

R&D POLICY IN THE REPUBLIC OF MOLDOVA AND SMART SPECIALISATION APPROACH: CONVERGENCE OR PARALLELISM?

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Smart Specialisation is a strategic approach to economic development through targeted support to research and innovation. It is a key element in the 'Innovation Union' flagship initiative of the Europe 2020 agenda for smart, sustainable and inclusive growth. The paper is focused on analysis (especially through desk-review and observations) of the existing R&D framework in our country, to see to what extent science policy can lead to smart specialization in the Republic of Moldova. As a result, we have formulated five major challenges for convergence of the national R&D system to smart specialization.

Key words: *smart specialization, R&D framework, science policy, innovation, regional development, structural challenges.*

Specializarea inteligentă reprezintă o abordare strategică a dezvoltării economice prin sprijinirea specifică a cercetării și inovării. Ea este un element-cheie în cadrul inițiativei emblematice „O Uniune a inovării” aflată pe agenda Europa 2020 pentru creștere inteligentă, durabilă și favorabilă incluziunii. În articol este analizat (în special prin desk-review și observații) cadrul existent de cercetare-dezvoltare în țara noastră, pentru a vedea în ce măsură politica științei poate conduce la o specializare inteligentă în Republica Moldova. Drept rezultat, sunt formulate 5 provocări majore pentru asigurarea convergenței dintre sistemul național de cercetare-dezvoltare și conceptual de specializarea inteligentă.

Cuvinte-cheie: *specializare inteligentă, cadru de cercetare-dezvoltare, politica științei, inovare, dezvoltare regională, provocări structurale.*

Разумная специализация является стратегическим подходом к экономическому развитию путем адресной поддержки научных исследований и инноваций. Она является ключевым элементом флагманской инициативы «Инновационный союз», включенной в Стратегию Европа-2020 для разумного, устойчивого и всеобъемлющего роста. В статье анализируются (используя в первую очередь аналитический обзор и наблюдения) существующие условия для осуществления научных исследований и разработок в нашей стране, чтобы понять, в какой мере научная политика может привести к разумной специализации в Республике Молдова. В результате, были сформулированы пять главных вызовов для обеспечения конвергенции национальной научной политики и концепта разумной специализации.

Ключевые слова: *разумная специализация, научные исследования и разработки, научная политика, инновации, региональное развитие, структурные вызовы.*

JEL Classification: *O30, O34, O38, O39.*

Introduction. Smart Specialisation (S3) is a strategic approach to economic development through targeted support to research and innovation, which implies concentrating resources on key priorities based on the economic potential of region or county rather than spreading efforts and investments too thinly. Smart Specialisation involves a process of developing a vision, identifying competitive advantages through an entrepreneurial process of discovery, setting strategic priorities and making use of smart policies to maximise the knowledge-based development potential of region or country [9]. Europa 2020 agenda sets out, through the 'Innovation Union' flagship initiative, a comprehensive innovation strategy to enhance Europe's capacity to deliver smart, sustainable and inclusive growth [5]. It highlights the concept of Smart Specialisation as a way to achieve these goals. Moldova as an associated country to the EU should strive to implement this approach. In this context, we analysed to what extent the current R&D framework fits smart specialization.

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General national framework. Moldova is a country in Transition to an efficiency-based economy [6] oriented towards European integration. In 2014 major progress was achieved in Moldova's rapprochement with the EU. EU is the biggest trade partner. Critical to achieving Moldova's development priorities, and to deeper political association and economic integration with the EU, are considered improved governance, stronger public administration, independent judiciary and strengthened rule of law. On the other hand, Moldova is a small country with:

- 12% uncontrolled territory (breakaway region Transnistria),
- the lowest GDP per capita in Europe - \$ 2,234 in 2014. The GDP is in absolute figures quite low and depends highly on remittances from Moldovans abroad (26,1% of the GDP) [2].
- with about 30% of the labour force, Moldova's emigrant population is in relative terms among the largest in the world. However, remittances are expected to decline [2].
- The political situation has become fairly unstable in the last years (three governments within a year). Corruption is an important problem for the country and has worsened in recent years: Moldova ranks 103th of 168 in the last Corruption Perceptions Index, for 2015.

Agriculture remains a mainstay of the economy and a major income source for the bottom 40% of the population, although agricultural output is volatile and low market competitiveness is a key bottleneck [13].

Strategic framework for R&I. Moldova's R&I strategic vision is described in the Innovation Strategy and the R&D Strategy, which contain some elements of a more strategic, coherent and integrated framework for promoting R&I. However even if some elements of smart specialisation approach were used in R&D and Innovation strategies (ex., SWOT analysis), they are not set regional / thematic specialisations. The strategies do not meet the requirements of S3 strategies (ex., stakeholders (entrepreneurs, universities) being poorly involved in developing Innovation Strategy. In the case of the R&D Strategy is mentioned that was made a foresight exercise, but stated objectives are not complemented always with appropriate measures. From the thematic point of view, the Strategies cannot be considered as specialisation strategies. The need to use smart specialisation approach is still poorly acknowledged.

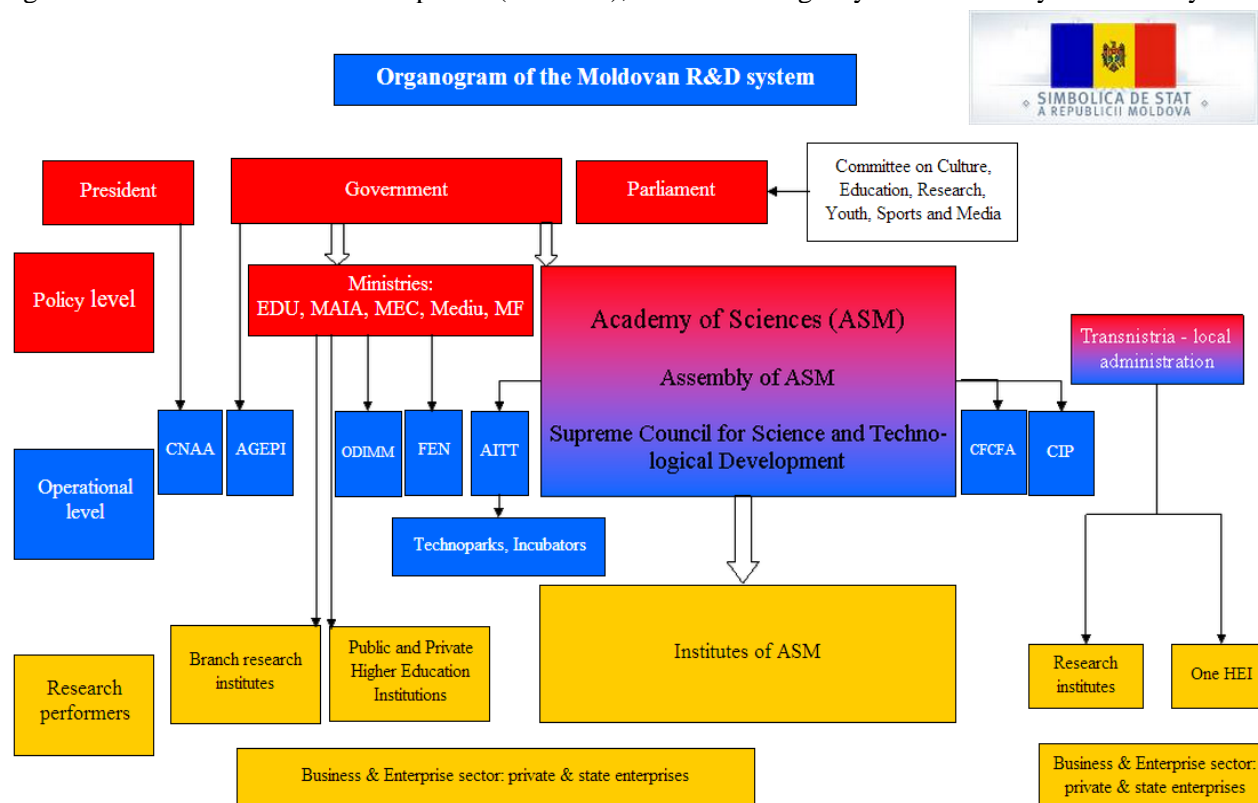
From the *thematic* point of views, In R&D Strategy the six societal challenges of Horizon-2020 are mentioned as priorities [12]. Five strategic directions of science and innovation for 2013-2020 are approved by Parliament [11]. The R&I strategies contains an explicit orientation towards addressing major societal challenges. But, the declared strategic or priority directions are so broadly formulated that enframe any scientific or technological activity. The well-defined science and technology areas (niches) to focus financial efforts are missing. This makes difficult orientation of R&D towards supporting competitive area of economy or to encourage the pursuit of technological specialisations. Strategic priorities formulated in loose terms coupled with insufficient detailing of priorities during calls for proposals cannot ensure the concentration of resources in the best R&D areas.

At *regional level*, there is a great difference in the R&D governance and activities between the capital Chisinau, which is inhabited by 21% of the country's population and generates approximately 50% of the GDP, and the rest of the country's territory. The share of R&D personnel outside the Chisinau of the overall Moldovan R&D personnel was 5.2% [10]. In the last period it was developed a framework for regional, but this framework includes insufficiently innovation and smart specialisation aspects.. Meantime, these support tools are not used for funding R&D and innovation activities. Moreover, documents relating to R&I poorly take into account social, economic and territorial disparities: local authorities have some rights in R&D policy, but there is no specific regional approach to the design or implementation of research policy and there are no special regional bodies for R&D development.

The current structure of the R&I system is based on the Code on science and innovation of 2004 [1]. The Academy of Sciences is a key player (fig.1): the main policy-making institution and fulfilling the role of a ministry of science (the president of ASM is a member of the government). Through the annual partnership agreement between the Moldovan Academy of Sciences (ASM) the government, the government has delegated the competence to carry out the state policy in the field of science and innovation to ASM.

At the operational level, the ASM is also the main policy implementation body. It is a research and innovation funding agency, the main research performing organisation in the country, and it takes also care of higher education in the frame of its own university. Nearly all public R&D and innovation funding programmes are managed by the ASM through its subordinated management bodies. Important implementing agencies outside the ASM structure are: the National Council for Accreditation and

Attestation (CNAA) accredits research organisations in Moldova, which is relevant for institutions wanting to become eligible for public R&D funding; the State Agency on Intellectual Property of the Republic of Moldova (AGEPI), which takes care of protection of intellectual property and the Organisation for SME sector development (ODIMM), which is the agency of the Ministry of Economy.



Abbreviations:

AGEPI - State Agency on Intellectual Property of the Republic of Moldova
 CNAA - National Council for Accreditation and Attestation
 CFCFA - Center for Fundamental and Applied Research Funding
 CIP - Center of International Projects

AITT - Agency for Innovation and Technology Transfer
 FEN - National Environmental Fund
 ODIMM - Organization for Small and Medium Enterprises Sector Development
 HEI - Higher Education Institution

EDU - Ministry of Education
 MAIA - Ministry of Agriculture and Food Industry
 MEC - Ministry of Economy
 Mediu - Ministry of Environment
 MF - Ministry of Finance

Fig. 1. Structure of the national R&D system

Source: Elaborated by author [2].

Moldova's R&D and innovation system is centralised and has a rather academic character. This is a stable framework for promoting R&I policies for over 10 years, which clearly defines roles in the design and implementation of actions. It ensures the autonomy of research community, the current model being seen as „protection” against frequent political changes. It also give the possibility of pro-science lobby by the president of ASM as he is a member of the government. However, the current model of governance does not ensure the involvement of all relevant stakeholders (for ex., the private sector is not represented in Assembly or Supreme Council). The low level of participation of the private sector in the governance, and in innovation activity in general, means that the ASM has only limited feedback from companies on the effectiveness and relevance of its activities and policies.

R&D policy is weakly linked with other relevant policies for innovation and the mix of these policies is not yet sufficiently geared towards fostering innovation and strengthening the knowledge base. There is an obvious risk that such an innovation system is not very efficient and slow to respond to emerging topics. The R&I have practically no role in the national development objectives identified in strategic planning documents. It is difficult to effectively manage conflicts of interest in conditions of concentration at the Academy of policy formulation and priority setting, as well as policy implementation and evaluation. Inefficiency of governance model is mentioned in international (OECD, UNESCO, EECA Policy mix) and national (Expert Group, Court of Auditors) reports.

R&I Funding. The national R&D system is chronically underfinanced (only 0,35% of GDP). The understanding of the importance of R&D as a basis for increasing of the competitiveness of the economy and for lowering the dependence of the country on remittances is rather low in the society. Low funding of R&D is caused largely by reduced involvement of other sectors, especially of the BES. Accurate data on funding from BES are missing. Modest investments of the business sector in R&D are determined largely by the structure of the economy and distribution of the FDI stock in Moldova which are not encouraging for R&D performing activities. The industry is focused on trading and low-tech products. Low costs continue to be the main source of competitiveness.

The government sector dominates the performance of R&D; most of the resources (70.0%) are spent within the ASM and branch institutes of ministries. The universities performs around 10% of research. Theoretically, all university teachers must carry out R&D, but usually the staff is overwhelmed with teaching duties and only a few conduct substantial research. The business-enterprise sector performs 20%, but no clear picture of research performance in this sector is available.

Government R&D funding is allocated mainly in the form of grants. The main funding instrument is so-called Institutional projects, which allocate in a semi-competitive mode more than 70% of public funds. It is used for allocating basic funding to research institutions. Under the current legal framework this funding instrument is implemented on a competitive basis, through calls for proposals and submission of projects proposals. In practice this scheme is not competitive. Proposals do not compete with each other and the funding amounts are more or less pre-defined. The share of competitive funding schemes varies within 10-15%. The low level of truly competitive funding leads to a certain conservation of structures. It will therefore be important to increase the share of competitive funding, to focus more on strengthening available excellent competencies, to focus on national priorities and on future oriented emerging priorities. The trend in the last years was of increasing the share of institutional funding at the expense of other funding instruments.

Distribution of public R&D funding on thematic priorities. Most finances are allocated to Innovative materials, technologies and products and Biotechnology (fig. 2). In spite of these thematic priorities, most measures of R&D policy in the Republic of Moldova are generic and the procedures are identical for funding instruments, evaluation, monitoring, and reporting for all thematic priorities. Only the State Programms for R&D are thematically focused. However, the topics in the programmes are kept rather broadly and the government funding allocated to this measure is modest. The financing of R&D programs decreased in the past five years more than 3 times, reaching €0.2m in 2014 [10], which represents only 1.1% of public funding for R&D in Moldova.

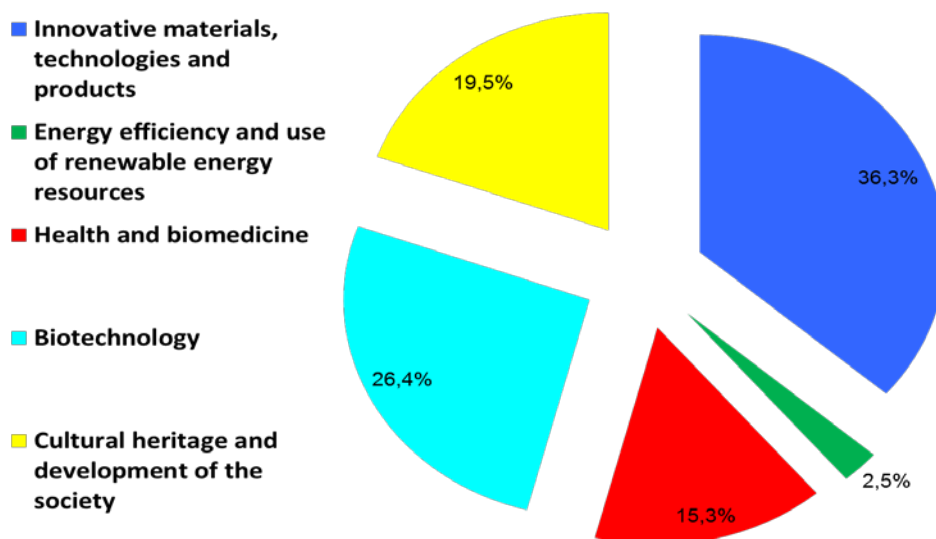


Fig. 2. Distribution of public R&D funding on thematic priorities in 2014

Source: Elaborated by author based on [10].

Concluding on financing framework, the strengths are as follows:

- Current legal framework provides distribution of R&D public funding on a competitive basis;
- Variety of financial instruments that address different objectives of science policy;

- International collaboration was intensified and financing from abroad plays an important role (more than 10%).
The main bottlenecks of financing framework are:
 - The distribution of public funds follows more a bottom-up approach (reflecting the interests of researchers), that in my opinion contributes to a weak integration of R&D into innovation system;
 - The assessment of institutions and its ranking by the CNAA is not taken into account in the distribution of institutional funding although institutions are classified in three categories A, B and C;
 - The design of the support schemes do not stimulate research within private companies;
 - The grants schemes practically do not provide R&D funds to private companies (because they are not accredited).
 - The efficiency schemes to attract R&D investments from business private sector are missing.

The mode of distribution of public funding is not stimulating for greater private sector investments. Modest investments of the business sector in R&D are determined largely by the structure of the economy and by the distribution of the FDI stock in Moldova which are not encouraging for R&D performing activities. The industry is focused on trading and low-tech products. Low costs continue to be the main source of competitiveness. Innovation in the industry and in services is based mostly on foreign equipment and technology acquisitions instead in-house technological solutions, since few Moldovan enterprises have any innovative departments.

Human resources. Some negatives trends are recorded on human resources: decreasing of the number of researchers (up to 3315, in 2014), ageing average age of the researchers reached 49.1 years [10] and the share of young researchers is below 25% [7], emigration. The number of researchers per 1 million people is more than 4.5 times lower than in EU.

As an answer to this precarious situation, the Academy of Sciences has established a series of schemes for attracting and retaining young people in science (scholarships, projects, awards): quotas for young researchers in projects supported under public R&D funding programmes (at least 20-30% of researchers); an annual specific competitive support programme for young researchers of up to 35 years; excellence grants of Moldovan Government for PhD students; establishing educational institutions within ASM (the Lyceum for gifted children and the University of the ASM) and for collaboration with scientific diaspora (ex., grants for short visits of representatives of the Scientific Diaspora). Several efforts were made for moving closer to European standards. ASM accepted the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, in 2013 the national EURAXESS portal was launched, and 3 Moldovan institutions are acknowledged for the Human Resources Strategy for Researchers (HRS4R) – Moldova State University, National Institute for Economic Research and University of Academy of Sciences.

On the other hand, the educational supply of the HEIs is still not sufficiently targeted at the needs of the labour market, business, R&D. Educational policies are inefficient to ensure a balanced structure of graduates by fields. Curricula is congested, has a high degree of theorization and does not provide relevance for personal, social and professional development of the beneficiaries. The system is insufficiently focused on training transversal competences and entrepreneurship and innovation skills. Creativity, critical thinking and other features of modern education are not yet sufficiently high on the agenda. This lack of skills has a strong impact on the innovation potential of firms. For example, Student preferences have changed from natural to social sciences. In consequence, there are significant gaps between the specialisation and the training level of graduates and the expectations of companies and institutions. The share of employees in technology-intensive sectors is very low [2].

The *employment and working environment for researchers is not attractive*, due to cuts in public R&D funding, an unstable economic situation and limited career opportunities. The average monthly salary of a researcher in a public research organisation was only €240 in 2014 [10]. Salaries in several sectors of the economy are much higher than these average levels, and the level of remuneration is hence one of the main factors which discourages talents to stay in research. Also stipends for PhD students are low (about €60 per month), and this obliges them to work in parallel to their studies. Existing programmes have rather limited impact since modest financial resources allocated to them not allow a radical change of research framework, emigration remaining an option for many young talented people.

Evaluations and monitoring system. It is a lack of a vision and integrated methodology for monitoring and evaluation of R&I and it is the need for improving the evaluation and impact assessment

culture. Indeed, new instrument were used in the last period (Foresight, S&T Policy Reviews by external experts, Erawatch, Think-Thank evaluations). Nevertheless, the regular and comprehensive evaluation mechanisms for all elements of R&I (system, policies, organisations, programmes, projects etc.) has not yet been established. For example, neither policies nor funding tools introduced since 2004 were object of evaluation.

It creates the impression of insufficient interdependence between research performance and financial allocations. A problem for small local scientific community is an objective evaluation due to close relations of a limited number of available experts. Provision of institutional funding is not based on any rigorous criteria of performance or results of academic accreditation, while the indicators used in the competitive funding are mostly quantitative and rather superficial [4]. No methodology for assessing the social and economic impact of the public R&D investments. Rather formal recent reorganisation of evaluation system of ASM, which does not ensure avoiding conflicts of interest, full use of output indicators, international benchmarking and ex-post evaluation tools. The international dimension is poorly integrated into the evaluation process. So, Excellence as a key criterion in funding and career advancement is affected by lack of critical mass of small community and ethical misconducts of post-soviet science.

Another problem is lack of reliable and comparable R&I statistics according to the European methodology and standards. Moldova is not included in Eurostat statistics and is not covered in the IUCR or IU scoreboard. Among several statistical weaknesses, R&I activities in the BES are not recorded yet (BERD, HR in business, related innovation indicators). For several standard indicators such as GERD different data are available (e.g. of ASM, BNS or UINESCO). Some indicators are not calculated according to the Frascati Manual provisions (e.g., data of personal are not recorded in full time equivalent). This is not allowed getting a clear picture of the R&I system and to have a more reliable basis for making policy recommendations.

Innovation. In the R&I strategic documents the concept of innovation is declared as way for shift from the current economic model based on remittances to a new model based on competitiveness. For ex., The Innovation Strategy (2013) provides the orientation of firms towards innovation and strengthening the connections between companies, educational and research sectors. The strategies stipulate also the transition from centralised R&I system with an academic character towards an open innovation system focused on needs of economy and society. Some elements of the industrial and innovation infrastructure to facilitate knowledge transfer were already developed, inclusively networks of business incubators (5 new incubators in last 2 years), innovation incubators in universities (4 new incubators) and industrial or scientific parks. Also there is a relatively well-regulated framework of IP rights – National Intellectual Property Strategy (2012), contains 30 specific actions to encourage the creation, protection and use of IP.

In opinion of several experts, one important problem for R&I system is a linear conception of the innovation, where research is driven by public authorities, conducted in public research centres and then applied by private companies [3]. A linear conception of the innovation process is an obstacle for integration various stakeholders and thus for networking of R&D sector with the rest of economy [8]. Tools to stimulate cooperation in the knowledge triangle education-research-business are weakly developed and only slowly emerging (for ex., lack of incentives to researchers at universities and public institutes in order to establish innovative spin off and start-up companies) and the governmental programmes for entrepreneurship have still a weak R&D and innovation component. As result:

- research is not integrated in a proper innovation system and operates rather separately of economy and education;
- public R&D sector is not sufficiently oriented towards the economic and social needs, and research results are often not relevant to companies;
- private companies also are not very open to cooperation with domestic research, inclusive due to the low absorption capacity of industry knowledge;
- the universities are traditionally focused more on education rather than in research and have limited collaboration with both R&D institutes and business;
- the universities and research institutes have limited experiences and capacities for patenting, licensing, start-up companies and other commercialisation efforts.

Conclusions. It can be formulated five major challenges for convergence of the national R&D system to smart specialization.

- Inefficient innovation governance model;

- Lack of human resources for R&I;
- Low R&D investments, especially by private sector, with no clear prioritisation;
- Weak links between R&D institutes, universities and BES;
- Undeveloped evaluation and monitoring system of R&I.

Overall, the national R&D policy does not correspond to the conception of smart specialization, but rather addresses separately different issues of the scientific community. The most actors of a national innovation system are not aware of the importance of S3 approach.

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