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EVALUATION AND FINANCING OF THE RESEARCH SECTOR IN THE REPUBLIC OF MOLDOVA IN THE CONTEXT OF EUROPEAN TRENDS

Abstract of the doctoral thesis in economic sciences

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CONCEPTUAL REFERENCES OF THE RESEARCH

Actuality and importance of the research topic addressed is primarily determined by the challenge of the efficient use of financial resources to ensure a research process based on excellence, integrated in the international research circuit and oriented towards meeting the growing needs of society and the national economy.

The importance of the research theme derives from the recognition of the indisputable role of the research sector in economic and social progress, as well as in the development of human knowledge, aspects validated by specialized literature. Research is the generator of technological innovations, scientific discoveries and solutions to the complex problems of the contemporary world. Moreover, the research sector constitutes a basic pillar in the strengthening of academic institutions, industry and public policies.

The evaluation of the research sector in the Republic of Moldova from the perspective of the way of financing is important in the context of the European integration process of the Republic of Moldova. Adherence to European values requires legislative reforms in the field of research with the aim of promoting transparency, responsibility and good governance in this sector. European integration gives the Republic of Moldova access to European research programs and funds, such as the Horizon Programs. Participation in these programs can bring additional funding and opportunities for collaboration with research institutions in EU member states, thus stimulating research progress.

Description of the situation in the research field and identification of research problems. Currently, the research sector in the Republic of Moldova is in an active process of reformation. This sphere of activity has a solid institutional architecture, within which fundamental and applied scientific research is carried out, and benefits from an already adopted state policy in the field of research and innovation. In the light of the prospect of integration within the European Union, the Republic of Moldova faces significant opportunities for the development of an innovation-oriented economy.

An essential aspect of research funding is represented by the share of expenditure in GDP. In 2021, at the level of the European Union, this share of expenditure for science constituted 2.27%, showing an increase of 0.24 percentage points compared to 2016. In contrast, the Republic of Moldova registers the lowest share compared to some states of the European Union, registering only 0.23% of GDP, down by 0.08 percentage points compared to 2016. These figures reflect the need for increased attention and effective policies to

strengthen the research sector in the Republic of Moldova in accordance with the European objectives of innovation and sustainable development.

Degree of study of the topic. The research was based on the in-depth study of the scientific works of several authors, including those of world renown, such as: Atkinson R., Branscomb L., David H., Morten F., Engels F., Ezell S.J., Feldman M.P., Florida R., Foray D., Gompers P., Hargadon A., Hippel E., Juma C., Kaplan S., Lallement M., Levy F., Marks H, Marshall A., Mazzucato M., Putnam R., Ricardo D., Sachs J., Smith A., Stromberg P., Vizjak A., Wagner A., as well as those from the Russian Federation:Arakelian A., Cazarina M., Golicenco O., Grițunova S., Malașenco O., Stefanova J., Valaițev S., etc. A significant contribution to the study of the stated research problem was made by the following local and Romanian scholars: Andrei L., Băloiu L., Bran P., Bucatînschi A., Câmpeanu E. M., Cojocaru I., Covalschi T., Cuciureanu G., Cujbă R., Dobrescu E., Duca G., Fetiniuc V., Furdui T., Ganea V., Gherasim T., Hâncu V., Hrișcev E., Iliadi G., Luchian I., Maleca I., Meșniță G., Minciună V., Munteanu C., Petrescu P., Pisoschi A., Prodan D., Șușu-Țurcan A., Timuș A., Trofimov V., Ungur C., Vălsan C., etc.

Research and studies in the respective field were developed within the National Institute of Economic Research, the Independent Analytical Center "Expert-Group", which contributed to the foundation of the notions and to the evaluation of the situation in the field of financing the research sector. The work was also based on the studies of international organizations, such as those carried out by the European Commission (EC), the Organization for Economic Cooperation and Development (OECD), the World Economic Forum (WEF), the Center for Finance and Business (KPMG), etc.

The purpose of the work: consists in developing the theoretical and methodological framework for evaluation and financing of the research sector in the Republic of Moldova and identifying recommendations for improvement in this field, taking into account the integration trends in the European research space.

To achieve the proposed goal, the following **objectives** were established: (i) studying and developing theoretical approaches regarding the evaluation and financing of the research sector; (ii) investigating and systematizing the funding mechanisms of the research sector; (iii) analysis of external practices in the field of financing scientific-technological and innovation activities; (iv) evaluation of the current situation of the financing of the research sector in the Republic of Moldova in terms of the resources allocated and the results obtained; (v) developing the methodological aspects of evaluating the budgetary performance of the

financing of the research sector in the Republic of Moldova; (vi) developing the concept of capitalization of scientific results as an evaluation indicator for measuring the efficiency of funding the research sector; (vii) developing some models of interdependence between the funding of the research sector and economic growth factors; (viii) identifying the possibilities of financial support of the research sector in the Republic of Moldova based on alternative financing methods.

Research hypothesis: Adequate and targeted funding of the research sector contributes to increasing scientific efficiency and facilitates the development of areas with the greatest potential for economic impact, having a positive implication on economic growth.

The general research methods focus mainly on theoretical procedures, followed by the presentation of the evolution of the funding of the research sector of the Republic of Moldova. In this sense, a series of scientific methods were applied to ensure a comprehensive and rigorous investigation: the method of scientific abstraction, the launch and testing of a hypothesis, the analysis method, the SWOT analysis, the analogical and comparative method, the statistical and economic-mathematical method, survey method, econometric method, etc.

The important scientific problem solved in that field consists in the scientific and methodological substantiation of the funding of the research sector in the Republic of Moldova, which allowed the development of performance evaluation indicators (methodology) and the establishment of alternative funding mechanisms for this sector, in order to obtain new perspectives regarding the efficiency of research funding, thus contributing to the stimulation of economic growth factors.

The novelty and originality of this research: (i) the development of theoretical and practical approaches regarding the financing of the research sector; (ii) creating a methodological framework regarding the allocation and use of financial resources to support research activities; (iii) analysis of the impact of funding the research sector on economic, social and human development; (iv) the synthesis of practical approaches to funding the research sector at European and national level, from the last decades; (v) conceptualization of the funding mechanism of the research sector; (vi) defining research sector funding instruments; (vii) development of a system of indicators for evaluating the funding of the research sector in the Republic of Moldova; (viii) detailed analysis of financial aspects and public spending in the research sector; (ix) identifying performance and results-based research funding models; (x) developing proposals regarding the diversification of funding sources for institutions active in the research sector.

The theoretical importance of this work consists in substantiating the current concepts related to the evaluation and financing of the research sector, in identifying and structuring the financing models specific to this field, and in supporting the need for the involvement of the Government of the Republic of Moldova through significant investments in research, considering the subsequent positive impact on the stimulation of economic growth factors.

The applicative value consists in the possibility of using the research results, in order to apply in the Republic of Moldova, in the context of European trends, some alternative methods of financing the research sector and some instruments of the financial market. At the same time, the work is valuable by offering the possibility to apply the methodology for evaluating the performance of the funding of the research sector, in particular, the Dashboard, for assessing the situation in the field of research funding. Research results can serve as support in the operational activity of research institutions and econometric models can be applied to evaluate the level of development of the research sector through public funding allocated to this sector. These results are valuable for use in research and in the educational context, being able to be integrated into the academic programs of university bachelor's and master's courses.

Approval of results. The main aspects of the doctoral thesis, the conclusions and the main recommendations, formulated in the thesis, were presented by the author in 15 national and international scientific conferences and symposia, as well as in 12 scientific publications of the author, with a volume of about 5, 8 c.a., of which 5 were published in specialized magazines.

Implementation of scientific results. The most important results of the research, obtained as part of the scientific approach, were accepted for implementation within the Institute of Ecology and Geography of the State University of Moldova, the Republican Association for the Study of the Quaternary Period from Moldova "INQUA-Moldova", being confirmed by acts of implementation.

Thesis structure. The purpose and tasks of this work were the basis of its logical organization, which includes: introduction, three chapters, general conclusions and recommendations, bibliography, appendices, as well as other structural elements, such as the list of abbreviations, annotations in Romanian, English and Russian languages , implementation certificates, etc.

Keywords: research sector, funding of the research sector, public funding, alternative funding methods, investments in research and development, capitalization of scientific results, economic growth.

THE CONTENT OF THE DOCTORAL THESIS

In the first chapter, "Theoretical dimension regarding the financing of the research sector and expressions (need) of evaluation", the author presents a detailed analysis of the main scientific theories used in the evaluation and funding of the research sector. It also provides a synthesis of current approaches, including case studies and examples of good practice from various economies, to illustrate how public and private policies can improve the funding of the research sector. In addition, the chapter conceptualizes and classifies the funding models of the research sector, placing particular emphasis on identifying the most relevant models that are, or could be, applicable in the context of the Republic of Moldova.

Within the field of economic studies, the evaluation of the impact of the funding of the research sector is a topic of particular interest. In the context of the respective paradigms, six economic theories emerge that the author has classified into two categories of primary theories that configure the fundamental approaches to the role of funding in the field of research: (1) theories of economic development and (2) theories of social and human development.

Table no. 1 Economic theories of funding the research sector

Theories of economic development / Promoters		**Theories of social and human development / Promoters**	
The theory of economic growth	*A. Smith, Th. Malthus, D. Ricardo, J.M. Keynes, R. Solow, P. Romer*	Theory of sustainable innovation	*A. Hargadon*
The theory of the economy of knowledge	*F. Machlup, K. Arrow, P. Romer, Foray, R. Atkinson*	Theory of investment in human capital	*G. Becker, L. M. Branscomb, F. Levy și R. J. Murnane*
Theory of positive externalities	*P. Samuelson, H. Etzkowitz, L. Leydesdorff, M Feldman, AN Link, DS Siegel*	Social capital theory	*P. Bourdieu, R. Putnam, J. Coleman*

Source: *Developed by the original author [1, 2, 3, 7, 9, 10, 11, 12, 20, 22, 31].*

A first category of theories addresses the impact of research funding on economic development and national prosperity. These theories explore how investments in research and innovation can stimulate economic growth and competitiveness through the generation and transfer of new knowledge, technological development and the diversification of products and services. *The second* category of theories examines how research funding can support social

and human progress, including: sustainable innovation theory, human capital investment theory, and social capital theory.

The process of public funding of the research sector is an integral part of the budget process, involving the development, approval, implementation and evaluation of the budget by the government. Since 2014, the implementation of a state budget based on programs represented a turning point in the management of the state's financial resources, through the adoption of the Law on Public Finances and Budgetary-Fiscal Responsibility. This marked the transition to program-oriented budgeting, focused on performance and efficiency, optimizing the use of public funds according to program objectives and results.

Research sector funding models are conceptualized as specific ways in which financial and material resources are allocated to support the research sector.

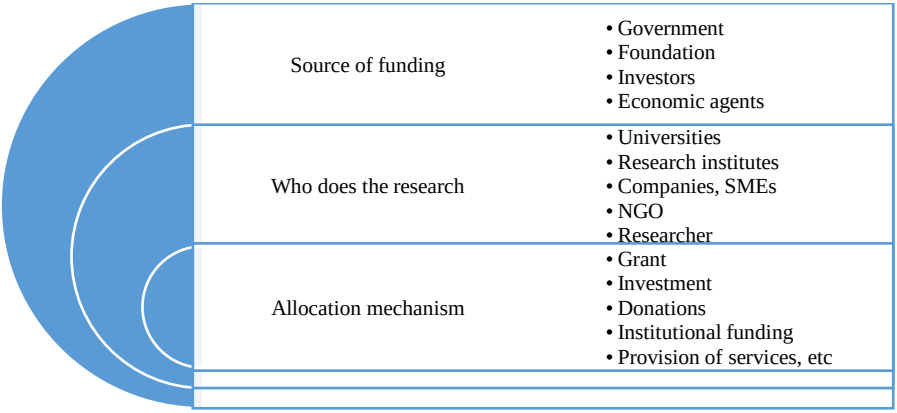


Figure no. 1 Funding models of the research sector
Source: *Developed by the original author [4]*

The classification of funding models of the research sector was carried out by the author on three main dimensions: the source of funding, who conducts the research and the mechanism for allocating funds. Source of funding includes government (supporting public interest research), foundations (addressing social or environmental issues), investors (seeking profit from research results) and economic agents (companies investing in innovation). Entities conducting research range from universities and research institutes to companies, SMEs, NGOs and independent researchers. Funding mechanisms include grants, investments, donations, institutional funding, service delivery and public-private partnerships, all reflecting the need for flexibility and innovation in research funding.

The second chapter "Methodology of scientific research funding assessment in the context of European trends" includes the tools designed by the author to be used in the

evaluation of the research sector. It also provides an analysis of the traditional and alternative methods of financing the research sector adopted in economically developed and neighboring countries. In addition, the chapter engages in a comprehensive assessment of the state of the research sector in the Republic of Moldova through the prism of the resources allocated, but also of the results obtained.

To evaluate the funding of the research sector, the author designed a system of indicators that includes three distinct categories: general indicators, specialized indicators and sectoral indicators. [14, 15, 16, 17, 18, 27, 32] On the Human Development Index (HDI), which measures life expectancy, literacy, education and standard of living, the Republic of Moldova ranks 80th in the world with a score of 0.767 . On the Quality of Life Index (QLI), based on material well-being, life expectancy, job security, political freedom and other variables, the Republic of Moldova has a score of 112.6, below the EU average of 153.

The Global Competitiveness Index (GCI) includes 98 indicators grouped into 12 pillars, where the Republic of Moldova ranks 86th worldwide. The Global Innovation Index (GII), which measures innovation competitiveness through 80 sub-indices, in which the Republic of Moldova ranks 54th worldwide. The Global Knowledge Index (GKI), which tracks performance in seven areas, where the Republic of Moldova ranks 78th worldwide. The global index of attractiveness of venture capital and equity investments (VC&PE), where the Republic of Moldova is in 101st place.

Economic growth is evaluated by: GDP growth which, for the Republic of Moldova in 2021, increased by a rate of 13.9%. Investments (gross fixed capital formation as % of GDP), where the Republic of Moldova had -1.7% in 2021. CD intensity (expenses for CD as % of GDP), where the Republic of Moldova had 0.23%, while the EU average was 2.3%.

To analyze the global spending of the research sector, 5 years (2018-2022) were selected.

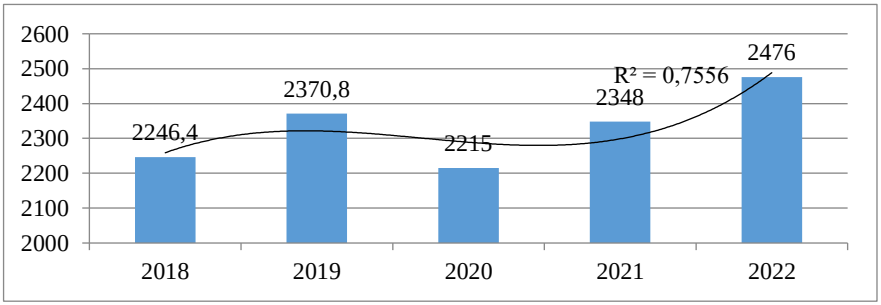


Figure no. 2. Dynamics of global expenses for the research sector during the years 2018-2022, billion. USD

Source: *Developed by the original author [24]*

From figure no. 2. it is observed that the expenses for the research sector at the global level have an upward trend, which formed a polynomial of the 3rd degree. From 2015 to 2022, the expenses for the research sector around the world increased by ≈1 ,1 times. At the same time, there is an average growth rate of ≈102.5% annually.

Research activity represents a major objective for the European Union, both in terms of financial and human effort (it aims to increase the number of researchers, as well as improve their training). Likewise, we mention that the financial resources directed to the research sector have marked changes in structure (funding platforms) and volume. Referring to research expenditures, an important aspect of funding is the share of expenditures in GDP, or CD intensity.

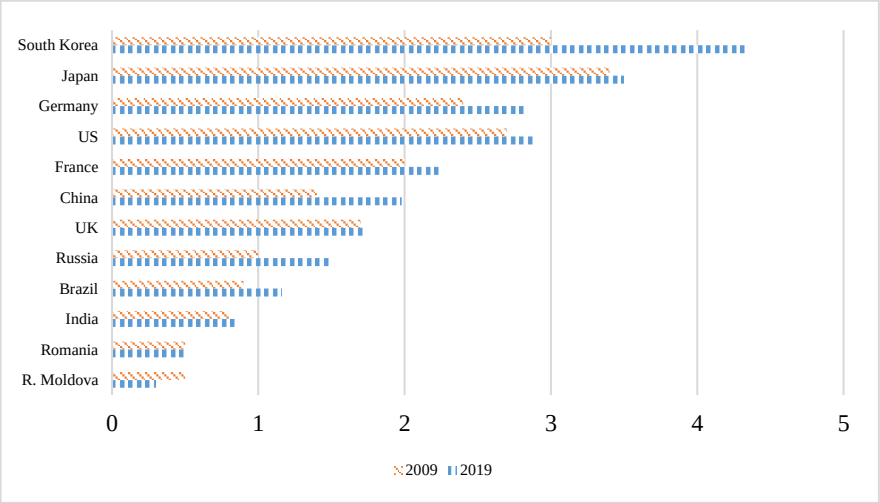


Figure no. 3. Intensity of the research sector in some countries, years 2009, 2019, in %
Source: *Developed by the original author [8]*

The intensity of CD in European countries, in 2019, is on average 2.3% and shows an increase trend compared to 2009 by ≈1.2 times. Romania remains at the same level of 0.5% throughout the analyzed period. However, the Republic of Moldova has the lowest share compared to other European Union and other states, which is only 0.23% of GDP, decreasing compared to 2009, by 0.2 percentage points (≈1.7 times) [30].

EU investments in research and innovation have as their basic objective: improving the quality of life of citizens; increasing the competitiveness of the EU economy; maintaining the position of world leader in RDI spending, which will reach 3% of GDP.

In the top 10 best performing economies in the world, according to the Global Competitiveness Index (GCI), there are 5 EU member states. And in the top 10 best countries

for innovation, according to the Global Innovation Index (GII), there are 7 EU states. These countries, according to the Global Research and Development Report, invest in the environment for science 2% of GDP or 1.3 thousand USD per capita. These performances are due to the domestic policies of these countries, as well as participation in the EU Horizon Framework Program [13]. The EU finances up to 100% of the total eligible costs for research and innovation projects. For scientific excellence, Germany scored the most.

All over the world, especially in European countries, *alternative methods of financing scientific activities* are widely and successfully used, the author considers it opportune to present relevant international practices for the financing of the research sector, such as financing through Venture Capital, Crowdfunding, Business Angels and others, which can also be taken over by our country.

Financing through Venture Capital is part of the European Union's Framework Program on the process of further integration of the EU's capital markets [29]. At the European level, venture capital investments are continuously developing. The volume of venture financing in Europe, according to KPMG's 2023 report, is on the rise until the 4th quarter of 2021. In the 4th quarter of 2022, venture funds constituted about 75.6 million USD, which is about 2 times more much compared to the 4th quarter of 2015.

Crowdfunding is a way of financing some projects using online resources (forums, social media platforms, etc.), which replaces the classic donation system with a reward-type methodology. Financing of this type can be carried out through: investments in equity capital; donations; rewards in the form of bonuses and loans or credits. According to the European Commission's report on crowdfunding, there are 232 platforms for scientific projects in Europe. The leaders in this department are Great Britain, which has 48 platforms, followed by France (with 45 platforms) and Germany (with 30 platforms). In Romania, 5 platforms are active for financing research and innovation projects. In the Republic of Moldova, there is currently only one crowdfunding platform, namely: GUVERN24, which was launched in 2015, the financial sources are exclusively personal donations. According to the destination of the projects launched on the GUVERN24 platform, it can be seen that, for the research sector, 4 projects are launched and financial resources in the amount of 1529 EUR are collected.

Business angels are natural and legal persons who invest their own capital in the development of a business, with the aim of acquiring or subscribing shares or parts of the social capital of the assisted enterprise [19]. During the analyzed period, at the European level,

an average of 29,000 business angels were active. There are 53 business angels in Romania, which have invested EUR 4.7 million. In Ukraine we have 60 business angels with an investment of EUR 12.9 million [33].

In the context of the internationalization of science, new funding opportunities are emerging for participants in the research sector. In addition to the funding from the state budget and the alternative one, a new source of funding for scientific activities is taking shape, which is developing due to the internationalization of the research sector. According to some authors, the Republic of Moldova can benefit as a result of the process of internationalization of science if it orients its own research-development system towards international cooperation [5, 6].

Another external practice of alternative financing of research activities is the percentage designation, a practice that comes from Central and Eastern Europe [21]. In the Republic of Moldova, the normative act that regulates the percentage designation is the Fiscal Code. Starting from 2016, citizens can redirect 2% of the amount of income tax paid to public associations, foundations and private institutions registered in the Republic of Moldova that carry out activities of public utility.

In the context of European trends, our country is facing important opportunities for the development of the science-based economy. The number of organizations carrying out research activity is decreasing and decreased by 29 entities, from 82 in 2015 to 53 in 2022. From the total number of organizations carrying out activity in the research sector on the territory of the Republic of Moldova, 19 are research institutes, which until 2017 were subordinated to the Academy of Sciences of Moldova, and starting from 2018 they came under the management of the Ministry of Education, Culture and Research and later, in 2023, 17 of them were absorbed by institutions of higher education (universities). It is worth noting that there are 13 universities that practice research. Universities contribute to increasing the number of doctors and post-doctoral fellows, which represent the human potential of the research sector.

Scientific human potential is a resource that contributes to the generation of new knowledge and the attraction of vital financial resources for the organization. The total number of employees in the research sector is decreasing and decreased by 1144 employees (2015-2022).

In the analyzed period, there are 3.6 researchers for every 1000 employed population, which is 0.9 researchers per thousand employed population less than the target of the new

research and innovation policies. After the modification of the funding method of the research sector, from 2020, the situation of this indicator improved and reached the value of 3.5 researchers per 1 thousand employed population, at the same time, in 2022 this indicator decreased and reached the value of 3, 3 researchers for every 1000 employed population.

Table no. 2. Dynamics of internal expenses of the research sector, by categories of expenses, during the years 2015-2022, million MDL

Name / Year	2015	2016	2017	2018	2019	2020	2021	2022	Total	The average level	2022/ 2015
Current domestic expenditure	**424,3**	**432,6**	**436,9**	**469,5**	**484,5**	**448,2**	**537,3**	**598,9**	**3832,2**	**479**	**1,4**
share,%	*94,1*	*97,1*	*96,3*	*96,9*	*97,3*	*95,4*	*95,9*	*95,0*	***96,0***	**x**	**1,0**
Remuneration of work	254	243,1	244,3	261,6	291,6	280,1	309,8	344,3	**2228,8**	**278,6**	**1,4**
Mandatory social security contributions and healthcare	66,6	64,1	63,7	68	72,1	69,4	84,3	95,3	**583,6**	**72,9**	**1,4**
Material expenses	68	54,4	63,8	61,8	48,3	40,7	61,1	67,1	**465,1**	**58,1**	**1**
Other current expenses	35,8	71	65,1	78,1	72,5	58	82,1	92,2	**554,8**	**69,3**	**2,6**
Domestic capital expenditure	**26,7**	**12,7**	**17**	**15**	**13,5**	**21,4**	**23,2**	**31,3**	**160,7**	**20,1**	**1,2**
share,%	*5,9*	*2,9*	*3,7*	*3,1*	*2,7*	*4,6*	*4,1*	*5,0*	***4,0***	**x**	**0,8**
Equipment	19,5	9,9	16	13,3	11,5	17,4	18,3	28,1	**134**	**16,8**	**1,4**
Other capital expenditures	7,1	2,8	0,9	1,7	2	4	4,9	3,2	**26,7**	**3,3**	**0,4**
Total	**451**	**445,3**	**453,9**	**484,5**	**498**	**469,6**	**560,5**	**630,2**	**3992,9**	**499,1**	**1,4**
Annual growth rate	**100**	**98,7**	**101,9**	**106,8**	**102,8**	**94,3**	**119,4**	**112,4**	**x**	**104,9**	**x**

Source: *Developed by the author based on the NBS*

The internal expenses of the total research sector (table no. 2.) constituted on average 499.1 million MDL and increased approximately 1.4 times. Internal expenditure from research activity includes current internal expenditure and internal capital expenditure. Current internal expenditure constitutes on average 96% of the total amount of internal expenditure for the research sector.

The current internal expenses for basic research constituted on average 95.7 million MDL (20.1%) and decreased by ≈2.1 times. Current internal expenses for applied research, during the study period, averaged 304.4 million MDL (63.8%) and increased by ≈2.1 times. Internal expenses for technological development amounted to 76.9 million MDL on average (16.1%) and decreased by ≈1.1 times.

The current internal expenses of the research sector are distributed among the following scientific fields: natural sciences (36.2%); engineering sciences and technologies

(19.8%); medical sciences (12.8%); agricultural sciences (15.8%); social sciences (8.3%); and humanities (7.2%).

During the period of 2015-2022, the dynamics of intellectual property titles issued for every 1 million MDL is negative, although there is a slight increase in 2022 compared to 2021, but it does not reach the level of 2015. The level of the Republic of Moldova to the number of patents issued for every 1 million EUR is, on average, 0.02 units, which is much lower compared to the average of the EU states (2.64).

Scientific publications have seen a positive trend, being on average 18.7 thousand publications annually, and the increase is about 2.2 times. Scientific researchers from the Republic of Moldova published an average of 38 publications per 1 million MDL allocated to the research sector. The trend is increasing, and the increase is about 1.9 times, from 24.4 publications per 1 million MDL in 2015, up to 45.4 publications per 1 million MDL in 2022. If we compare the performances researchers from the country at the EU level, then we can state that the Republic of Moldova exceeds the EU average by approx. 5.6 times (0.34).

The SWOT analysis of the research sector in the Republic of Moldova highlighted the fact that research enjoys a favorable framework, supported by solid policies regarding parks and intellectual property, encouraging innovation and collaboration between researchers and the private sector. EU involvement provides advice and funding, strengthening innovation capacity. Collaboration with the diaspora brings diversity and new resources, and modern infrastructure facilitates research. The financial support and expertise provided by investor networks improve the chances of projects' success. However, the sector faces challenges such as lack of transparency in the evaluation of research institutions, suboptimal allocation of funds and inadequate regulations for business involvement. Insufficient funding and low salaries can discourage innovation and retention of young professionals. Poor coordination between government entities and lack of adequate infrastructure for technology transfer and commercialization of research are other important obstacles. These weak points highlight the need for reforms to stimulate a sustainable and efficient development in research in the Republic of Moldova. [25, 26, 27, 28]

To evaluate *the current funding mechanism of the research sector* in the Republic of Moldova, the author developed a questionnaire, in which he included twenty questions. The answers to these questions were provided by 165 experts representing various research institutions. The profile of the surveyed experts was analyzed according to age, gender, position held, scientific degree and period of activity in the field of research. In this study, the

surveyed experts were distributed according to their fields of activity, according to the following percentages: 36.4% (60) specialize in natural sciences, 16.4% (27) in social sciences, 12.7% (21) are involved in medical sciences, engineering sciences and technologies, and agricultural sciences 12.1% (20) each, and 10.3% (17) having activity in the humanities.

The ranking of funding instruments by importance, the experts have done as follows: 1st place – State Program; 2nd place – Institutional; 3rd place – Projects financed by international organizations (OECD, UNDP, etc.); 4th place – Young researchers; 5th place – EU program Horizon Europe.

Starting from 2020, the funding of the research sector has been changed and the main share of the funding falls to the funding from the State Program. Research experts strongly argue that the State Program must remain and continue to be the main source of funding, thus ensuring the necessary stability. And, the good international practices, presented in chapter 2 of the thesis, highlight that the funding of fundamental scientific research is exclusively carried out from institutional budgetary sources.

In the third chapter, "The comprehensive evaluation of the funding of the research sector in the Republic of Moldova in the European context" the methodology for evaluating the performance of the funding of the research sector in accordance with European principles is included. In the same way, the capitalization of scientific results is conceptualized using the evaluation of the scientific efficiency coefficient for research projects in the Republic of Moldova. At the same time, the chapter presents a conceptual platform regarding the correlation between science funding and economic growth factors, in the Republic of Moldova, based on the econometric model. This chapter also presents a series of practical recommendations for improving the funding system of the research sector in the Republic of Moldova.

The author found a gap in the absence of an adequate mechanism for evaluating the performance of public funding in the research sector. Thus, the author proposes the implementation of *a system of indicators that allows the efficient evaluation of the financing of this sector within the budget process*. This system of indicators is designed in accordance with European principles in the field of public finance, thus ensuring a coherent and comparable approach at European level. In table no. 3., we present the system of indicators systematized by the author of the thesis that reflects the diversity and complexity of the funding of the research sector.

Table no. 3. The system of indicators for evaluating the budgetary performance of the research sector in the Republic of Moldova in accordance with European principles

The indicator	Calculation method
IP 1. The degree of correspondence between the funding ceiling of the research sector in CBTM and the State Budget, %	(Funding of the research sector planned in the State Budget / Funding of the research sector planned in CBTM) * 100
IP 2. The ratio of revenues from the research sector to the total revenues of the State Budget, %	(Total revenues executed for the research sector / Total revenues executed in the State Budget) * 100
IP 3. Degree of execution of revenues in the research sector, %	(Total realized revenues for the research sector / Total specified revenues for the research sector) * 100
IP 4. The ratio of expenses in the research sector to the total expenses of the State Budget, %	(Total expenditures executed for the research sector / Total expenditures executed in the State Budget) * 100
IP 5. Degree of execution of expenses in the research sector, %	(Total expenditure executed for the research sector / Total expenditure specified for the research sector) * 100
IP 6. The share of current expenses in the total expenses of the research sector, %	(Current actual research sector expenditure / Total effective research sector expenditure) * 100
IP 7. The share of capital expenditures in the total expenditures of the research sector, %	(Effective capital expenditure for the research sector / Total effective expenditure for the research sector) * 100
IP 8. The share of personnel expenses in the total expenses of the research sector, %	(Effective personnel expenditure for the research sector / Total effective expenditure for the research sector) * 100
IP 9. The share of material expenses in the total expenses of the research sector, %	(Actual expenditure of materials for the research sector / Total effective expenditure for the research sector) * 100
IP 10. The share of other expenses in the total expenses of the research sector, %	(Other actual expenditures for the research sector / Total effective expenditures for the research sector) * 100
IP 11. The share of expenses for fixed assets in the total expenses of the research sector, %	(Effective expenditures for fixed assets / Total effective expenditures for the research sector) * 100
IP 12. Growth rate of public funding for the research sector compared to the previous year, %	[(Public funding executed for the research sector in the current year - Public funding executed for the research sector in the previous year) / Public funding executed for the research sector in the previous year] * 100
IP 13. The share of expenditure on the research sector in relation to GDP, %	(Effective expenditures for the research sector/ GDP) * 100
IP 14. The degree of penetration of scientific fields, %	(Actual expenditure on natural sciences/ GDP) * 100 (Effective spending on engineering sciences and technologies/ GDP) * 100 (Effective spending on medical sciences/ GDP) * 100 (Actual Expenditure on agricultural sciences/ GDP) * 100 (Actual spending on social sciences/ GDP) * 100 (Actual spending on humanities sciences/GDP) * 100

Source: *Developed by the author based on [23]*

The information in the presented table provides a detailed analysis of financial aspects and public expenditure within the research sector. Each indicator is designed to provide a comprehensive view of public funding, revenue and expenditure in the research sector. The

detailed analysis of the indicators in the *Dashboard* of the financing of the research sector in the Republic of Moldova for the year 2023 reveals a complex and varied picture of the state of this strategic field. By means of these indicators, not only quantitative aspects are outlined, but also qualitative trends, reflecting the evolution and dynamics of the research sector in a financial context.

With the implementation of PNCI 2020-2023 in the Republic of Moldova, there is an intensification of attention from the control bodies, especially the audit of the Court of Accounts, on the *capitalization of scientific results*. In this context, scientific results are evaluated to determine if they meet the necessary criteria to be considered capitalizable assets. In order to carry out the process of capitalization of scientific results, the author of the thesis proposes the use of the *scientific efficiency coefficient*, i.e. the average cost per scientific result.

$$C = \frac{\sum I_{PC}}{\sum R_{PC}} \quad (1)$$

where: C – the average cost per scientific result obtained;

I_{PC} – public investments of research projects;

R_{PC} – scientific results of research projects.

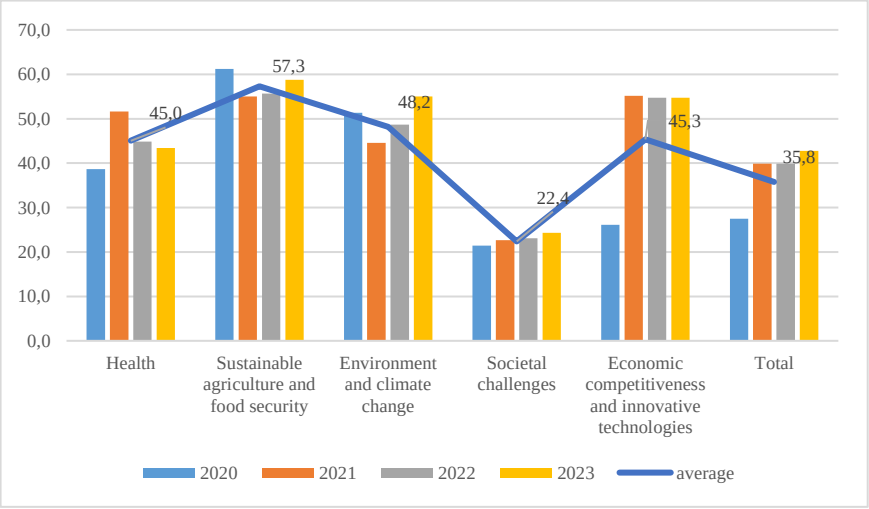


Figure no. 4 Scientific efficiency coefficient on strategic priorities from the State Program (2020-2023), years 2020-2023, thousand MDL

Source: *developed by the author based on ancd.gov.md*

For projects within the State Program (2020-2023), priority: Health, the average cost per scientific result in 2023 is 43.4 thousand MDL. So, the average cost per result for the

strategic priority: Sustainable agriculture and food security, in 2023 was 58.8 thousand MDL, which means 1.7 results for every 100 thousand MDL. In 2023, for the priority: Environment and climate change, the average cost of a scientific result was 55 thousand MDL, or 1.8 scientific results for every 100 thousand MDL invested. Compared to the other strategic priorities, the priority: Societal challenges, in 2023 obtained an average cost for each scientific result of 24.3 thousand MDL or 4.1 results for every 100 thousand MDL invested. A higher average cost compared to the other priorities, 54.7 thousand MDL per result, or a number of 1.8 results for every 100 thousand MDL financed, was found for the priority: Economic competitiveness and innovative technologies, in the year 2023.

In the time interval between 2013 and 2021, natural sciences and engineering sciences and technologies constituted the most significant fields in terms of share in GDP, each representing a share of 0.05% (figure no. 5.).

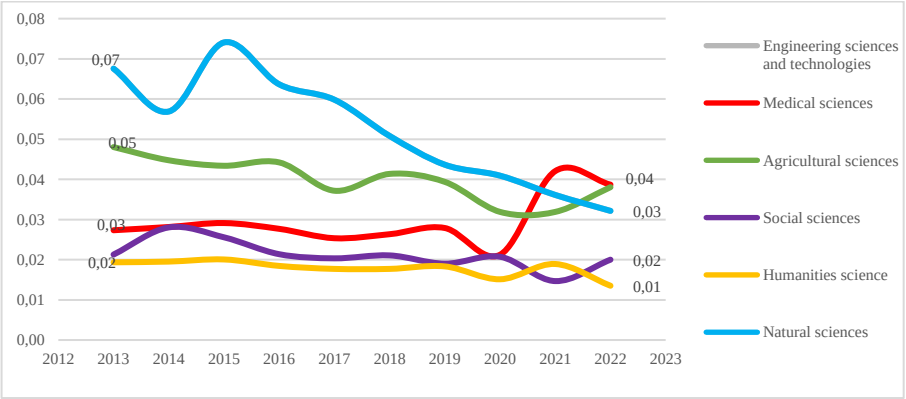


Figure no. 5 Degree of penetration of scientific fields, years 2013-2022, share in GDP, %
Developed by the author based on the NBS

In contrast, the year 2022 saw a paradigm shift, with medical sciences and agricultural sciences emerging as preeminent fields, contributing 0.04% each to GDP. This transformation was influenced by two distinctive factors: the increased emphasis of the state on the medical system, manifested by the allocation of research projects in the wake of the COVID-19 pandemic, and the reduction of the impact of climate change on the agricultural sector.

In accordance with the neo-classical paradigm of economic growth, which postulates that increasing productivity is a generating factor of economic expansion, the author developed an econometric model intended to evaluate *the influence of research sector funding on labor productivity*. The coefficient of determination, with a significant value of 0.96, highlights a notable quality of the model. According to this result, it can be deduced that a 1%

increase in the funding of the research sector corresponds to a proportional increase of 1.7% in labor productivity.

Similar to labor productivity, the author estimated the *impact of the funding of the research sector on investment in fixed assets*, which shows us that a 1% increase in the rate of research funding contributes to a proportional increase of 1.4% in the rate of investment in fixed assets.

To adapt the multiplier to the context of the research sector, the author modified the basic formula for calculating the multiplier by replacing income with GDP and investment with expenditure for the research sector.

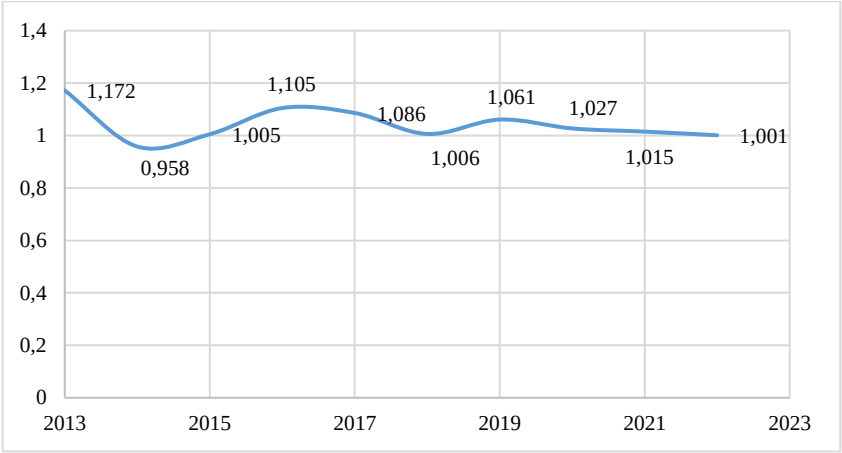


Figure no. 6 Multiplier of domestic expenditures for the research sector, years 2013-2022

Developed by the author based on the NBS

From the analysis of the obtained result, we deduce that, in 2013, the multiplier reached its maximum value (1.172). This phenomenon coincides with the period in which the Academy of Sciences of Moldova (AȘM) benefited from support from the Government of the Republic of Moldova, through the implementation of policies aimed at increasing expenses for scientific research. In contrast, 2014 recorded the lowest value of the multiplier (0.958), in a period marked by the financial crisis, but also by the transition to budgeting based on performance indicators.

The budget allocations, although they constitute the main source of funding for the research sector, prove to be insufficient under the conditions of the state's limited resources and in the context of the new requirements imposed by the integration of the Republic of Moldova into the European Union. For these reasons, research organizations need to identify

alternative funding methods, such as: *international project funding, private funding obtained by attracting private capital and through financial market instruments*.

Table no. 4. Recommendations for improving the financing mechanism of the research sector in the Republic of Moldova based on alternative financing methods

The name of the measure	The benefits
Creation of Funds for Research and Innovation	- the funding provided by the fund can stimulate innovative initiatives; - the funds can be used to improve the technical infrastructure and purchase state-of-the-art equipment; - the funds can be used to support training and professional development programs for the staff of research institutions; - the funding provided by the fund can facilitate collaborations and partnerships between research institutions from the Republic of Moldova and other national or international entities; - the fund can support projects that address social and global issues, such as health, environment, energy or education; - the availability of additional funding and innovative research opportunities can attract and retain talent in the research sector in the Republic of Moldova.
Extension of eligibility for percentage designation from income tax	research institutions would benefit from an additional source of funding, contributing to strengthening the budget of their future research and innovation funds and expanding the capacity to carry out research projects.
Attracting international projects	- international projects often bring significant funding; - collaboration with international partners in research and innovation projects facilitates the exchange of knowledge, technologies and best practices; - participation in international projects increases interaction and collaboration between researchers from the Republic of Moldova and those from other countries; - international projects can provide access to advanced research infrastructure and equipment; - participation in international projects offers researchers and professionals from the Republic of Moldova opportunities to develop their careers; - involvement in successful international projects strengthens the visibility and prestige of the research sector in the Republic of Moldova at the global level; - international projects offer opportunities for establishing sustainable partnerships and collaborations between research institutions from the Republic of Moldova and organizations from other countries.
Implementation of capital market tools, such as: Capital Venture,	*For investors:* - Investment opportunity in innovative projects; - The possibility to contribute to the development of future knowledge and technologies;

Crowdfunding and Business Angels	- Participation in research and innovation projects through financial contributions from the community; - Direct involvement of citizens in supporting research initiatives; - Investments and financial assistance for early stage research projects; - Access to experience and contact networks in the business environment. *For society:* - Development of technologies and innovations that can solve social and economic problems; - Contribution to the development of knowledge and technology. *For research institutions:* - Access to additional financial resources; - Development of human and material resources, improvement of infrastructure and acquisition of advanced research equipment.

Source: Developed by the author

The above highlights the need for urgent measures to improve the funding system of the research sector in the Republic of Moldova, including: increasing the efficiency of financial flows intended for research activities; expanding the degree of coverage of the total financial needs of the sector to meet the requirements of PNCI 2024-2027; the implementation of innovative financing mechanisms; and ensuring the harmonization, consolidation and alignment of financing at the level of the standards of the European Union countries.

GENERAL CONCLUSIONS AND RECOMMENDATIONS

The research carried out in the doctoral thesis led to the formulation of the following **conclusions**:

1.The analysis of the conceptual approaches carried out in the paper showed that the theoretical classification of the impact of research funding highlights two distinct directions: theories of economic development, and social and human ones. This distinction emphasizes the diversity of financial effects on the economy and society, highlighting the importance of a balance between economic and social progress for sustainable development.

2.The analysis of the conceptual approaches carried out in the paper showed that the theoretical classification of the impact of research funding highlights two distinct directions: theories of economic development, and social and human ones. This distinction emphasizes the diversity of financial effects on the economy and society, highlighting the importance of a balance between economic and social progress for sustainable development.

3.The investigation of research funding models demonstrated their influence by the interaction between funding sources and the level of economic development. The classification of these models according to the sources of funding, the actors involved and the mechanisms for allocating financial resources highlights the diversity and complexity of research funding, reflecting the need for an approach adapted to the specifics of each situation.

4.The comparative analysis carried out in the paper demonstrated that, in the context of the most developed economies, innovation and the involvement of the research sector have a significant impact on the growth of the private sector through the implementation of innovations in products and services. The policies and funding opportunities offered by the EU have contributed to increasing the international visibility of some economies, but the neighboring countries, including the Republic of Moldova, have an average level of science funding, requiring the development of priority directions for the national economy.

5.The growth of venture funds in recent years at the European level indicates a positive trend for research funding. However, in the Republic of Moldova, these financing methods are insufficiently known and used, to the detriment of the internationally recognized research potential. It is essential to prudently harness this potential by supporting and developing scientific and innovation organizations.

6.The evaluation of the research sector in our country shows that its activity has made significant progress even if there are financial restrictions. An obvious proof is the exponential increase in patent applications filed, more than four times. However, the number of

intellectual property titles issued at 1 million lei decreased by 20%. Compared to the average of the EU states, the Republic of Moldova registers a substantially lower level in terms of the number of patents issued for every 1 million euros. Researchers from the Republic of Moldova publish an average of 28.7 publications annually per 1 million lei allocated to the research sector, which far exceeds the average of the EU states (4.2 times), a fact that is due to a sharp increase in the requirements for researchers , on the background of modest expenses for the research sector.

7.Funding monitoring in the research sector in the Republic of Moldova can be carried out through a dashboard, developed by the author as part of the thesis, which provides a broad understanding of financial performance and complex trends in this field, providing, at the same time, relevant information for the orientation of public policies and future development strategies.

8.The concept of capitalization of scientific results in accounting is current for evaluating their economic value and integrating them into the assets of the entity's balance sheet, using appropriate accounting principles and standards. The analysis of the scientific efficiency coefficient in research projects shows that the average costs per scientific result vary significantly depending on the research field and the complexity of the project, underlining the need for careful planning and accurate cost estimation to achieve realistic objectives and avoid problems financial during the course of the project.

9.The data obtained from the econometric analysis indicate a significant connection between research sector funding and key drivers of economic growth, especially labor productivity and investment in fixed assets. The coefficient of determination, which recorded significant values in several scenarios, confirms that the model used fits well and suggests that the variables considered have a significant impact on the evolution of labor productivity and investments in fixed assets. These conclusions underline the importance of research funding for economic development, indicating that stimulating investment in this field can have a significant positive effect on the economic and social performance of the republic.

10. The adaptation of the multiplier to the specifics of the research sector highlighted the fact that its fluctuations are influenced by several factors, including government support, the financial context and changes in funding methods. Periods of constant government support for research institutions have led to significant increases in the multiplier, thus underscoring the importance of adequate funding for research progress. On the other hand, financial crises

or changes in funding methods have led to decreases or variations in the multiplier, underlining the need for a stable and consistent public policy to support the research sector.

The results obtained from the theoretical and empirical research carried out in the framework of the doctoral thesis allowed the formulation of the following **recommendations:**

1.We propose the implementation, under the auspices of the Government of the Republic of Moldova, of a regulatory framework intended to facilitate the establishment by public institutions active in the field of research and innovation of their own Funds for Research and Innovation, complementary to their main structures, managed internally. The purpose of these Funds is to promote and support progress in scientific research, innovation and the improvement of the technical infrastructure of the research sector. Funds can pursue various objectives, including stimulating research activity, facilitating the innovative process, increasing competitiveness, developing human and material resources, addressing social and global issues, strengthening collaboration between sectors and promoting scientific and technological excellence. Sources of funding for these Funds may include income from services provided by public law organizations in the field of research and innovation, donations and other sources in accordance with legislation. We recommend the allocation of 20% of the revenues collected by the institutions to these Funds, in order to finance the development of the technical infrastructure.

2.The creation of the regulatory framework, under the auspices of the relevant ministries, regarding the extension of the eligibility for the percentage designation of 2% of the income tax, paid by natural persons, to public research and higher education institutions, which would constitute a significant boost for the development to these entities, giving them increased opportunities in multiple fields. This initiative would support increasing the capacity of the respective institutions to initiate and implement advanced research projects, thus strengthening their contribution to the development of knowledge and innovation.

3.The amendment, by the competent ministries, of the legislative and normative acts that regulate the management of international projects by: simplifying the procedure for exempting international projects, by fully exempting research projects from outside the country from all taxes and fees; aligning the remuneration of researchers from international projects at the level of EU countries. This can create a more attractive environment for global collaboration and attracting international financial resources.

4.The establishment, under the coordination of the non-banking financial regulatory authorities - the National Commission of the Financial Market and relevant ministries, together with public institutions in the field of research and innovation, of a suitable framework for attracting private capital in support of research funding. This involves the development and implementation of a legal framework to facilitate the development of alternative financing methods such as Venture Capital, Crowdfunding and Business Angels. At the same time, the creation of an Investment Fund with Risk Capital is proposed, as well as the diversification and consolidation of funding models for research, by promoting new funding platforms adapted to this purpose.

5.Monitoring, by the relevant bodies, of the system of indicators for evaluating (measurement) the performance of the financing of the research sector in accordance with European principles. This proposal is designed to ensure that financial allocations are managed in accordance with the highest European standards and principles in the field of public finance. Through a continuous evaluation of these indicators, monitoring of the responsibility and efficiency of the use of funds by the research sector will be ensured.

6.In order to maximize the value brought by research to society, public institutions must actively engage in the capitalization of scientific results, using the Scientific Efficiency Coefficient. Therefore, in accordance with the recommendations of the Court of Accounts of the Republic of Moldova, research institutions are involved in a mandatory process of capitalization of scientific results, by transferring the related funding in the accounting records, in the form of intangible/tangible assets associated with these results. The Scientific Efficiency Coefficient represents the average cost per result, which can be accounted for within the research institution, serving as an indispensable metric in evaluating the impact and efficiency of research activities.

7.In order to retain and attract young talents, it is recommended to develop the compensation mechanism, by relevant ministries, to young researchers employed in public research and innovation institutions for support, motivation for employment, and payment of housing rental expenses and of electricity and thermal energy consumption in the first three years of scientific activity. The size of the allowance should be aligned with the allowances received by newcomers in similar sectors: education, culture and health.

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List of scientific publications on the topic of the thesis

1. Articles in scientific journals (5 articles)

1. 1. Articles in foreign magazines (1 article)

1.**RAILEAN, V**. *Diversificarea finanțării sectorului de cercetare din Republica Moldova în contextul internaționalizării științei* În: Revista „Economia Contemporană", nr. 3/2022, ISSN 2537 – 4222. Baze de date: REPEC (Research Papers in Economics); CEEOL (Central and Eastern European Online Library); Disponibil: http://www.revec.ro/article-2022-id-103-vol..7.nr..3-965-diversificarea.finan&.538;arii.sectorului.de.cercetare.din.republica.moldova.in.contextul.interna&.538;ionalizarii.&.536;tiin&.538;ei.html

1.2. Articles in magazines from the National Register of professional magazines Category B (3 articles)

1. **RAILEAN, V**.; TIMUȘ, A. *Metode moderne de finanțare a activităților științifice și tehnologice: practici relevante pentru Republica Moldova*. În: Revista „Economica" nr. 4 (106) 2018, Ed. ASEM. Chișinău, 2018. pp. 60-71. ISSN 1810-9136. Disponibil: https://ibn.idsi.md/sites/default/files/imag_file/60-71.pdf

2. **RAILEAN, V.,** *Diagnosticarea sectorului de cercetare din republica Moldova prin prisma statisticii naționale în domeniul resurselor și rezultatelor*, În Revista „Studia Universitatis Moldaviae", 2022, nr.11(02), ISSN 2587-4446 E-ISSN 2587-4454 p.3-13. Disponibil: https://ibn.idsi.md/ro/vizualizare_articol/167435

3. **RAILEAN, V**.; TIMUȘ, A. *Estimarea costurilor producției științifice rezultate din proiecte din cadrul Programului de Stat (2020-2023) din Republica Moldova* În: Revista „Intellectus" nr. 1/2023, pp. 21-30. ISSN 1810-7079. Disponibil: https://ibn.idsi.md/sites/default/files/imag_file/21-30_12.pdf

1.3. Articles in other national journals (1 article)

1. **RAILEAN, V.,** TIMUȘ, A. *Evolution of research and development expenditure at global, regional and national levels*. În rev. CSEI WORKING PAPER SERIES, Special Issue 16, December 2020, editat în aprilie 2021. pp. 86-93. CZU: 336.531.2:001.89(478+100) Baze de date: DOAJ (Directory of Open Acces Journals); CEEOL (Central and Eastern European Online Library); REPEC (Research Papers in Economics). Disponibil: https://ibn.idsi.md/sites/default/files/imag_file/WP_Issue16_86-93_RAI.pdf

2. Articles in the proceedings of conferences and other scientific events (5 articles)

2.1. Articles in the works of scientific events included in other databases accepted by ANACEC (4 articles)

1. **RAILEAN, V**. *Evaluation aspects of the mechanism of financing of the research sector from Republic of Moldova in the context of european tendencies.* În: Materialele Simpozionului științific internațional al tinerilor cercetători ediția a XVII-a, ASEM, Chișinău, 24-25 aprilie 2019, pp. 64-70, ISBN 978-9975-75-962-5. https://ibn.idsi.md/sites/default/files/imag_file/64-70_3.pdf

2. **RAILEAN, V**. *Analiza cadrului normativ național de reglementare a activităților de cercetare-dezvoltare-inovare în contextul integrării europene.* În: Materialele Conferinței științifice a doctoranzilor Ediția a VIII-a, Volumul I, USDC, Chișinău, 10

iunie 2019, pp. 208-213. ISBN: 978-9975-108-66-9. https://ibn.idsi.md/sites/default/files/imag_file/208-213_4.pdf

3. **RAILEAN, V**.; TIMUȘ, A. *Evaluarea mecanismelor și modelelor de finanțare a activităților științifice, aplicate în țările UE și la nivel mondial.* În: Materialele Conferinței Internaționale Științifico-Practice „Creșterea economică în condițiile globalizării: bunăstare și incluziune socială", ediția a XIV-a, Volumul I, INCE, Chișinău, 10-11 octombrie 2019, pp. 139-146. ISBN 978-9975-3305-6-5. https://ibn.idsi.md/sites/default/files/imag_file/139-146_0.pdf

4. **RAILEAN, V**. *Aspecte teoretice și practice de evaluare a sectorului de cercetare din Republica Moldova.* În: Materialele Conferinței științifice a doctoranzilor Tendințe contemporane ale dezvoltării științei: viziuni ale tinerilor cercetători, Ed. a IX-a, 10 iunie 2020: [în vol. II], USDC, Chișinău, pp. 284-287. ISBN 978-9975-3389-5-0. https://ibn.idsi.md/sites/default/files/imag_file/284-287_9.pdf

2.2. Articles in the works of scientific events included in the Register of materials published on the basis of scientific events organized in the Republic of Moldova (1 article)

1. TIMUȘ, A.**; RAILEAN, V.** *Particularitățile finanțării sectorului de cercetare al Republicii Moldova în contextul integrării europene*. În: Materialele Conferinței internaționale „Performanțe într-o economie competitivă" ediția V, IMI-Nova, Chișinău, 18-19 mai 2018, pp. 80-87, ISBN: 978-9975-3190-3-4

3. Theses of scientific communications (2 theses)

3.1. Theses of scientific communications abroad (1 thesis)

1. ТИМУШ, А.; **РАЙЛЯН, В.;** *Альтернативные инструменты финансирования научно-технической деятельности в Республике Молдова. В:* IV Российская научная интернет-конференция «Проблемы и перспективы развития научно-технологического пространства», 15-19 июня 2020 г, Вологодский научный центр Российской академии наук. В: Проблемы и перспективы развития научно-технологического пространства, сс. 372-376, ISBN 978-5-93299-491-7, Доступер: http://dspace.ince.md/jspui/bitstream/123456789/1610/1/Альтернативные_инструменты_финансирования.pdf

3.2. Theses of scientific communications in the country (1 thesis)

1. **RAILEAN, V**. *Analiza cheltuielilor de cercetare şi dezvoltare din Republica Moldova.* În: Materialele Conferinței "Metodologii contemporane de cercetare şi evaluare, Dept" Chişinău, Moldova, 22-23 aprilie 2021, USM, pp. 197-200. ISBN: 978-9975-159-16-6. Disponibil: https://ibn.idsi.md/sites/default/files/imag_file/p-197-200_0.pdf

The total volume of published author sheets: 5,8 c.a.
Of which, own contribution: 4 c.a.

ADNOTARE

Railean Veronica: „Evaluarea și finanțarea sectorului de cercetare din Republica Moldova în contextul tendințelor europene", teză de doctor în economie, specialitatea 522.01. Finanțe, Chișinău, 2024

Structura tezei: Teza de doctor a fost elaborată în cadrul Universității de Stat din Moldova și include introducere, 3 capitole, concluzii generale și recomandări, bibliografia din 160 de titluri, 19 anexe, 131 pagini de text de bază, 30 de tabele, 25 de figuri și 21 formule. Cercetările sunt reflectate în 12 publicații.

Cuvinte-cheie: sector de cercetare, finanțarea sectorului de cercetare, finanțare publică, metode alternative de finanțare, investiții în cercetare-dezvoltare, capitalizarea rezultatelor științifice, creștere economică.

Scopul lucrării: dezvoltarea cadrului teoretic și metodologic de evaluare și finanțare a sectorului de cercetare din Republica Moldova și identificarea unor recomandări de îmbunătățire în acest domeniu ținând cont de tendințele de integrare în spațiul european de cercetare.

Obiectivele cercetării: (i) studierea și dezvoltarea abordărilor teoretice privind evaluarea și finanțarea sectorului de cercetare; (ii) investigarea și sistematizarea mecanismelor de finanțare a sectorului de cercetare; (iii) analiza practicilor externe în domeniul finanțării activităților științifico-tehnologice și de inovare; (iv) evaluarea situației actuale a finanțării sectorului de cercetare din Republica Moldova prin prisma resurselor alocate și a rezultatelor obținute; (v) dezvoltarea aspectelor metodologice de evaluare a performanței bugetare a finanțării sectorului de cercetare din Republica Moldova; (vi) dezvoltarea conceptului de capitalizare a rezultatelor științifice ca indicator de evaluare pentru măsurarea eficienței finanțării sectorului de cercetare; (vii) elaborarea unor modele de interdependență dintre finanțarea sectorului de cercetare și factorii de creștere economică; (viii) identificarea posibilităților de susținere financiară a sectorului de cercetare din Republica Moldova în baza metodelor alternative de finanțare.

Noutatea și originalitatea științifică: (i) dezvoltarea abordărilor teoretice și practice privind finanțarea sectorului de cercetare; (ii) crearea unui cadru metodologic privind alocarea și utilizarea resurselor financiare pentru susținerea activităților de cercetare; (iii) analiza impactului finanțării sectorului de cercetare asupra dezvoltării economice, sociale și umane; (iv) sinteza abordărilor practice ale finanțării sectorului de cercetare la nivel european și național, din ultimele decenii; (v) conceptualizarea mecanismului de finanțare a sectorului de cercetare; (vi) definirea instrumentelor de finanțare a sectorului de cercetare; (vii) elaborarea unui sistem de indicatori de evaluare a finanțării sectorului de cercetare din Republica Moldova; (viii) analiza detaliată a aspectelor financiare și a cheltuielilor publice în cadrul sectorului de cercetare; (ix) identificarea modelelor de finanțare a cercetării bazate pe performanță și rezultate; (x) elaborarea propunerilor privind diversificarea surselor de finanțare pentru instituțiile ce activează în sectorul de cercetare.

Semnificația teoretică a acestei lucrări constă în fundamentarea conceptelor actuale referitoare la evaluarea și finanțarea sectorului de cercetare, în identificarea și structurarea modelelor de finanțare specifice acestui domeniu, și în susținerea necesității implicării Guvernului Republicii Moldova prin investiții semnificative în cercetare, având în vedere impactul pozitiv ulterior asupra stimulării factorilor de creștere economică. Concluziile și recomandările formulate pot influența dezvoltarea unor noi perspective privind finanțarea cercetării, contribuind astfel la creșterea economiei și a progresului social.

Valoarea aplicativă constă în posibilitatea de a utiliza rezultatele cercetării, în vederea aplicării în Republica Moldova, în contextul tendințelor europene, a unor metode alternative de finanțare a sectorului de cercetare și a unor instrumente ale pieței financiare. Totodată, lucrarea este valoroasă prin oferirea posibilității de a aplica metodologia de evaluare a performanței finanțării sectorului de cercetare, în special, a Tabelului de Bord, pentru aprecierea situației în domeniul finanțării cercetării. Rezultatele cercetării pot servi drept suport în activitatea operațională a instituțiilor de cercetare și pot fi aplicate modelele econometrice pentru evaluarea nivelului de dezvoltare a sectorului de cercetare prin intermediul finanțării publice alocate acestui sector. Aceste rezultate sunt valoroase pentru utilizare în cercetare și în contextul educațional, putând fi integrate în programele academice ale cursurilor de licență și masterat universitar.

Implementarea rezultatelor științifice: Cele mai importante rezultate ale cercetării, elaborate în teză, au fost acceptate spre implementare în cadrul Institutului de Ecologie și Geografie al Universității de Stat din Moldova, Asociației Republicane pentru Studierea Perioadei Cuaternare din Moldova „INQUA-Moldova", fiind confirmate prin acte de implementare.

ANNOTATION

Railean Veronica: "Evaluation and financing of the research sector in the Republic of Moldova in the context of European trends", PhD thesis in economics, specialty 522.01. Finance, Chisinau, 2024

Thesis structure: The thesis was developed within the State University of Moldova and includes introduction, 3 chapters, general conclusions and recommendations, bibliography of 160 titles, 19 appendices, 131 pages of basic text, 30 tables, 25 figures and 21 formulas. Research is reflected in 12 publications.

Key-words: research sector, funding of the research sector, public funding, alternative funding methods, investment in research and development, capitalization of scientific results, economic growth.

The thesis goal: the development of the theoretical and methodological framework for the evaluation and financing of the research sector in the Republic of Moldova and the identification of recommendations for improvement in this field, taking into account the integration trends in the European research area.

The objectives of the thesis: (i) studying and developing theoretical approaches regarding the evaluation and financing of the research sector; (ii) investigating and systematizing the funding mechanisms of the research sector; (iii) analysis of external practices in the field of financing scientific-technological and innovation activities; (iv) evaluation of the current situation of the financing of the research sector in the Republic of Moldova in terms of the resources allocated and the results obtained; (v) developing the methodological aspects of evaluating the budgetary performance of the financing of the research sector in the Republic of Moldova; (vi) developing the concept of capitalization of scientific results as an evaluation indicator for measuring the efficiency of funding the research sector; (vii) developing some models of interdependence between the funding of the research sector and economic growth factors; (viii) identifying the possibilities of financial support of the research sector in the Republic of Moldova based on alternative financing methods.

Scientific novelty and originality consists in the detailed approach to the research sector, in the in-depth analysis of theoretical approaches regarding the optimization of the management of resources allocated to the financing of research projects, and also in the identification of innovative mechanisms for evaluating the research sector in the Republic of Moldova.

The results obtained that contribute to the solution of the important scientific problem: (i) the development of theoretical and practical approaches regarding the financing of the research sector; (ii) creating a methodological framework regarding the allocation and use of financial resources to support research activities; (iii) analysis of the impact of funding the research sector on economic, social and human development; (iv) the synthesis of practical approaches to funding the research sector at European and national level, from the last decades; (v) conceptualization of the funding mechanism of the research sector; (vi) defining research sector funding instruments; (vii) developing a system of indicators for evaluating the funding of the research sector in the Republic of Moldova; (viii) detailed analysis of financial aspects and public spending in the research sector; (ix) identifying performance and results-based research funding models; (x) developing proposals regarding the diversification of funding sources for institutions active in the research sector.

The theoretical significance of this work consists in foundation the current concepts related to the evaluation and financing of the research sector, in identifying and structuring the financing models specific to this field, and in supporting the need for the involvement of the Government of the Republic of Moldova through significant investments in research, considering the subsequent positive impact on the stimulation of economic growth factors. The conclusions and recommendations formulated can influence the development of new perspectives on research funding, thus contributing to the growth of the economy and social progress.

The applicative value consists in the possibility of using the research results, in order to apply in the Republic of Moldova, in the context of European trends, some alternative methods of financing the research sector and some instruments of the financial market. At the same time, the work is valuable by offering the possibility to apply the methodology for evaluating the performance of the funding of the research sector, in particular, the Dashboard, for assessing the situation in the field of research funding. Research results can serve as support in the operational activity of research institutions and econometric models can be applied to evaluate the level of development of the research sector through public funding allocated to this sector. These results are valuable for use in research and in the educational context, being able to be integrated into the academic programs of university undergraduate and master's courses.

Implementation of scientific results: The most important results of the research, elaborated in the thesis, were accepted for implementation within the Institute of Ecology and Geography of the State University of Moldova, the Republican Association for the Study of the Quaternary Period from Moldova "INQUA-Moldova", being confirmed by implementation documents.

АННОТАЦИЯ

Райлян Вероника: «Оценка и финансирование исследовательского сектора в Республике Молдова в контексте европейских тенденций», кандидатская диссертация по экономике, специальность 522.01. Финансы, Кишинев, 2024

Структура диссертации: Докторская диссертация была разработана в Государственном Университете Молдовы и включает введение, 3 главы, общие выводы и рекомендации, библиографию из 160 наименований, 19 приложений, 131 страниц основного текста, 30 таблиц, 25 рисунков и 21 формул. Исследования отражены в 12 публикациях.

Ключевые слова: исследовательский сектор, финансирование исследовательского сектора, государственное финансирование, альтернативные методы финансирования, инвестиции в исследования, капитализация научных результатов, экономический рост.

Цель исследования: разработка теоретической и методологической основы оценки и финансирования исследовательского сектора в Республике Молдова и определение рекомендаций по совершенствованию в этой области с учетом интеграционных тенденций в европейском исследовательском пространстве.

Задачи исследования: (i) изучение и разработка теоретических подходов к оценке и финансированию исследовательского сектора; (ii) исследование и систематизация механизмов финансирования исследовательского сектора; (iii) анализ внешней практики в сфере финансирования научно-технологической и инновационной деятельности; (iv) оценка текущей ситуации с финансированием исследовательского сектора в Республике Молдова с точки зрения выделенных ресурсов и полученных результатов; (v) разработка методологических аспектов оценки бюджетных показателей финансирования научно-исследовательского сектора в Республике Молдова; (vi) разработка концепции капитализации научных результатов как оценочного показателя эффективности финансирования исследовательского сектора; (vii) разработка некоторых моделей взаимозависимости между финансированием исследовательского сектора и факторами экономического роста; (viii) определение возможностей финансовой поддержки исследовательского сектора в Республике Молдова на основе альтернативных методов финансирования.

Научная новизна и оригинальность (i) развитие теоретических и практических подходов к финансированию исследовательского сектора; (ii) создание методологической основы распределения и использования финансовых ресурсов для поддержки исследовательской деятельности; (iii) анализ влияния финансирования исследовательского сектора на экономическое, социальное и человеческое развитие; (iv) синтез практических подходов к финансированию исследовательского сектора на европейском и национальном уровне за последние десятилетия; (v) концептуализация механизма финансирования исследовательского сектора; (vi) определение инструментов финансирования исследовательского сектора; (vii) разработка системы показателей для оценки финансирования исследовательского сектора в Республике Молдова; (viii) подробный анализ финансовых аспектов и государственных расходов в исследовательском секторе; (ix) определение моделей финансирования исследований, ориентированных на результативность и результаты; (x) разработка предложений по диверсификации источников финансирования учреждений, работающих в исследовательском секторе.

Теоретическая значимость и прикладная ценность диссертации заключается в обосновании существующих концепций, связанных с оценкой и финансированием исследовательского сектора, в выявлении и структурировании моделей финансирования, специфичных для этой области, а также в поддержке необходимости участия Правительства Республики Молдове за счет значительных инвестиций в исследования, учитывая последующее положительное влияние на стимулирование факторов экономического роста. Сформулированные выводы и рекомендации могут повлиять на развитие новых взглядов на финансирование исследований, способствуя тем самым росту экономики и социальному прогрессу.

Прикладная ценность заключается в возможности использования результатов исследования для применения в Республике Молдова, в контексте европейских тенденций, некоторых альтернативных методов финансирования исследовательского сектора и некоторых инструментов финансового рынка. В то же время работа ценна тем, что предлагает возможность применить методологию оценки эффективности финансирования исследовательского сектора, в частности Dashboard, для оценки ситуации в сфере финансирования научных исследований. Результаты исследований могут служить поддержкой в оперативной деятельности исследовательских учреждений, а эконометрические модели могут применяться для оценки уровня развития исследовательского сектора за счет государственного финансирования, выделяемого этому сектору. Эти результаты ценны для использования в научных исследованиях и в образовательном контексте, поскольку могут быть интегрированы в академические программы университетских курсов бакалавриата и магистратуры.

Внедрение научных результатов: Наиболее важные результаты исследования, изложенные в диссертации, приняты к внедрению в Институте экологии и географии Государственного Университета Молдовы, Республиканской ассоциации по изучению четвертичного периода Молдовы». INQUA-Moldova», подтверждаемая исполнительными актами.

RAILEAN VERONICA

EVALUATION AND FINANCING OF THE RESEARCH SECTOR IN THE REPUBLIC OF MOLDOVA IN THE CONTEXT OF EUROPEAN TRENDS

522.01 FINANCE

ABSTRACT

of the doctoral thesis in Economic Sciences

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