

DEVELOPMENT OF SUPPORT INFRASTRUCTURE FOR INNOVATION ACTIVITY IN THE REPUBLIC OF MOLDOVA

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Abstract. *Innovation is an already well-established concept in the context of economic development, improving competitiveness and catalyzing the potential of micro, small and medium sized enterprises. The purpose of the paper is to analyze the public policy framework on the development of support infrastructure for innovation activity in the Republic of Moldova, and to elucidate the main strategic documents that include respective provisions and their impact on creating a favorable environment for companies focused on applying innovations in offered processes and / or products. The research methodology is based on the analysis of state policies on the development of innovation support infrastructure, as a result of which it was determined that although, in the last ten years, the priority of innovation is mentioned in more and more strategic documents, the share of gross domestic product expenditure allocated by the government of the Republic of Moldova for science and innovation is in significant decline. Innovation infrastructure (innovation incubators, clusters, science and technology parks), although is constantly evolving, still has significant shortcomings in terms of the interconnection between enterprises and research institutions as a result of poor capitalization and limited application by companies of scientific research / innovations for various reasons (lack of knowledge, of financial resources, of qualified staff, etc.).*

Key words: support infrastructure, innovations, public policies.

JEL CLASSIFICATION: O30, O38

INTRODUCTION

Innovation activity continues to be the accelerator of economies development at the global level. Today, the world's economies tend to become integrated and interdependent, and companies are to take advantage of global business opportunities by marketing new products and processes faster than competitors - a key criterion in economic growth, also recognized in the "Innovation Agenda" from Lisbon. [4] According to the Code on Science and Innovation of the Republic of Moldova, the infrastructure of research and innovation represents the totality of organizations that contribute to the development of scientific and innovation activity: the Academy of Sciences, other organizations in the fields of research and innovation, financial institutions, funds and agencies supporting activities in the field, business incubators, innovation parks (scientific, technical-scientific and technological), enterprises and other specialized organizations.[1]

According to Eugen Hrişcev's view, innovations represent "changes occurred in the production of goods and services, in socio-economic relations, science, culture, education and other spheres of human activity, conditioned by the use of intellectual resources and oriented towards modernizing the production process, improving its results and (or) reducing costs" [8, p.12].

The OECD defines innovation as "the end result of innovation activity, represented by a set of scientific, technological, organizational, financial and commercial actions, which involve investment in new knowledge, designed to provide for the realization of a new or improved product". [1]

The role of innovations has been widely addressed at national and international level by various researchers (Shumpeter J., Hansen A., Francis D., Bessant. J. Şendrea M., Stratan A., etc.); international organizations (OECD, World Bank, European Commission, etc.) and authorities. The actuality of the researched topic also lies in the spectacular results that companies in the most diverse industries have in creating innovative and competitive products worldwide. The need to be competitive imposes new quality standards, new visions, technologies and new approaches in interacting with customers. In this complex process, the role of the authorities is to create the framework of public policies aimed at promoting the development of innovations, but more importantly to create tools and catalyze the connection between the actors involved in the innovation process. Thus, we propose the following objectives: (1) identification and analysis of public policy documents that provide for the development of innovation activity; (2) determining the share of expenditure on science and innovation in total budget expenditure for the last 10 years (2009-2019); (3) determining the share of expenditure on science and innovation in gross domestic product for the last 10 years (2009-2019); (4) description of the evolution of the support infrastructure for the innovation activity in the Republic of Moldova; (5) elucidation of the strengths and weaknesses of the innovation system in the Republic of Moldova, based on the "Global Innovation Index" international ranking.

MATERIALS AND METHODS

The article aims to analyze the public policy framework on the development of support infrastructure for innovation activity in the Republic of Moldova, elucidate the main strategic documents that include respective provisions and their impact on creating a favorable environment for companies focused on applying innovations in offered processes and / or products. The research methodology is based on the analysis of state policies on the development of innovation support infrastructure.

RESULTS AND DISCUSSIONS

The widely applied innovation activity in various fields is essential to increase the competitiveness of the economy, create job places, improve education, reduce the anthropogenic impact on the environment and improve the quality of life. Investing in research, technological development and innovation (RTDI) has a positive impact on industry development and creation of a favorable environment for companies to be aware of the importance of this process. The major impediment, noticed especially by small and medium enterprises, which stays at the basis for the implementation of innovations is the high costs for conducting studies, finding optimal solutions and applying them in the company's processes. Thus, in order to correct market failures, ensure the coordination of activities and encourage innovation, governments implement various policies to support the RTDI sector. The support of the innovation activity by the authorities of the Republic of Moldova is carried out through the following legislative documents:

- Innovation strategy of the Republic of Moldova for the period 2013-2020 "Innovations for competitiveness" (GD no. 952 of 27.11.2013).
- Law on science and technology parks and innovation incubators (no. 226 of 01.11.2018). Official Gazette no. 448-460 / 725 of 07.12.2018.
- Code on Science and Innovation of the Republic of Moldova (no. 259-XV of 15.07.2004). Official Gazette of the Republic of Moldova no. 58-66 / 131 of 23.02.2018.

- Government Decision of the Republic of Moldova no. 614 of 20.08.2013 on "The concept of cluster development of the industrial sector of the Republic of Moldova".

Since 1994, together with the approval of the *Code on Science and Innovation*, the main actor in the field of science becomes the Academy of Sciences of Moldova, which develops concepts, projects and state programs, provides advice to public authorities on strategic directions of state policy in the field of economic, social and humanitarian spheres. The Academy of Sciences of Moldova, through agencies, science parks, innovation incubators and business incubators, achieves the relationship between the scientific, academic and entrepreneurial environment, so that innovations are applied in practice and entrepreneurship is in a process of continuous development. In this way, a mutual development takes place: the scientific-academic environment, through research and elaborations, innovates entrepreneurship, which, in turn, demands innovations, in the pursuit of competitiveness and prosperity.

In order to create the innovation infrastructure, in 2007, the Law on Science and Technology Parks and Innovation Incubators was developed and adopted, which provides fiscal, customs and tariff facilities for their residents. Also in 2007 the "Academica" Science and Technology Park and the "Innovator" Innovation Incubator were inaugurated. Thus, from 2007 to 2015, 8 innovation incubators were established in Chisinau, Balti and ATU Gagauzia. (Table 1)

They offer its residents - innovative companies, a package of services, such as: spaces, constructions and endowments, supplemented with a whole series of material, informational, personnel, financial, expertise and consultancy services.

Table 1. List of innovative business incubators in the Republic of Moldova

Innovative business incubators		
<i>Business incubator</i>	<i>Location</i>	<i>Year of establishment</i>
<i>Inovatorul</i>	Chisinau	2007
<i>Politehnica</i>	Chisinau	2011
<i>Innocenter</i>	Găgăuzia	2012
<i>Inventica USM</i>	Chisinau	2012
<i>Nord</i>	Bălți	2012
<i>Antreprenorul inovativ</i>	Bălți	2013
<i>Media Garaj</i>	Chisinau	2014
<i>IT4BA</i>	Chisinau	2015

Source: Developed by author

The innovation strategy of the Republic of Moldova for the period 2013-2020, "Innovations for competitiveness" sets three objectives: [2]

1. technological development of enterprises, including small and medium enterprises;
2. development of the support infrastructure for the innovative activity;
3. ensuring the conditions for building a knowledge-based economy.

Also, the Strategy provides the necessary framework for the implementation of the results of national scientific research, being in accordance with the Research and Development Strategy of the Republic of Moldova developed by the Academy of Sciences of Moldova. Thus, the purpose of the Strategy is to ensure a consistent framework of horizontal policies that will contribute to increasing the country's international competitiveness and building a knowledge-based economy, by developing human

capital, strengthening the capacities of Moldovan companies to absorb, generate and disseminate innovations and by their closer interconnection with university and research centers.

The general objectives identified above, are detailed below in specific objectives, concrete measures and actions that will be carried out in the process of implementing the Strategy. (Table 2)

Table 2. Presentation of specific objectives and actions aimed at achieving the goal of the strategy of the Republic of Moldova "Innovations for competitiveness"

<i>Specific objective</i>	<i>Actions</i>
<i>Facilitating the networking and technological integration of Moldovan and foreign companies</i>	<ol style="list-style-type: none"> 1) providing support for the networking of Moldovan SMEs with “business angels” (“investment angels”, investors who invest in new, risky but promising businesses) and for stimulating the association of innovative SMEs with European and international business associations; 2) facilitating the process of creating an Innovation Investors Club of the Republic of Moldova, which would bring together businessmen with the capacity to provide capital, consulting, positive practices and models for innovation business; 3) organization of business camps in which local and foreign business leaders will share their experience of innovative entrepreneurship to young companies; 4) conducting strategic negotiations in order to attract medium and large international companies in the Republic of Moldova, with capacities to generate new technological chains and create innovative clusters; 5) strengthening the capacities of the Organization for Attracting Investments and Export Promotion, of the Chamber of Commerce and Industry and of other support agencies for the networking of local companies with foreign ones.
<i>Providing state support for innovative companies</i>	<ol style="list-style-type: none"> 1) development and inclusion of the “Innovation Management” module in the “Efficient business management” state program; 2) development and implementation of the state program "Exchange of experience with European companies in advanced innovation management" for companies that have already demonstrated innovative skills; 3) inclusion of the innovation components within the state support programs of SMEs (the Program for attracting remittances in the economy - PARE1 + 1, the National Program for economic empowerment of young people, the Credit Guarantee Special Fund); 4) inclusion of innovation components in the Regulation of the Energy Efficiency Fund to encourage innovations in the field of energy conservation and efficiency; 5) extension of the formula for financing projects in the field of innovation in formula 1 + 1 for the procurement of new technologies and for technology transfer projects; 6) development and implementation of the state program "Innovative Moldova" to support new innovation export-oriented businesses (start-ups); 7) development and implementation of the state program “Innovative Voucher for SMEs” for mini-grants intended for innovative SMEs for marketing and organizational innovations, improvement of electronic pages, design and packaging improvements in industrial products; 8) development and implementation of the state program for pre-competitive financing, support for testing industrial models and prototypes; 9) development of the national mark “Green Economy” for products and processes and of the regulation of granting and use.

Source: Developed by author based on. [2]

Another strategic document developed by the Ministry of Economy, which supports the development efforts of the industrial sector and implicitly the application of innovations by the business environment, is ***the Concept of cluster development of the industrial sector of the Republic of Moldova***. [3] The purpose of the concept is to determine the needs and possibilities of implementation and development of a mechanism for associating economic agents in "clusters" in order to contribute to the efficient and competitive development of industries. The state intervention proposed by the conception is related to the cluster development of the industrial branches with a significant growth potential, in which the necessary premises for the creation of the clusters were formed. The development of clusters aims to solve the problem of declining industrial activity, due to the low competitiveness of manufacturing enterprises in the Republic of Moldova. This concept represents the first complex document on the creation and development of clusters in the industrial sector and is based on best practices from Europe, China and other countries. The concept aims to obtain the following potential effects on research and innovation: increasing the demand for research / development services from enterprises, increasing the level of qualification of researchers, promoting technology transfer, developing research centers in the field, ensuring access of scientific institutions to new sources of financing, etc.

There are four clusters in the Republic of Moldova at the moment. These are the technical-scientific and training cluster "Elchim-Moldova", based on JSC "TOPAZ". The members of the cluster are 2 representatives of the business environment, 4 universities and 4 research, development and innovation institutions. The mission of the cluster is to concentrate scientific, intellectual and material resources in order to solve the problems related to the creation of innovative equipment and technologies for electrophysical and electrochemical methods of materials processing. The second is the innovative-educational cluster "InnoCenter", Comrat. The mission of the cluster is to create an object with an innovative infrastructure, which will increase the competitiveness of the region through the development of high-tech SMEs, marketing and transfer of high technologies.

In September 2018, the Organization for Small and Medium Enterprises Sector Development (ODIMM), through the Technical Assistance and Information Exchange Instrument of the European Union (TAIEX), generated the creation of two new clusters over a year. Soroca Textile Cluster SORINTEX, which brings together a number of 38 founding members and the Innovative Cluster Cahul. The generation of clusters was developed according to the model of clusters in Romania. The Romanian Cluster Association has provided methodological support in the process of generating Moldovan clusters. The association models applied by the clusters from Cahul and Soroca have the potential to replicate in other industries and will serve as an example for new initiatives coming from the territory.

Annually, financial resources for the development of the RTDI sector are provided from the state budget. The analysis performed on the evolution of expenditures for science and innovations in the last 10 years, shows that they have been in a continuous increase, from 378260.8 thousand lei in 2009, to 498000.0 thous. lei in 2019, which is welcomed. However, if we compare the share of RDI expenditures to total expenditures from the state budget, one can note that there is a decrease, from 2.88% in 2009 to 0.97% in 2019. Another relevant indicator for the analysis in the field innovation, used worldwide is the share of spending on science and innovation as a share of gross domestic product (GDP). The Republic of Moldova is well below the average of the European Union countries, where the share of GDP expenditures is on average 2.5%, registering a share of 0.62% in 2009, with a slight increase in the coming years, up to 0.40% in 2012. Subsequently, the share of expenditure on science and innovation decreased to 0.24% of GDP in 2019. (Table 3)

Table 3. The share of science and innovation expenditures in GDP and the state budget, thousands lei

Year	State budget		Gross domestic product	Expenditure on science and innovation	Share of science and innovation expenditure in GDP (%)	Share of expenditure on science and innovation in the state budget (%)
	Revenue	Expenditure				
2009	13099881,3	17748362,0	60429803	378260,8	0,62	2,88
2010	15318344,9	19454519,2	71885474	339093,9	0,47	2,21
2011	19087181,7	20354074,1	82348703	328156,5	0,40	1,61
2012	21367269,1	22164269,1	88227753	360354,0	0,40	1,62
2013	22507826,7	24394796,6	100510471	349922,5	0,35	1,43
2014	27570005,1	30010942,8	112049578	388261,1	0,35	1,58
2015	29152350,6	32724705,7	122562742	441970,9	0,36	1,35
2016	31378944,8	35561744,8	160814564	466900,0	0,35	1,31
2017	32839162,2	36994768,4	178880890	453900,0	0,25	1,23
2018	36618500,0	41332400,0	192508553	484500,0	0,25	1,17
2019	44136645,0	51551945,0	210351082	498000,0	0,24	0,97

Source: Developed by author based on: Statistical Yearbook of the Republic of Moldova, Budget Law 2009-2019, Statistical Data Bank. <https://statistica.gov.md/pageview.php?l=ro&idc=407&nod=1&>

By comparison, countries that opt en masse for the application of innovation in all areas of the economy and whose governments that are oriented towards the creation and continuous improvement of the RDI sector, end up investing about 3% of GDP per year for innovation. The world leader in innovation is Japan, which has had an annual share of research and innovation spending of more than 3% of GDP since 2006. Another country oriented towards the wide application of innovations is the United States of America, which in the period between 2006 and 2017 records annual expenditures of about 2.5% of GDP for this sector.

The European Union 2020 strategy developed in 2010 includes in its key priorities reaching the share of 3% of GDP of expenditure on research and development by 2020. Analyzing the period between 2006-2017, there is observed an increase in the share of expenditure on RDI from GDP, from 1.76% in 2006, to 2.06% in 2017. [7]

The Global Innovation Index (GII) is a ranking of global economies based on innovation capabilities, which has been published annually since 2007 and is developed by the World Intellectual Property Organization, American Cornell University and the Insead French management school. The ranking is based on about 80 indicators, including: human capital and research, infrastructure, loans, investments, interconnections, innovation, results of creative activity, etc., being grouped in inputs and outputs of innovations. The ranking analyzes the indicators of 129 countries and their annual evolution. The Republic of Moldova ranked 58th out of 129 in 2019, being down compared to the last two years. At the same time, it should be mentioned that the innovation outputs register much better results compared to the inputs in the period 2017-2019. (Table 4)

Table 4. Evolution of the Republic of Moldova in the "Global Innovation Index" ranking, 2017 – 2019

Year	Global Innovation Index	Innovation inputs	Innovation outputs
2019	58	81	45
2018	48	79	37
2017	54	73	32

Source: Developed by author on the basis of the Global Innovation Index Report [6]

According to the analysis performed in the "Global Innovation Index" ranking, the strengths of the Republic of Moldova in the field of innovation are:

➤ GII strengths for the Republic of Moldova are found in five of the seven GII pillars, and mostly on the innovation output side of the GII.

➤ Four of these relative strengths are in Knowledge & technology outputs (44), where the Republic of Moldova shows strengths in sub-pillar Knowledge creation (28) as well as in three indicators: Utility models by origin (4), Labor productivity growth (13), and ICT services exports (18).

➤ In Creative outputs (49), strengths are found in sub-pillar Intangible assets (26) as well as in three indicators: Trademarks by origin (7), Industrial designs by origin (11), and Mobile app creation (20).

➤ In Institutions (82), the Republic of Moldova's only strength is indicator Ease of starting a business (12).

➤ In Human capital & research (64), relative strengths for the country are indicators Expenditure on education (11) and Government funding per pupil (7).

➤ In Business sophistication (93), indicator ICT services imports (28) is a GII strength for this country.

In contrast, the weaknesses of the research and innovation sector in our country are the following:

➤ The Republic of Moldova's weaknesses in the GII are found in five of the seven GII pillars, and mostly on the innovation input side of the GII.

➤ In Human capital & research (64), GII weaknesses are indicators Global R&D companies (43) and Quality of universities (78).

➤ In Infrastructure (88), relative weaknesses are sub-pillars General infrastructure (115) and Ecological sustainability (116) and indicators Logistics performance (106), GDP per unit of energy use (112), and ISO 14001 environmental certificates (111).

➤ In Market sophistication (60), GII weaknesses are sub-pillar Trade, competition, & market scale (108) and indicator Domestic market scale (121).

➤ In Business sophistication (93), the Republic of Moldova has weaknesses in sub-pillar Innovation linkages (120) as well as in three indicators: University-industry research collaboration (109), State of cluster development (124), and Research talent (70).

➤ On the innovation output side, only one weakness is found in indicator National feature films (99).

CONCLUSIONS

The innovation system in the Republic of Moldova has not yet managed to fully integrate into the processes of globalization of innovations. Currently, the support infrastructure for innovation activity in the Republic of Moldova is represented by: innovation incubators, science and technology parks and clusters. The share of expenditure on science and innovation in 2019 of total budget expenditure is only 0.97% and 0.24% of gross domestic product. These figures are well below the average of European Union countries, whose share of expenditures in GDP is approx. 2.5%. At the same time, it should be mentioned that the annual budget allocated for innovation activity in the Republic of Moldova has been in a continuous decrease in the last 10 years. The share of expenditures on science and innovation in GDP has decreased from 2.88% in 2009 to 0.24% in 2019. Paradoxically, the priority of developing the business environment through innovation in the last 10 years is included in more and more strategic documents as important and necessary, but expenditure on innovation is steadily declining. However, the modest financing capacities of micro, small and medium sized enterprises do not allow them to apply this instrument to diversify processes and products, which is also reflected in the "Global Innovation Index" ranking for 2019, where the indicator Business sophistication is 93 out of 129. The Republic of Moldova has weaknesses in sub-pillar Innovation linkages (120) as well as in three indicators: University-industry research collaboration (109), State of cluster development (124), and Research talent (70).

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