Міжнародний симпозіум «Оцінювання результатів наукових досліджень у сучасних реаліях: еволюція підходів у когнітивному, соціально-економічному та управлінському аспектах» (28 листопада, 2024, Київ, Україна)

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SCIENCE ADMINISTRATION AND RESEARCH EVALUATION IN MOLDOVA

The article discusses the issue of research projects evaluation in Moldova and features evolvement of the government administration system in the science and innovation field. A detailed description of the reforms in R&D administration in the 1990s (after Moldova acquired independence), as well as in 2004 and 2017 is given. It is highlighted that the National Agency for Research and Development (NARD) was created in 2018 as the central administrative body under the Government of the Republic of Moldova. NARD is the successor of the rights and obligations of the Centre for International Projects, the Agency for Innovation and Technology Transfer and the Agency for Research and Development, i.e. the state institutions that were previously part of the Academy of Sciences of Moldova (ASM). The status and administrative functions of ASM have significantly changed. NARD is responsible for the implementation of research and innovation policy, EU Framework Programme for Research, Innovation Horizon 2020 and other European programs, as well as for the coordination of the Moldovan Office for Science and Technology in Brussels. Extensive statistical and factual data on organization and performance of the Moldovan research and innovation system is provided: the evolution of the domestic research management system throughout 1990—2016, R&D funding in 1996—2023 and the structure of R&D expenditure in 2023, participation of domestic research institutions in EU projects in 2007—2015, evaluation criteria for research projects, innovation projects, tech-

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nology transfer projects, and innovation vouchers, research papers published by domestic authors in 2000—2016, procedures for project funding and evaluation of reports on project implementation (until 2018, 2019—2023, after 2024), researchers' publications in Scopus journals in 2004—2023. The importance of the participation of Moldovan researchers in European support programs and international cooperation is emphasized. Changes in the functions of organizations responsible for accreditation and certification of institutions after 2017 are described.

Keywords: *evaluation, research projects, research and innovation system, Academy of Sciences of Moldova, National Agency for Research and Development, National Council for Accreditation and Attestation.*

Introduction. Before the disintegration of the Soviet Union, by the end of 1980s the Academy of Sciences of Moldova (ASM) had been the main research & innovation (R&I) centre of Moldova, incorporating 31 organizations, including 21 research institutes. The ASM staff had exceeded 5,000, including more than 1,300 researchers, while the total personnel in the Moldovan R&I system, including those in research institutions and universities, had been around 30,000, with more than 2,000 doctors of sciences and nearly 600 doctors habilitat.

Significant changes occurred in ASM after the proclamation of sovereignty (June 23, 1990) and independence (August 27, 1991) of the Republic of Moldova, leading to the consolidation of the autonomy of ASM. It became a true republican R&I forum due to the development of the legislative and normative framework on science and innovation, along with the reorganization of R&D management. The institutional and functional autonomy of research institutions also increased. The cooperation with European and global scientific community acquired a dynamic character. However, economic transformations of the last decade of the 20th century led to destructive phenomena both in the real sector of the national economy and in the spheres of social, cultural and spiritual life. The R&D sector faced problems like degradation of infrastructure, brain drain, and shrinking numbers of young specialists. As a result, the number of researchers in the domestic R&D plummeted, although the number of scientific publications, including in renowned international journals, increased, especially due to the intensification of international cooperation.

The evolution of R&I system in Moldova in these years saw different phases. It was administered by a number of government departments and institutions, including the Ministry of Economy, the Ministry of Education, and a specialized department in the government. A new stage in the development of ASM and the R&D sector as a whole began in 2004 with the adoption by the Parliament of a new law entitled "The Code on Science and Innovation of the Republic of Moldova". The responsibility for elaborating and imple-

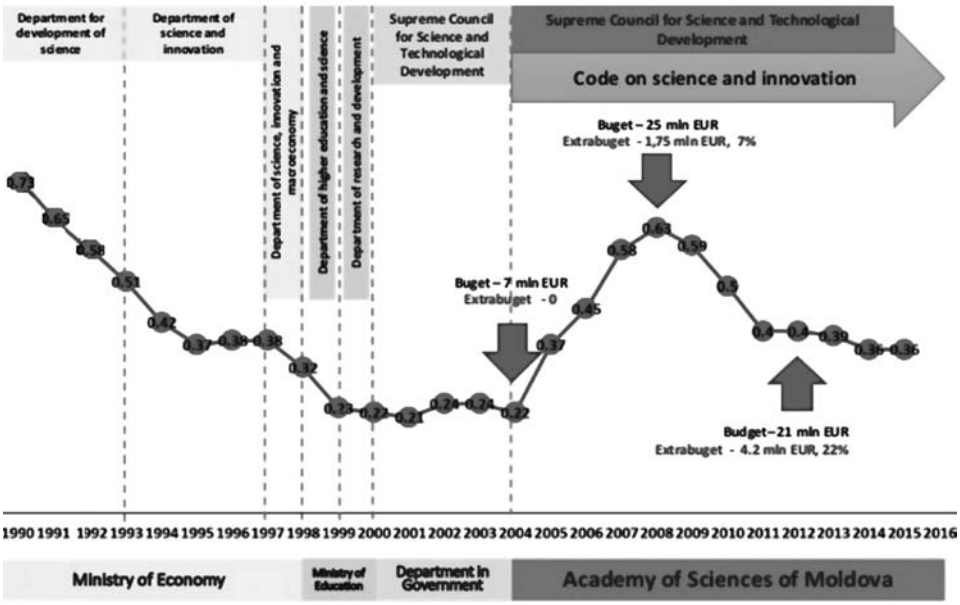

Fig. 1. The evolution of research management system in the Republic of Moldova
Source: Academy of Sciences of Moldova. Official website. URL: https://asm.md/en/about (last accessed: 25.10.2024); Code of Science and Innovation of the Republic of Moldova No. 259-XV of July 15, 2004. URL: https://www.wipo.int/wipolex/en/legislation/details/9803 (last accessed: 25.10.2024); National Agency for Research and Development. Official website. URL: https://ancd.gov.md/en/content/nard (last accessed: 25.10.2024); Republic of Moldova. Official website. Science. URL : https://moldova.md/en/content/science (last accessed: 25.10.2024).

menting the government science and innovation policy was delegated under this law to ASM. This law enabled for a substantial increase in R&I financing from the state budget, creating premises for improving technological and research infrastructures in research institutions and universities in parallel with working conditions and remuneration of researchers, whose average salary increased by 1.5—2 times.

The reform made the ASM Assembly the supreme governing body of ASM, while the 17-member Supreme Council for Science and Technological Development became the executive body of the Assembly. The Assembly elected the Supreme Council for Science and Technological Development for four years. It included representatives from ASM, research institutions, universities, and the State Agency for Intellectual Property. The reform could consolidate the scientific community and interactions between domestic research institutions and universities.

At that time, ASM comprised six Sections of Sciences: Economical and Mathematical; Biological, Chemical and Ecological; Physical and Engineer-

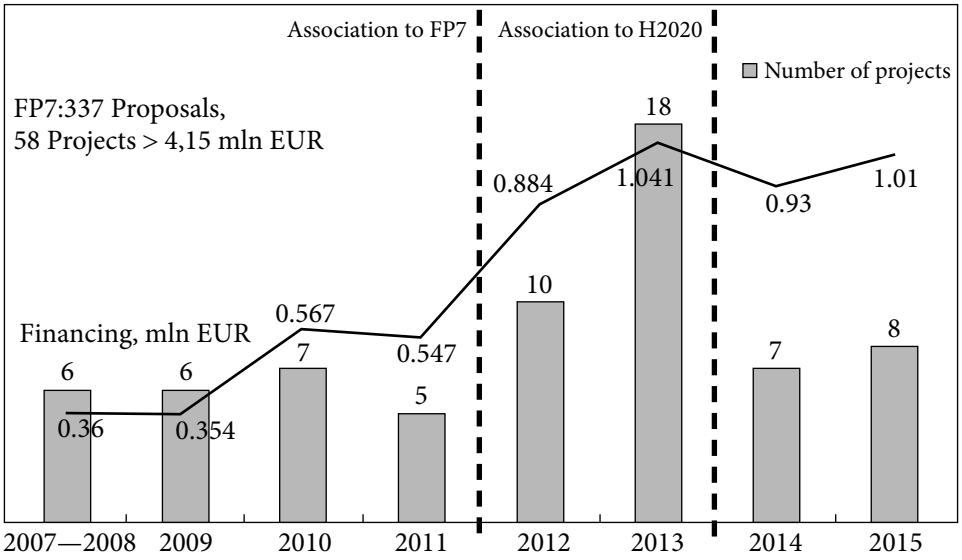

Fig. 2. The dynamics of participation of the research institutions from the Republic of Moldova in EU Projects
Source: Horizon Europe. URL: https://horizoneurope.md/ro/most (last accessed: 25.10.2024).

ing; Medical; Agricultural; Humanities and Arts. Several types of R&D institutes were related to ASM with the status of institutional members, profile members, and affiliated members. Three auxiliary organizations were linked to ASM: the Agency for Innovation and Technology Transfer (responsible for the funding and implementation of the respective type of projects); the Centre for International Projects (coordinating the implementation of international projects); and the Public Institution Agency for Development and Research (funding and implementing national projects financed from the public budget).

The outcome of the reform launched in 2004. The structure and organization of ASM evolved over time, so that in 2017 it comprised six Sections of Sciences: Natural and Exact; Medical; Agricultural; Engineering and Technological; Social and Economic; and Humanities and Arts. 51 accredited institutional, profile, and affiliated members were linked to ASM at that time, including research institutions and universities subordinated to the Ministry of Education, Ministry of Health and Ministry of Agriculture.

After the reform of 2004 until 2017 ASM performed R&I management functions through the Supreme Council for Science and Technological Development. The evolution of this management over 1990—2017 is illustrated in Fig. 1.

A peer review assessment of the Moldova's R&I system was performed from November 2015 till April 2016. The panel of international experts in-

cluded five independent experts from Poland, Austria, Greece, Netherlands and Romania acting in their personal capacity and two peer reviewers as policy-makers from Austria and Estonia. The panel acknowledged the relevant contribution of ASM as the leading research institution in Moldova in preserving a valuable research capacity in the country [1]. A major focus area of the ASM effort was consolidating the scientific community and developing skills required for success in national and international R&D projects. At national level, the ASM goal was to reinforce domestic R&D facilities; at international level, the main objective of this effort was to step up integration into the European Research Area.

ASM played a key role in the association of Moldova to the EU's Seventh Research Framework Programme (FP7) through signing the Memorandum of Understanding for the association in October 11, 2011, and the association to the Horizon 2020 EU Programme in July 01, 2014. The participation of research institutions and universities in the FP7 is shown in Fig. 2.

In the Horizon 2020 Programme, there were 130 project applications until 2016 from 186 applicants (68 from research institutions, 56 from universities, 27 from small and medium enterprises, 19 from non-government organizations (NGOs), 16 from other types of institutions). The European Commission accepted 15 projects with the EU contribution of € 1.94 million. The Republic of Moldova became one of the most active participants of the H2020 Programme among the Eastern Partnership states.

ASM supported internationalization of Moldovan R&D within and beyond EU. Several bilateral funding schemes have been established with e.g. Romania and Russia. ASM set up cooperation through 41 agreements with international research and research funding entities, mostly in the European Research Area. Also, ASM enabled for participation of Moldova in EU activities on the better coordination of national R&I programs, including ERA-NETs and JPIs (e.g. WaterWorks). Due to the efficient international cooperation, the number of publications in international journals was constantly increasing since 2004 and on, as shown in Fig. 3.

Despite the tricky environment, some Moldovan research institutes achieved an international scientific record in their research areas, including the *Institute of Applied Physics*, the *Institute of Electronic Engineering and Nanotechnologies*, and the *Institute of Chemistry*. Positive developments occurred in 2007 with the Law on Science and Technology Parks, and Innovation In-

[1] Peer Review of the Moldovan Research and Innovation system. European Commission Directorate-General for Research & Innovation Directorate A — Policy Development and Coordination Unit A4 — Analysis and monitoring of national research policies. URL: https://projects.research-and-innovation.ec.europa.eu/sites/default/files/rio/report/Moldova-PSF_PR-KIAX16004ENNOP.pdf (last accessed: 25.10.2024).

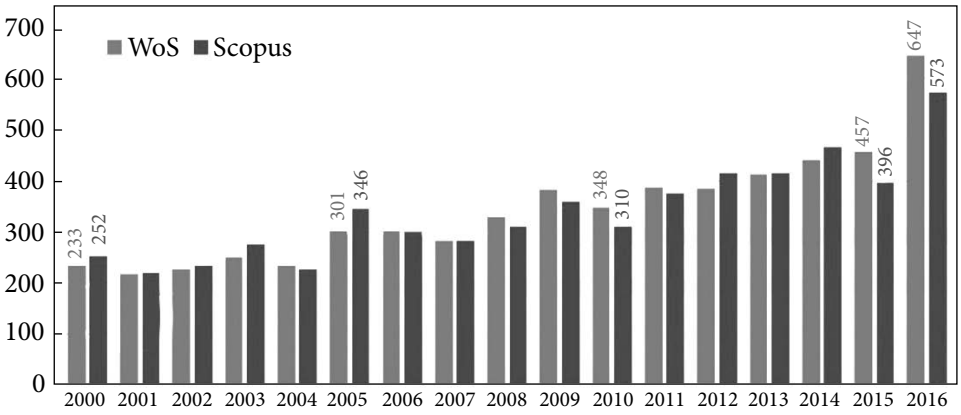

Fig. 3. Research papers published by authors from the Republic of Moldova
Source: Academy of Sciences of Moldova. Official website. URL: https://asm.md/en/about (last accessed: 25.10.2024).

cubators. As a result, science and technology parks, as well as seven innovation incubators became operational in 2014 with 33 companies gaining a resident status.

Institutions responsible for accreditation and attestation. While ASM and the auxiliary institutions were responsible for implementation and evaluation of research projects until 2017, the National Council for Accreditation and Attestation (CNAA) was responsible for accreditation of research organizations located in Moldova, and attestation of research and teaching staff (with conferring relevant degrees and titles). CNAA was created in 2004 in accordance with Code on Science and Innovation by expanding the powers and increasing the staff of the Superior Commission of Attestation (CSA) established in 1992 with the aim of creating and coordinating an integrated system for training and certification of research and teaching staff in the Republic of Moldova. CNAA included two commissions, whose members were permanent employees of other organizations (research, education or public administration). The commissions were led by the two vice-presidents of CNAA and included:

• The accreditation commission for organizations in science and innovation field: six members of ASM, proposed by its President, six members representing higher education institutions, proposed by the government, and four representatives of the government;

• The research and teaching staff attestation commission: eight members of ASM, proposed by its President and eight members representing higher education institutions, proposed by the government.

The accreditation conducted by CNAA was highly relevant for institutions seeking to become eligible for public R&I funding. Accreditation was

granted for a period of up to five years. Under the Code on Science and Innovation all research organizations accredited by CNAA become members of ASM. They were divided into three groups: institutional, profile, and affiliated members of ASM.

In 2010—2014, most organizations underwent the second evaluation and accreditation procedure. However, according to a recommendation of the panel performing peer reviews assessment of the Moldova national R&I system, it was suggested that the accreditation process for eligibility for public research funding should be abolished since it constituted an artificial administrative barrier for research actors and especially for business sector and NGOs.

Other implementing agencies outside the ASM structure were:

• The State Agency on Intellectual Property of the Republic of Moldova (AGEPI), responsible for the protection of intellectual property, and

• The National Environmental Fund (FEN), managing dedicated research funding under the Ministry of Environment.

CNAA was abolished in 2018, with its functions transferred to the National Agency for Quality Assurance in Education and Research (ANACEC), a successor of the National Agency for Quality Assurance in Professional Education (ANACIP) created previously in 2014 as a legal public body, responsible for quality assurance in education and research. The ANACEC Department of Research and Innovation Evaluation (DECI) consists of two sections: Section for attestation of research and teaching staff and habilitation of doctoral supervisors, and Section for evaluation of research and innovation organizations.

In spite of several attempts to elaborate a comprehensive evaluation methodology, the final document is yet to be approved, and the evaluation of research and innovation organizations has not been performed so far, except for a partial evaluation of institutes incorporated in universities.

Evaluation of the research projects performed by the Academy of Sciences of Moldova after the reform of 2017. The recommendation of the panel performing peer reviews assessment of the Moldova national R&I system in 2016 to abolish the accreditation process of research organizations in Moldova performed by CNAA was one of the measures proposed as part of a fundamental reorganization (reform) of the R&I system suggested by the Panel. The ideology of this reform was opposite to the reform launched in 2004 by the adoption of the Code on Science and Innovation. While the reform of 2004 aimed at centralization of ASM functions, turning ASM into the main policy-making institution on a par with a ministry of science, the reform of 2017 focused on decentralization. As a result of this reform, ASM should lose many of its R&I management functions. In fact, the reform followed an even worse scenario: ASM was deprived of its research institutions, even though this measure had not been suggested by the peer reviews panel. Most of the research institutions were transferred from ASM to the Ministry

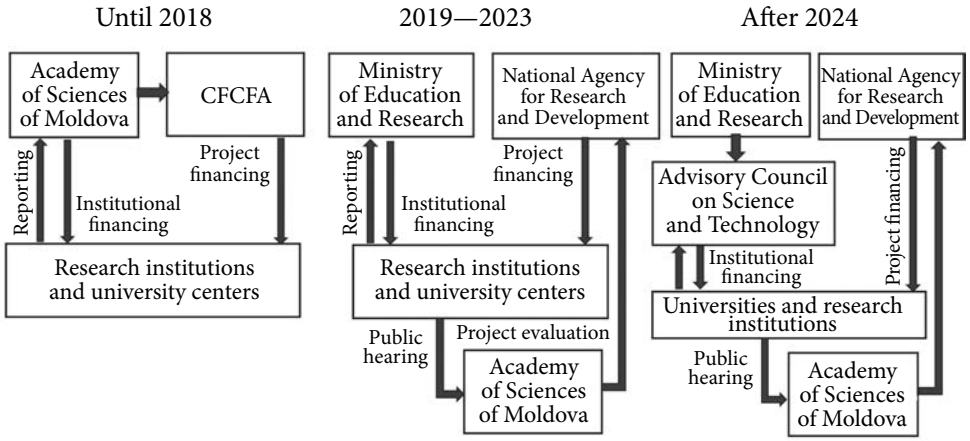

Fig. 4. Funding and reporting on research projects
Source: Code of Science and Innovation of the Republic of Moldova No. 259-XV of July 15, 2004. URL: https://www.wipo.int/wipolex/en/legislation/details/9803 (last accessed: 25.10.2024). National Agency for Research and Development. Official website. URL: https://ancd.gov.md/en/content/nard (last accessed: 25.10.2024). Republic of Moldova. Official website. Science. https://moldova.md/en/content/science (last accessed: 25.10.2024).

of Education and Research in 2018. However, just four years later, in 2022, this step was found to be bad, and the research institutions were transferred to universities with the loss of the legal entity status. Another recommendation of the panel was to establish an independent R&I agency under a ministry(ies) with dual functions: an advisory body for R&I policy-making and an executive body responsible for R&I evaluation and funding. These activities should include publishing calls for R&I proposals, evaluation of proposals, and project funding and monitoring.

The National Agency for Research and Development (NARD), founded in 2018 as a central administrative authority under the Government of the Republic of Moldova, was a legal successor of the Centre of International Projects, the Agency for Innovation and Technology Transfer and the Agency for Research and Development, public institutions previously under ASM. NARD is responsible for the implementation of the national policy on research, development and innovation, the EU Framework Programme for Research and Innovation Horizon 2020, other European programmes, and for the coordination of Moldovan Office for Science and Technology in Brussels (MOST)[2]. While NARD is responsible for the evaluation of project proposals, their funding and monitoring, it does not evaluate the outcomes of pro-

[2] Government of Republic of Moldova. National Agency for Research and Development. URL: https://ancd.gov.md/en/content/nard (last accessed: 25.10.2024).

ject implementation. This function is performed by ASM. The evolution of funding and evaluation of reports on project implementation is illustrated in a chart of Fig. 4.

Table 1. **Evaluation criteria by project type**

Project type	Project in the State Program	Bi/ multilateral	For young researchers	Stimulation of excellence in research	Resilience of the country in crisis situations	Mitigating the impact of the *Covid*-19 pandemic
Evaluation criterion	Criterion weight	Criterion weight	Criterion weight	Criterion weight	Criterion weight	Criterion weight
Extent of reaching goal and objectives	0.4	0.4	0.4	0.4	0.4	0.3
Dissemination of results (publications, conferences, exhibitions, patents, etc.)	0.3	0.3	0.3	0.3	0.3	0.2
Socio-economic value of results	0.2	0.2	0.2	0.2	0.2	0.2
Collaboration with co-partner organizations or other domestic or foreign organizations	—	0.2	0.1	0.1	—	—
Involvement of young researchers, preparation of doctoral theses	0.1	0.1	—	—	0.1	0.1
Contribution to the resolution of the crisis situation and the resilience of the problem addressed	—	—	—	—	0.2	—
Effectiveness of the technology (methodology) in diminution of the *Covid*-19 impact	—	—	—	—	—	0.1
Implementation of results in *Covid*-19 impact diminution	—	—	—	—	—	0.1
Maximum total score	30	30	30	30	30	30

Source: National Agency for Research and Development. URL: https://ancd.gov.md/en (last accessed: 25.10.2024).

Until 2018, ASM via the Supreme Council for Science and Technological Development was responsible for institutional financing of research institutions, while the Center for Fundamental and Applied Research Funding (CFCFA) administered the research projects through the evaluation and monitoring of project proposals from research institutions and universities. The reports on financed projects were evaluated by scientific councils of research institutions and universities with the participation of experts from ASM Sections of Sciences. Most of these projects were institutional projects. The share of public research funding allocated through institutional projects increased from 67 % in 2010 to 75 % in 2014.

In 2019—2023, when most of the research institutions were subordinated to the Ministry of Education and Research (MER), their institutional financing was performed by MER, while the research projects were financed and monitored by NARD as described above. Similar to the period until 2018, most of the research projects were institutional ones, but they were called State Program Projects, because they were funded by the State Programs in 2018—2019, and by the National Program on Research and Innovation in 2020—2023. The reports on the projects funded by NARD were evaluated by ASM in a public hearing organized by ASM Sections of Sciences.

Since 2024, the institutional projects have been funded by the MER via a newly created Advisory Council of Science and Technology as sub-programs of the National Program on Research and Innovation in 2024—2027, with other types of projects funded by NARD. The reports on the projects funded by NARD are further evaluated by ASM in a public hearing. The reports on sub-programs are expected to be evaluated by ASM, and the evaluation procedures are currently under elaboration.

Public hearings for the evaluation of reports on research and innovation projects at ASM are organized according to the regulation on public hearings approved by NARD in coordination with ASM in 2018. Under this regula-

Table 2. **The evaluation criteria for innovation projects, technology transfer projects and innovation vouchers**

Evaluation criterion	Extent of reaching the goal and objectives	Functionality of the technology / product / service	Socio-economic value of results	Availability of the infrastructure for project continuation	Collaboration with co-partner organizations	Results dissemination
Criterion weight	0.3	0.3	0.2	0.1	0.05	0.05

Source: National Agency for Research and Development. URL: https://ancd.gov.md/en (last accessed: 25.10.2024).

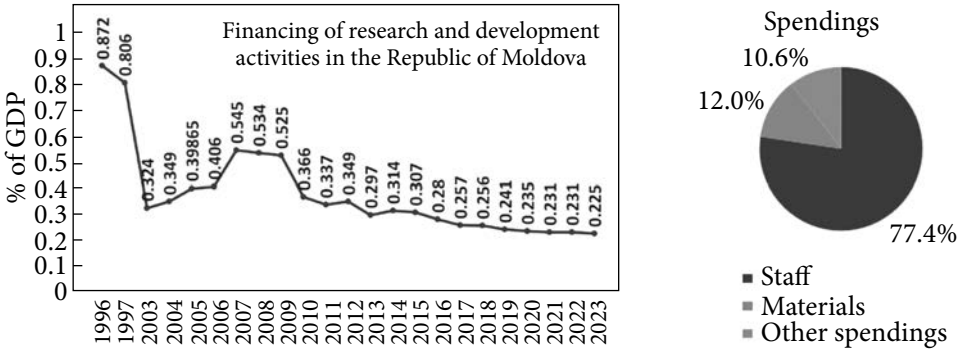

Fig. 5. R&D financing in the Republic of Moldova and the structure of expenditures in 2023
Source: National Agency for Research and Development. URL: https://ancd.gov.md/en (last accessed: 25.10.2024).

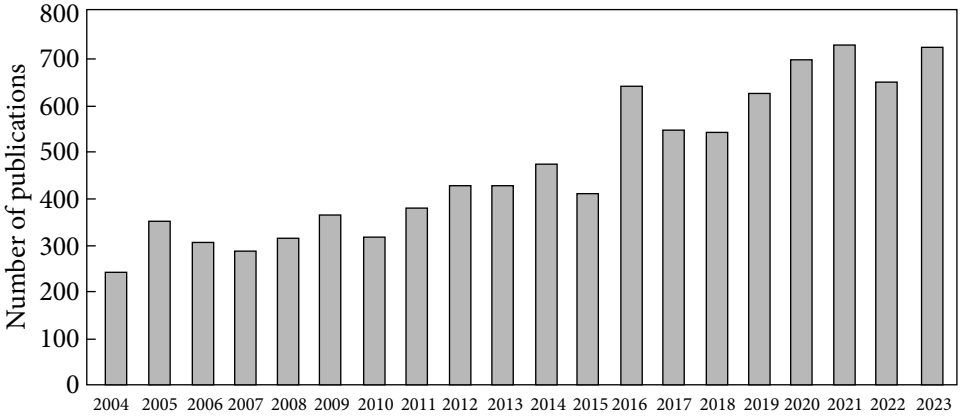

Fig. 6. Number of Moldovan researchers' publications in Scopus journals in 2004—2023
Source: Scimago. URL: https://www.scimagojr.com/countrysearch.php?country=MD (last accessed: 25.10.2024).

tion, each project report is to be submitted to at least two reviewers, and then discussed at a meeting of an ASM Section of Sciences. The evaluation sheets submitted to reviewers contain various criteria depending on a project type, as shown in Table 1.

Each evaluation criterion has its own weight depending on its importance for a specific type of projects. The experts have to evaluate each criterion by 0 to 5 scores: 0 — lack of information; 1 — insufficient information; 2 — unsatisfactory; 3 — satisfactory; 4 — good; and 5 — very good. Also, they are supposed to give a convincing argumentation for each score for every criterion, and to formulate a conclusion. The total score of evaluation is counted by Excel and normalized to a maximum of 30 points. Depending on the obtained final score, the overall evaluation of the report is as follows: very

good ($26 \leq p \leq 30$), good ($22 \leq p < 26$), satisfactory ($18 \leq p < 22$), unsatisfactory ($p < 18$). The passing scale is 18 points.

The evaluation criteria for innovation projects, technology transfer projects and innovation vouchers are presented in Table 2. These types of projects are evaluated by a special mixed commission created by NARD and ASM.

In 2023, NARD coordinated management and financing of 166 research projects within the National Programme of Research and Development on five strategic priorities: health (40 projects); sustainable agriculture, food security and safety (25); environment and climate change (27); societal challenges (45); economic competitiveness and innovation technologies (29).

Apart from the above mentioned, the public hearings have evaluated the following projects at ASM: bilateral and multilateral projects (17); technology transfer projects (6); open science call projects (7). The public hearings procedure is as follows: project reports are presented by project managers, each project is discussed, and results of the discussion, with account to the expert evaluation, lay grounds for a decision on the final evaluation grade of a project and the recommendation on further funding of the project by NARD. After that, ASM Sections of Sciences prepare recommendations on each project to be submitted to NARD for further actions. Information about public hearings containing a project abstract and recommendation prepared by Sections of Sciences is available on ASM website[3].

The evolution of R&D funding in the Republic of Moldova in 1996—2023 is shown in Fig. 5. A downfall in funding in 1990s was followed by an increase once the reform of R&I system was launched in 2004. The funding peak, occurred in 2007—2009, was followed by a continuous decrease unabated even after a new reform of the Moldovan R&I system launched in 2017.

This trend in R&D funding had implications for the R&I system performance reflected in the data on publication activity of Moldovan researchers, shown in Fig. 6. The R&I system performed well after the reform of 2004, with the number of publications being up until 2016. This can be considered as an indication on the favourable character of the reform, which is not the case for the reform of 2017. The stagnating number of publications after 2016 could be attributed to the inertia of the system, and the things can get even worse if adequate measures are not taken.

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[3] Academy of Sciences of Moldova. URL: https://www.asm.md/audierile-publice (last accessed: 25.10.2024).

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УПРАВЛІННЯ НАУКОЮ ТА ОЦІНЮВАННЯ НАУКОВОЇ ДІЯЛЬНОСТІ У МОЛДОВІ

У статті розглянуто питання оцінювання наукових проєктів у Молдові та особливості розвитку системи державного управління наукою та інноваціями. Наведено докладний опис реформи управління науковою системою в 1990-х рр. (після здобуття Молдовою незалежності), а також у 2004 та 2017 рр. Наголошено, що у 2018 р. створено Національне агентство з досліджень та розробок (НАДР) як центральний адміністративний орган при Уряді Республіки Молдова. НАДР є правонаступником прав і обов'язків Центру міжнародних проєктів, Агентства з інновацій та трансферу технологій та Агентства з досліджень і розробок, тобто державних установ, які раніше входили до складу Академії наук Молдови (АНМ). Суттєво змінилися статус та управлінські функції АНМ. НАДР відповідає за реалізацію наукової та інноваційної політики, Рамкової програми ЄС з досліджень, Програми «Горизонт 2020» та інших європейських програм, а також за координацію роботи молдавського Бюро з питань науки і технологій в Брюсселі. Надано докладні статистичні та фактологічні дані про організацію та діяльність науково-інноваційної системи Молдови: еволюцію національної системи управління наукою впродовж 1990—2016 рр., фінансування досліджень і розробок (ДР) у 1996—2023 рр. і структура витрат на ДР у 2023 р., участь молдавських науковців у проєктах ЄС у 2007—2015 рр., критерії оцінювання наукових проєктів, інноваційних проєктів, проєктів передачі технологій, інноваційних проєктів, наукові статті, надруковані молдавськими авторами у 2000—2016 рр., процедури фінансування проєктів і оцінювання звітів про виконання проєктів (до 2018 р., 2019—2023 рр., після 2024 р.), наукові публікації в журналах, включених до бази даних Scopus, у 2004—2023 рр. Підкреслено важливість участі молдавських дослідників у європейських програмах підтримки та міжнародної співпраці. Охарактеризовано зміни у функціях організацій, відповідальних за акредитацію та сертифікацію установ, після 2017 року.

Ключові слова: *оцінювання, наукові проєкти, науково-інноваційна система, Академія наук Молдови, Національне агентство з досліджень і розробок, Національна рада з акредитації та атестації.*