

DIVERSIFICATION OF FINANCING OF THE RESEARCH SECTOR IN THE REPUBLIC OF MOLDOVA IN THE CONTEXT OF THE INTERNATIONALIZATION OF SCIENCE

Ph.D. Veronica RAILEAN

State University of Moldova, Republic of Moldova

E-mail: veronica_pvp@mail.ru

Scientific Coordinator, Ph.D., Associate Professor Angela TIMUS

National Institute for Economic Research, Republic of Moldova

E-mail: ince.timush@gmail.com

Abstract: *This study presents an analysis of alternative financial resources for the research sector in the Republic of Moldova, in the context of internationalization. The indicators proposed by The Forum of the European Science Foundation on internationalization were used to assess the internationalization of science funding.*

Keywords: *research sector, research and development funding, internationalization of science.*

JEL Classification: *O32, O33, O39.*

1. Introduction

The research sector is empowered with the function of producing new knowledge, innovations and new technologies, which are expensive. The main source of funding for scientific and technological activities is government funding, but due to the process of internationalization of science, there have been changes in the mechanism of funding for scientific activities, which have contributed to new opportunities for financial support for research and development-innovation. In terms of global innovation capacity, the Republic of Moldova ranks 109th out of 141 countries, with a score of 29.9, which is quite low compared to neighboring countries. The internal expenditures for research and development in the Republic of Moldova constitute 0.3% of GDP, which places it on the 81st place out of 141 with a score of 10.1.

Table nr. 1. Global Competitiveness Index - Innovation capability

The country	Global Competitiveness Index - Innovation capability, year 2019
Russia	32
Romania	55
Ukraine	60
Republic of Moldova	109

Source: authored by World Economic Forum, 2019.

This study aims to perform an analysis of financial sources entered in the Republic of Moldova resulting from the internationalization of the research and development sector. In order to achieve the proposed goal, the works from the specialized literature of the authors were studied, both abroad and in the country, among which we can mention: J. R. Cunha-Melo (2015), G. Mesnita and F. Dumitriu (2006), G. Cuciureanu (2007), G. Cuciureanu and S. Manic (2010) etc.

2. Materials and methods

For the present study, were used the classical evaluation methods:

- economic-mathematical methods, for calculating the relative and absolute indicators specific to the study;
- analytical-comparative method, for analyzing and comparing the dynamics of funding indicators for scientific and technological activities;
- the graphical method, for the graphical representation of the funding of the research sector resulting from the internationalization process.

The methodology used in this study is the one proposed by the European Science Foundation (European Science Foundation, 2012), which proposed a complex set of indicators to measure the internationalization of research institutions, which are grouped into indicators for funding research agencies and indicators for research institutions.

Eight indicators are proposed to assess the agencies' funding:

- *Budget for Joint Research Programmes*, use for: intensity of funding for collaboration; european integration at the level of joint funding; international collaboration, mutual learning.
- *International co-authored papers* - use for: monitoring the international orientation of the research funded by the funding organisation and through this the effectiveness of the internationalisation of the organisation.
- *International co-patenting*, use for: monitoring the contribution of research funded by a funding organisation to international innovation; monitoring the effectiveness of the internationalisation of the organisation.
- *Budget for attracting researchers from abroad*, for: analysis of funding for mobility.
- *International Mobility*, use for: assess bi-directional international mobility; indicators provide information on integration into international science.
- *Co-funded research output*, for: measuring the level of the de facto integration at European or international level of research funders, through activities of researchers who jointly decided to collaborate.
- *Evaluation procedure*, for: internationalisation of peer review to enhance objectivity in selection process; and benefits from experiences and perception of foreign panellists and reviewers.
- *Openness of programmes*, use for: understanding the extent to which national programmes are open to funding people working abroad.

Indicators for research organizations are:

- *Budget coming from abroad*, use for: measuring the capability to attract funding from non-national sources in terms of volume of funding and of type of sources attracted.
- *Budget coming from abroad: output generated*, use for: measuring the capability to attract funding from non-national sources in terms of volume of funding and of type of sources attracted.
- *International co-authored papers*, for: measures the level and growth of international collaboration.
- *Recruitment of researchers from abroad*, for: attract talent to the organisations to add external knowledge to the organisations' human resources and attractiveness of the organisation.
- *International Mobility*, use for: the inward mobility indicator measures the additional resources and changing attractiveness of an organisation over time; this is a flow indicator measuring fresh inflow in the investigated period.
- *Budget for Joint research programmes or projects*, for: measuring the level of integration at European or international level of research performers, which

- jointly decided to plan and to manage programmes and/or projects where one or more functions are shared.
- *International use of own infrastructures*, use for: monitoring the international use of infrastructures.
 - *Recruitment committees*, use for: measuring international participation in the process of recruiting researchers.
 - *Evaluation procedure*, for: internationalisation of peer review to enhance objectivity in ex-post evaluation process; benefits from experiences and perception of foreign panellists in order to enhance the international perspective of the research agenda.

3. Results and discussions

In the context of the internationalization of the research sector, new funding opportunities are emerging for participants in the research sector. In addition to state funding and alternative funding, such as capital venture, crowdfunding and bussines angels, a new source of funding for scientific activities is emerging, which is developing due to the internationalization of the research sector.

According to some authors (Cuciureanu, 2007; Cuciureanu and Manic, 2010), the Republic of Moldova can benefit as a result of the process of internationalization of science if it will orient its own research-development system towards international cooperation. External companies opt for internationalization because it offers them quality scientific products at low cost (Mesnita and Dumitriu, 2006).

Indicators of appreciation of the internationalization of research funding are still under development (Cunha-Melo, 2015). At the same time, we note that there are developed indicators that can be measured. For example: Budget for attracting researchers from abroad, which uses data from annual bank reports on the entry of financial resources for scientific and technological activities.

In table no. 2 presents the bank data on the inflows of financial means for research and development and information services.

Table nr. 2. Budget for attracting researchers from abroad, years 2012-2021, million USD

Name / Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
IT services	42,2	48,6	58,8	59,0	66,4	102,4	154,7	200,8	258,2	349,8
Research and development services	2,0	2,2	1,3	1,1	2,0	3,0	2,6	2,7	3,0	6,0
Total research services, including IT	44,2	50,8	60,1	60,1	68,4	105,4	157,3	203,5	261,2	355,8

Source: authored by BNM, 2022. Report Balance of payments, years 2012-2021. [online] Available at: <<https://www.bnm.md/bdi/pages/reports/dbp/DBP16.xhtml>> [Accessed 15 March 2022].

In the last ten years, the Republic of Moldova has registered positive performances in the internationalization of the financing of the research-development sector, as well as of the IT sector. Research and IT services provided abroad amounted to an average of 136.7 million USD per year, which increased ≈ 8 times, from 44.2 million USD in 2012 to 355.8 million USD per year 2021.

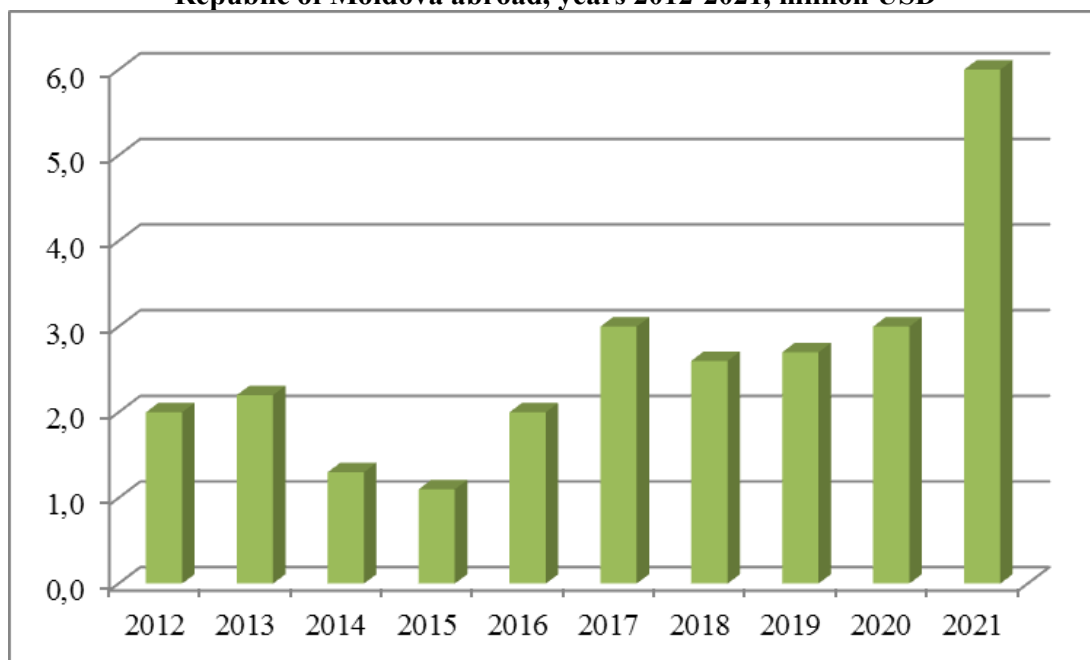
The annual growth rate of these services was on average 124.4% and increased 1.4 times in 10 years.

The highest value of the annual growth rate is attested in 2017 compared to 2016, year in which both types of services increased due to the entry into force of the association agreement European Union - Republic of Moldova.

Research and development services constitute 1.9% of the total services identified as a component part of scientific-technological activities, and 98.1% are IT services.

In figure no. 1 presents the dynamics of the entry into the country of the financial means for research and development services, for the years 2012-2021.

Figure no. 1 Dynamics of research and development services provided by the Republic of Moldova abroad, years 2012-2021, million USD



Source: authored by BNM, 2022. Report Balance of payments, years 2012-2021. [online] Available at: <<https://www.bnm.md/bdi/pages/reports/dbp/DBP16.xhtml>> [Accessed 15 March 2022].

The research and development services provided by the Republic of Moldova abroad registered a positive oscillating trend, being on average 2.6 million USD annually.

From 2012 to 2021, the country's inflows of financial resources for research and development services increased ≈ 3 times, from 2 million USD to 6 million USD.

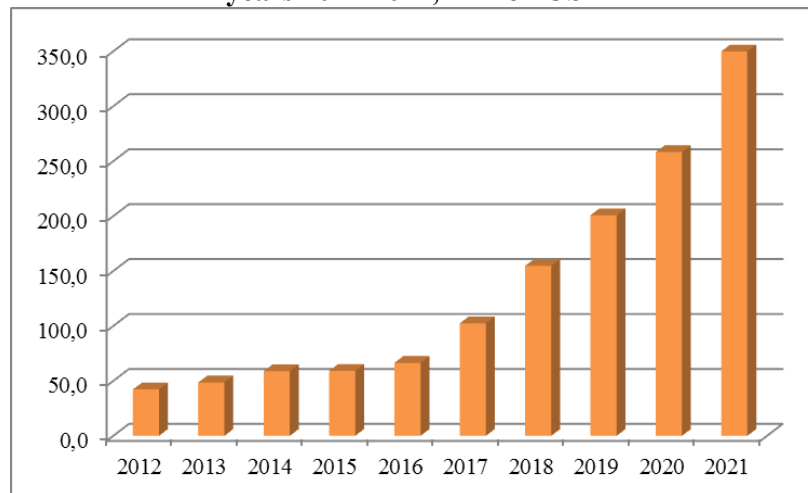
The lowest value was recorded in 2015, and the highest - in 2021. This year, the amount for research services has doubled compared to 2020.

In figure no. 2 presents the dynamics of the entry into the country of the financial means destined for the IT services, for the years 2012-2021.

In the last decade, the Republic of Moldova has provided an average of 134.1 million USD of information services abroad. We notice an increase of about 8.3 times, from 42.2 million USD in 2012, to 349.8 million USD in 2021.

The growth trend is a constant one, due to the affordable costs for IT products that our country offers.

Figure no. 2 Dynamics of IT services provided by the Republic of Moldova abroad, years 2012-2021, million USD



Source: authored by BNM, 2022. *Report Balance of payments, years 2012-2021*. [online] Available at: <<https://www.bnm.md/bdi/pages/reports/dbp/DBP16.xhtml>> [Accessed 15 March 2022].

In 2015 compared to 2014, the lowest annual growth rate was recorded (100.3%), and the highest annual growth rate was set in 2017 compared to 2016, due to the expansion of the sector on the foreign market, but also the entry of foreign IT companies in the Republic of Moldova.

For example, the foreign company "ENDAVA", which has over 10,000 employees, located near customer locations. The Endava subdivision of the Republic of Moldova has about a thousand employees and has been present on the Moldovan market since 2000.

4. Conclusions

An alternative source of funding for scientific and technological activities is the financial resources resulting from the process of internationalization of the research sector.

In the last decade, the Republic of Moldova has provided research and development and IT services in the amount of 1366.8 million USD. The trend is a positive one, and the increase was about 8 times.

IT services are the main share and have increased in the analyzed period by ≈ 8.3 times. And research and development services have increased about 3 times.

Large foreign companies opt for the internationalization of scientific activities to underdeveloped countries, due to qualified staff and low costs of scientific and technological products.

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