual directions of the Global Innovation Index in 2023 are shown in the diagram (see diagram 2.2)



**Diagram 2.2. Results of Georgia according to individual directions of the Global Innovation Index in 2023<sup>14</sup>**

As can be seen from the diagram, according to individual directions of the Global Innovation Index in 2023, Georgia has the highest ranking in the direction of institutions, it occupies 25th place in the ranking, then comes the level of business development, 58th place, according to the state of human capital and research, 69th place, etc. The worst result of the country is 81 places according to the results of creative activity.

As shown by the research conducted by the National Statistical Service of Georgia in this regard, which it conducted to study and analyze the state of innovative entrepreneurship in the country, it is clear that 6.9% of the companies have placed completely new or significantly improved products on the market, as well as 6% of the companies operating in the service sector. Ma offered the customer an innovative type of service. The innovative goods and services offered to the customers by the enterprises producing innovative products and services were mostly developed by them (75% of innovative goods and 83.7% of services). In other cases, they implemented and realized the transfer of technologies obtained from other companies. 58.3% of the volume of innovative products they introduced were new for the company, and 41.7% were innovative for the market. If we compare this with the indicator of the previous year, we will see that these volumes will be equal to 60% and 39.4% (Sakstat, 2020).<sup>15</sup>

<https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2023-en-main-report-global-innovation-index-2023-16th-edition.pdf>

<sup>14</sup> National Statistical Service of Georgia. Innovative activity of enterprises in 2022.

<https://www.geostat.ge/media/53876/INN-2022.pdf>

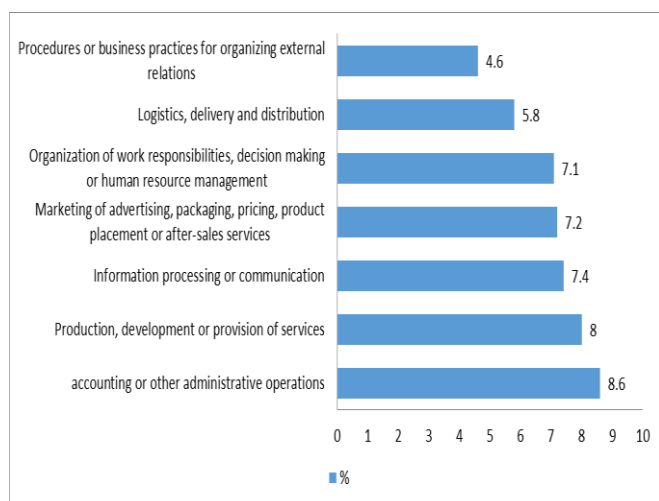
<sup>15</sup> National Statistical Service of Georgia. Innovative activity of enterprises in 2022.

<https://www.geostat.ge/media/53876/INN-2022.pdf>



## “Technology Transfer as the Development of Innovative Entrepreneurship”

The diagram below shows the structure and distribution of innovative production and business processes in percentages (see diagram 2.3).



**Diagram 2.3. Structure and distribution of innovative production and business processes in percentages (Sakstat, 2022).<sup>16</sup>**

As can be seen from the diagram, the highest specific share in the structure of innovative production and business processes is accounted for by accounting or other administrative operations (8.6%), followed by information processing and communication (7.4%) and marketing of advertising, packaging, pricing, product placement or after-sales services etc.

In conclusion, as a result of the analysis of the innovative production activity by the National Statistics Service of Georgia, indicates the increase in the prices of the products produced by innovative entrepreneurship, which ultimately leads to a decrease in customers, which is the reason for the high level of poverty in the country.

#### IV. STATE PRIORITIES FOR PROMOTING AND ENCOURAGING INNOVATIVE ENTREPRENEURSHIP AND TECHNOLOGY TRANSFER IN GEORGIA

The government of Georgia is taking important steps in the direction of promoting the development of innovative entrepreneurship and technology transfer. In this regard, several important programs have been developed and are operating in the country, among which the 2021-2024 state program "For the construction of the European state" is worth noting, which outlines the encouragement and support of those investment projects whose main activity is the creation of innovative and high-tech products with the involvement of universities and regional techno parks.

<sup>16</sup> WIPO. Global Innovation Index 2023. Innovation in the face of uncertainty. Pp. 122. <https://www.wipo.int/edocs/pubdocs/en/wipo-pub-2000-2023-en-main-report-global-innovation-index-2023-16th-edition.pdf>

(Program "for the construction of the European state", 2020).<sup>17</sup>

Also, an important document of the government in the direction of innovative entrepreneurship and technology development is the "Basic data and directions of the country" for the years 2023-2026, it contains the main activities that will contribute to the development of innovative entrepreneurship in the country, namely:<sup>18</sup>

- Promoting and encouraging the growth of the number of specialists, entrepreneurs and companies working in the field of innovation and information technology;
- Establishment and development of infrastructure for the development of innovative entrepreneurship and development of new technologies;
- Guaranteed provision of grant funding for specialists and entrepreneurs working in the field of innovations;
- Creation and development of broadband optical-fiber cable infrastructure in order to provide regions with high-speed Internet and increase availability.

In this regard, another important document of the Government of Georgia is presented by "Vision 2030. Development Strategy of Georgia", in which a special place is given to the issues of promoting innovative entrepreneurship and technologist development, it envisages (Vision 2030):<sup>19</sup>

- To increase access to finance for startups and techno parks and to increase the inflow of foreign direct investments, to introduce and develop the phenomenon of venture capital and business angels;
- Creation and registration of conditions and mechanisms conducive to innovative entrepreneurship, academic and public sector, institutions and society cooperation;
- Creation and development of a unified national platform that will promote and help the development of innovative entrepreneurship and the introduction of new technologies.
- Implementation of flexible management mechanisms at the institutional, regional and national levels for the development and strengthening of research, innovative entrepreneurship in the scientific and technical field.

In Georgia, the state implements its policy in the field of innovation and technology through the Innovation and Technology Agency under the Ministry of Economy and

<sup>17</sup> Government of Georgia. "For the construction of the European state". Government program 2021-2024. Vol. 2020.

[https://www.gov.ge/files/68\\_78117\\_645287\\_govprogramme\\_2021-2024.pdf](https://www.gov.ge/files/68_78117_645287_govprogramme_2021-2024.pdf)

<sup>18</sup> Ministry of Finance of Georgia. Basic data and directions of the country for the years 2023-2026.

<https://www.mof.ge/5539>

<sup>19</sup> Government of Georgia. "Vision 2030. Development Strategy of Georgia". Tb. 2023.

[https://www.gov.ge/files/428\\_85680\\_321942\\_khedva-2030-saqarthvelos-ganvitharebis-strategia-1.pdf](https://www.gov.ge/files/428_85680_321942_khedva-2030-saqarthvelos-ganvitharebis-strategia-1.pdf)

Sustainable Development. According to the agency's data, by the end of 2023, grants have been issued to 641 startups in Georgia. 155 startups received 150,000 GEL grants, 24 startups received 650,000 GEL grants, and 482 startups received small grants. The information technology specialist training program has also been started.<sup>20</sup>

Bringing innovative activities and technology development into the legal framework was an important step, in this regard the Law "On Innovations" was adopted in 2016<sup>21</sup> (Law of Georgia "On Innovations, 2016"). The purpose of which is to support and facilitate the formation and development of an innovative ecosystem in the country and the formation and development of an innovative economy based on it, which will be based on the introduction of intellectual property and innovative technologies in the fields of production and services, as well as the transfer of advanced technologies created abroad to Georgia.

According to the law, the deliberative body of the government - the Research and Innovation Council was defined. Its functions, innovation promotion infrastructure, financing sources and rules for innovative entrepreneurship were determined, and provisions for the implementation of innovative projects and programs funded by the government were also written and given in the form of clauses.

#### V. CHALLENGES AND RECOMMENDATIONS FOR THE DEVELOPMENT OF INNOVATIVE ENTREPRENEURSHIP AND TECHNOLOGY TRANSFER IN GEORGIA

Important changes that determine the rapid development of the Georgian economy are impossible without the active participation of each component of the national innovation system. Similarly, we can talk about regional innovation systems, since the balance of all elements of the innovation framework of the region and well-organized connections in practice determine the possibility of its movement towards an innovative economy. It should be noted that the formation of competitive advantages of innovative activities, such as, for example, the transformation of resources into a competitive advantage in the unique economic conditions of the region, as well as their effective distribution both in the regional economic system and beyond, is an important aspect that should be taken into account in the process of implementing an innovative strategy. It is advisable for each company, taking into account the geographical, economic, social, and other characteristics of the territories, to develop its algorithms for the management of innovative

development, for each region separately. And narrowing the scope of action from national to regional will allow it to achieve a higher quality of final results.

We conducted a short survey to identify key challenges and develop recommendations for innovative entrepreneurship and technology transfer. Representatives of various governmental bodies, and educational and research institutes working in this regard participated in it.

The following challenges facing entrepreneurs engaged in innovative activities in the country were highlighted:

1. It is important to establish tax incentives for investors if they invest in risky projects. For example, in leading foreign countries, it is a practice that if an investor out of 10 startups financed by him, 8 turns out to be ineffective, then he will receive a tax benefit for the corresponding cost. This creates an incentive for investors to make risky investments. Establishing a similar tax benefit in Georgia will encourage investors.

2. A special challenge in the field of innovation dissemination is the difficulty and lack of information dissemination. Most of the companies operating in Georgia do not have proper information about the modern technological news and innovations in the world, they do not know about the existence of startups, and they are not familiar with their activities and functions.

3. Refinement of educational programs and development and introduction of new ones to raise the level of entrepreneurial education in higher education institutions is an important challenge in the development of innovative entrepreneurship in the country and the transition to an innovative economy.

4. An important challenge is the provision of education in the direction of entrepreneurship in Georgian schools. It turned out that entrepreneurship is not taught in schools.

5. The development and implementation of the mechanism for the creation and development of startup accelerators and incubators in Georgia is a challenge for the development of startups and innovative entrepreneurship.

To overcome the established challenges, we made the following recommendations and proposals:

1. The Georgian government should study the foreign experience of financing innovative entrepreneurship and startups, as well as tax benefits for investors in this regard, and develop a scheme that will encourage foreign investors and private funds to engage in the financing of innovative entrepreneurship.

2. To eliminate the lack of information in the direction of spreading innovations and technological news in the world, we consider it necessary for state bodies and non-governmental organizations working in this field to organize conferences and informal meetings with the joint participation of company management and startups. That will allow them to define problems and needs, optimize processes, and ultimately solve the problem.

<sup>20</sup> Ministry of Economy and Sustainable Development of Georgia. Innovation and Technology Agency. Agency web. page. 2023. Government of Georgia. "Vision 2030. Development Strategy of Georgia". Tb. 2023.

[https://www.gov.ge/files/428\\_85680\\_321942\\_khedva-2030-saqarthvelos-ganvitharebis-strategia-1.pdf](https://www.gov.ge/files/428_85680_321942_khedva-2030-saqarthvelos-ganvitharebis-strategia-1.pdf)

<sup>21</sup> Law of Georgia "On Innovations" ch. 2016. <https://matsne.gov.ge/ka/document/view/3322328?publication=1>

3. To raise the level of entrepreneurship education in higher education institutions, we consider it necessary to develop and introduce appropriate programs for entrepreneurship education, as well as to develop a policy document on the process of implementing technological transfer, which will encourage the development of the mentioned direction.

4. Great importance is attached to the study of entrepreneurship in Georgian schools because in this way the foundation will be laid for the formation of a future entrepreneur. In general, we believe that entrepreneurship should be taught as a compulsory subject in high schools and universities. In response to this challenge, we believe that the Ministry of Education and universities should, based on the study of foreign experience, develop new forms and methods of teaching and create working groups to develop an action plan for the introduction of entrepreneurship education.

5. We believe that it is important to create and develop startup accelerators and incubators since they play an important role in the improvement and development of startup activities, they offer trainings and workshops to improve their skills, improve access to necessary resources for startups, etc. In our opinion, the state must develop and widely implement grant and co-financing programs to promote their development.

Thus, the challenges identified by our study of the issue and the set recommendations represent another important step in the direction of technological transfer and the development of innovative entrepreneurship.

## VI. CONCLUSION

The heading of the References section must not be numbered. All reference items must be in 8 pt font. Please use Regular and Italic styles to distinguish different fields as shown in the References section. Number the reference items consecutively in square brackets (e.g. 1).

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