PERSPECTIVES ON THE RELATIONSHIP BETWEEN STRATEGIC MANAGEMENT INSTRUMENTS AND PERFORMANCE OF PUBLIC (SECTOR) RESEARCH, DEVELOPMENT AND INNOVATION SYSTEM

https://doi.org/10.47743/jopafl-2023-28-13

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Abstract: *The study aims to contribute to the scholarship on the performance of organisations belonging to public RDI and identify its relationship to the strategic management instruments applied by the main actors involved in management and execution processes. The analysed operating instruments comprise processes, methods and operating procedures in a written form and whose content has been established by an issuing body, and which are available for all organizational levels. We will outline the specific aspects found in the evaluation rankings, as well as the measures adopted for increasing scientific performance. The assessment of the national research, development and innovation system, and of the Romanian Academy regarding the applicable operating instruments enabled us to draw a set of conclusions that we hope will be appreciated positively. This paper contributes to the organisational management literature by investigating the elements of strategic planning and management of public RDI in Romania and by studying how they are connected to the achieved performance.*
Keywords: *public sector performance, RDI, strategic management instruments, Romanian Academy.*

Introduction

Public sector decision-makers have been forced to identify specific *methods, techniques, means and working instruments* needed to ensure conditions for society's progress due to transformations faced by countries, their economies and organisations

brought by such systemic challenges as economic growth slow-down, burdening debts, aging of population, social unrest, healthcare and security crisis (Ferguson, 2014). A public system is closely linked to any state's functioning. Employees, politicians and scientists working in public sector are interested in the reorganisation, improvement and optimisation of operations, especially of those related to provision of financial resources. Today's budgetary system of Romania comprises and provides funding to public institutions that were set up and are operating based on their own legal provisions. These days the working environment of public institutions is becoming more and more complicated. Public transparency and adherence to various international organisations bring new rules, regulations and requirements that should be met. Growth and decrease of the level of funding depends both on the desire of decision-makers to provide specific public services, and on their capacity of supporting them financially due to reasons related to other commitments.

Dealing with lack of sufficient funds, governments often adopt specific measures that whether fall within planned budgets, or comply with other conditions. For this purpose, „*public sector performance is measured, which involves making a distinction between the following terms occurring in a production process - input, throughput, output and outcome".* (Profiroiu *et al*., 2007). The authors of this study also suggest that *„on the one hand, we could establish a link between the outcomes and the input used for achieving them, and on the other, between the objectives reached through these outcomes*", although not always a direct link between the inputs and outputs is found. It mainly depends on the type of process, time frame and the moment when the outcome appears. We refer here to research articles that could be written over several years, and the outcomes (books, articles, patents, etc.) could be recorded long after the end of an activity. According to the Frascati Manual (Frascati Manual, 2015, accessed on 08.07.2023), there are two main approaches to measuring research performance in the public sector in terms of public funding. One approach considers the amounts received and reported by state institutions over a specific period. Another approach takes into account the amounts for RDI performance over a fixed period of time that the governments commit to pay (planned for a period of 5-6 years under national RDI strategy), or which have already been paid. A periodic review is conducted using different types of indicators matching the aim of the review.

There have been academic debates on the optimisation or achievement of higher efficiency in the functioning of public entities (including those carrying out RDI) which often put forward highly advanced solutions. Still, public sector entities are both complex and twisted, as well as fragile and less adaptable. A wide range of events may seriously disrupt the entire system's functioning. The events related to restructuring, underfunding, adjusting the mission and aims, fluctuating staff, non-eligibility of payments, retrocessions and other disputes often turn into real challenges for public entities. Continuation of activities entails the existence and application of working instruments (strategies, standards, regulations, procedures, etc.) complying with specific requirements, bringing benefits to organisations. Unless these are clear, specific, correlated or adapted to the applied field, they become useless. Complicated inaccurate working instruments, or having a content „not being aligned with what an organisation says, invests in, or does" (Bryson, 2002), just turn them into a bureaucratic tick. The strategy as an „extension of any organisation's mission, making a bridge between itself and its environment, ... is usually created to cope with strategic problems, and formalises organisation's response to the tasks

it deals with" (Bryson, 2002); being the main instrument we have included into the analysis carried out in this study.
We have described up to now the main arguments that made us extract an important public sector segment, namely, the research, development and innovation system (RDI), and analyse the strategic management instruments in an attempt to see their usefulness in practice. We therefore view science as a „global public good" [36 accessed on 19.06.2023] that may contribute have a significant contribution to people's prosperity.

Literature review

As a function of top management, strategic management integrates vision, values, opportunities and capacities which may lay the foundation of coordinated actions (Johnsen, 2015). It made its way into the public sector entities and has become pervasive (Poister, 2010). Strategic instrument is a „generic name for any method, model, technique, framework, methodology and approach used to facilitate a strategic activity", being mainly developed by the consultants for big international corporations (Stenfors *et al*., 2007). The authors of a relatively new study looked into the working instruments in the managerial and execution activities, reaching the conclusion that „supporting instruments in strategic decision-making have become more and more popular" (Stenfors *et al*., 2007). The study found that the executive directors of analysed companies „use extensively a variety of instruments to support important decisions". The study respondents mostly viewed as complicated and difficult to handle the challenges associated with the application of instruments in the three analysed phases – searching, implementation and use. Nevertheless, the respondents' views show that there are real opportunities for consolidating the position held by the instruments at strategic level due to their high impact on top management, and the need for collaboration in different sectors emphasises the strategic role of such instruments (Stenfors *et al*., 2007).

A more recent study (Rozario, 2021) on the application of strategic management instruments, containing hypotheses on the use of a high number of instruments, showed that if the number of strategic management instruments and methods is high, organisational performance is higher. A comparative analysis of empirical studies on strategic management instruments and techniques (Berisha Qehaja *et al.* 2017) found that there are important gaps between theoretical models and evidence on the use in practice of strategic management instruments and techniques, and an awareness of their use is needed to maximise their potential for diminishing the number of cases of entrepreneurial failure. Assessment of public sector performance has been widely discussed, being noted that it is „a highly difficult" process due to several reasons, such as multitude and diversity of stakeholders of public institutions, nature of provided service, lack of competitive environment, complexity of the socioeconomic environment, influence of political values, as well as differences in values and perceptions of performance (Androniceanu, 2003: 380). Still, public funding is based on specific instruments called „budgetary programs" aimed to „strengthen the quality of public policies", whose content also includes sets of outcome and/or efficiency indicators, as well as the methods for monitoring if they have been reached [29: 28^5]

Measurement of public sector performance has been widely debated not only in Romania. More than thirty years ago, the Government Performance and Results

Governmental Act of 1993 (GPRA) in the US (and its amendments) imposed that all federal agencies made strategic and performance measuring plans to justify their funding. Although making profit is not a mission of not-for-profit and governmental organisations, they incur costs and are expected to manage profit well. Therefore, it is essential that all research organisations learned how „ to do more with less" (Arveson, 2012). In Romania, such legislative initiatives started to be adopted at the beginning of 2000, although without specific measures for joint participation of stakeholders or determination for imposing a mandatory application, budgetary programs and performance indicators becoming operational in practice only in 2023 [17]. In Romania, the authorities committed among other things to solving the problem of public research system fragmentation by adopting a mechanism of systematic review and by encouraging research institutions to merge and also implement institutional strategic plans helping in the creation of a framework for making and spending the budgets in line with state programs, and also by using result/efficiency indicators [17] through the National Recovery and Resilience Plan (NRRP) [37, accessed on 07.06.2023], a highly comprehensive document that has been viewed by many experts as the „best plan we have had so far" [25].

As a part of medium-term strategic planning system of central public administration institutions, institutional strategic plans are the components of the quality management system, which include two elements, one related to management (office, vision, values, analysis of internal and external environment, medium-term priorities, lines of research, review, assessment and reporting) and another one dealing with budget planning [**14**]. In what regards other similar studies on innovation performance in countries found in the lower part of the European ranking of innovation, one study (Zajko, 2023) puts forward recommendations for the 2023-2030 National Innovation Strategy for Slovakia (the country situated in 2022 on position 23, also under the section of „emerging innovators"). After making a comparative analysis of the key factors in current innovation performance of Slovakia, the Czech Republic and Austria, the author presents a set of conclusions, out of which, we are just extracting those pertaining to management tools, „In contrast to Slovakia, the Czech government followed a systematic, ambitious and financially stable RDI strategy for its policies reflected in innovation performance. Several strategic documents attempt to fulfil the role of National Innovation Strategy of Slovakia for 2023-2030, including the National RDI Strategy Project run until 2030, whose aims, monitoring and funding indicators are still too general. A positive feature is the provisional plan of the RDI management system reform replacing the current fragmented system. However, none of these documents states the ambition of Slovakia to go back to the group of „*moderate innovators*" with a sufficient and sure funding for this goal." (Zajko, 2023).

There could be many working instruments, specific to types of activities, which depend on the need, interest and involvement of regulation decision-makers. On the other hand, these help decision-makers provide intervention methods and the means for understanding the environment and describing the methods. For example, regarding the „procedure for the approval of research funds", a recent study conducted among the researchers of the Romanian Academy found that the procedure was seen as mostly „non-transparent" (46% of respondents), only 7% viewing it as „easy to apply", and 28 % as „hard to apply", the other almost 20% seeing it as „transparent"(Gâlea, 2021). A study on *Strategic Planning and Public Management Reform: The Case of Romania* draws a conclusion on the attitude of local authorities towards strategic planning. So, „the main

benefits of planning are coherence in local development efforts, better local governance, and opportunity to access EU funds, while the main challenges comprise adoption of efficient instruments that would allow higher participation of stakeholders... and higher expertise and competence in this area" (Hinţea *et al*., 2015). A similar attitude among the researchers of the Romanian Academy system was reported by a study conducted six years ago (Gâlea, 2021).

Strategic planning is based on a set of working instruments characteristic the working environment of systems and organisations. To fulfil their role properly, the working instruments should comply with a set of requirements asking that such instruments should be written down, refer to all important processes and activities in the system they serve, ensure a separation of roles (submission, checking, opinion giving, approval) and also be simple, complete, precise and adapted to processes and activities, and also be known by those applying them [**33**]. Strategic measures regarding the overall public system reform aim to reach such main goals as „*decentralisation for local socioeconomic development*" (Androniceanu, 1999: 230). It could also be seen in relation to the national RDI system, so we also encounter in practice regional programs of smart specialisation.

Methodology

The research was conducted using two methods, *content analysis* of such working instruments as relevant strategic documents regarding the Romanian public sector RDI and a *comparative analysis* of documents selected considering their relevance for analysing the performance of public sector RDI. Our analysis covered the period between the year of appearance of the most important act regulating research activity in Romania (GD 57), 2002, and up to now. The analysed documents were extracted from public sources, namely, the web pages of Romanian institutions (The Ministry of Research, National Institute of Statistics, other ministries and public authorities) and of the European Union. Legal acts have been extracted from the iLegis law management application. Full and partial citation of content was done by mentioning the source. We have also made *comparative analyses* of some elements of innovation performance shown using the *SCImago* rankings that classify academic and research institutions using a composite indicator combining three sets of indicators research performance (a share of 50%), innovation results (a share of 30%) and societal impact (a share of 20%) [43]. The latter is the composite in the calculation of innovation performance starting with the year 2015, when SCImago ranking comprised 5.139 institutions worldwide, and which tracks the impact on society by means of looking at aspects related to handling documents using an indicator called *altmetric*s (added to 2019 edition) but also through the *number of blacklinks and web pages.*

Applied research

To bring arguments for the title formulated above through the conducted applied research, we use the following hypothesis:
Presence of strategic planning documentation as management instruments and coherence in managing the concepts have a high influence on the results and therefore system's performance.

Therefore, we will analyse:

1. Strategic management instruments and their impact on the results and performance of the national RDI system and of the Romanian Academy
2. Steps in solving the identified problems

1. Strategic management instruments and their impact on the results and performance of the national RDI system and of the Romanian Academy

Overview
To understand better the RDI system in Romania, we will be presenting its statistical profile for the period between 2019 and 2021. Therefore, it could be observed that:
a. at the end of 2021, there were 550 RDI entities, of which, 45% or 249 entities in the public sector (governmental and universities) – see other details in Table 1 *Research and development entities by performance sectors at the end of 2019, 2020 and 2021*.

Table1 Research and development entities by performance sector at the end of 2019, 2020 and 2021

Performance sectors	Year 2019	Year 2020	Year 2021
	Number	Number	Number
Total, of which:	480	621	550
Public sector, of which:	259	252	249
- governmental sector	174	168	165
- higher education sector	85	84	84
Private sector, of which:	221	369	301
- companies	204	346	281
- private not-for-profit sector	17	23	20

source: [22, accessed on 02.06.2023]

b. there were 47.011 people employed in RDI at the end of 2021, almost 8% more than in 2019. Similar growth occurred in „ researchers" occupational group – see Table *2. Research and development employees by occupation at the end of 2019, 2020 and 2021*.

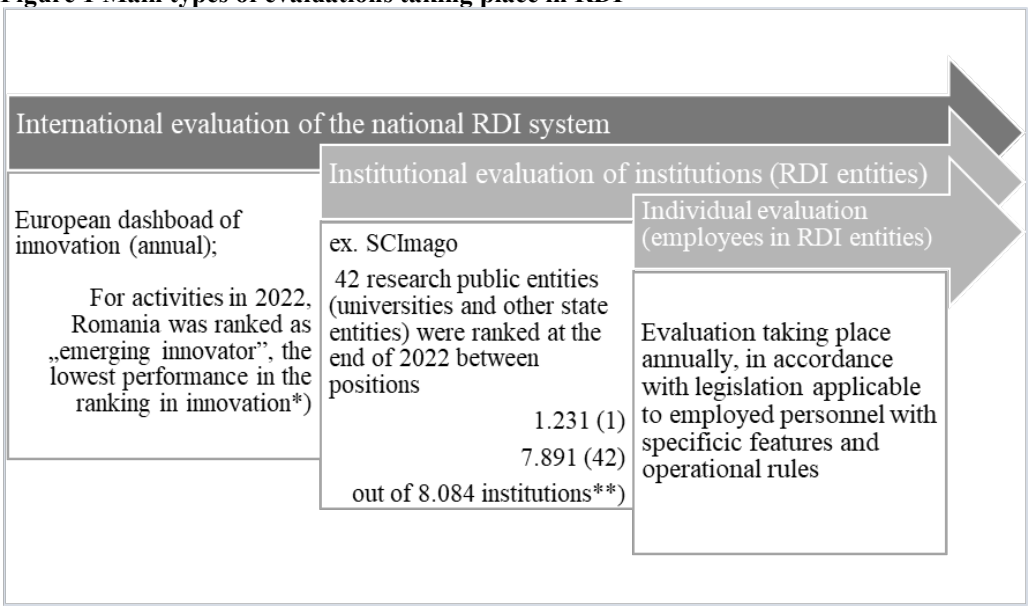
Table 2 ***Research and development employees by occupation at the end of 2019, 2020 and 2021***

Grouping by occupation of research and development employees	Years		
	2019	2020	2021
	Number of people	Number of people	Number of people
Total, of which:	43,973	45,304	47,011
Researchers	27,168	28,090	29,347
Support staff and similar positions	6,195	6,674	7,531
Other categories of employees	10,610	10,540	10,133

source: [22, accessed on 02.06.2023]

To provide an overall image of the system, it should be noted that it operates continuously and benefits from public and private funding, undergoing different types of evaluation, such as (a) the international evaluation of the entire national RDI system, (b) international evaluation of RDI institutions (c) employee evaluation – see Figure 1 Main *types of evaluations taking place in RDI*

Figure 1 Main types of evaluations taking place in RDI



*) *source: [23],* **) *source: [43]*

The instruments used in strategic management of RDI are mainly regulatory acts and working procedures, rules and other provisions that could be used by people in charge to run specific activities so that these could contribute to reaching the mission of scientific research.

Presentation of several strategic working instruments in RDI

After having analysed several instruments related to strategic management in the Romanian RDI sector, we found that:

Some of them have been amended many times. For example, since its adoption (August 2002) and at the time of this study (June 2023), the legal act that regulates *scientific research and technological development* [**35**] had over 200 amendments and additions to its content through 25 legal interventions [**24**] and a high number of interventions was made to additional provisions (rules and interpretation provisions);

Some cannot properly play their main role due mainly to administrative reasons caused by serious delays in adoption; see examples in Table 3 *Records of 2002-2023 national research, development and innovation strategies* (NS-RDI) *and* in Table 4 *Records of 2002-2023 national research, development and innovation plans* (NS-RDI), where column 7 contains information on the entry into force;

Although the programming periods remained the same (around 6 years), strategic regulation instruments of the national RDI sector grew tremendously in terms of their content, the number of characters is three times greater in the NS-RDIs. (Table 3, column 6),

The content of strategic planning, execution and control instruments for RDI has lately become very big, being correlated formally and on paper with other documents. The information included in NS-RDI and NP-RDI make references to other strategic regulatory instruments in the field, such as the National Recovery and Resilience Plan (over 1300-

pages long documentation), regional strategies and programs of smart specialisation, 2030 National Strategy for Sustainable Development of Romania (completing the three dimensions – economic, social and environmental, and 17 sustainable development objectives undertaken after Romania has signed 2030 Sustainable Development Agenda of the United Nations) [2, accessed on 17.06.2023], European and national strategies and policies, the Report of PSF experts, other plans and sectoral programs of ministries or research and development academic entities, etc.

The number of bodies (commissions, committees, councils, meetings, etc.) is very high, their efficiency is hard to assess due to lack of publicly available information on the structure, functioning, responsibility or achieved results. There also have been cases when due to failure of completing the initial goal of such bodies, their membership is changed in inappropriate way. The responsibility of such bodies is hard to evaluate. We could note the example of National Committee for Science and Technology Policy, a body that should have been set up after the approval of the act regulating the scientific research activity [**34, art. 40**], and which recently has been changed due to a set of reasons, such as „lack of activity of the current Council*"* [**34**].

Table 3 Records of 2002-2023 national research, development and innovation strategies (NS-RDI)

NS-RDI	Period *(GD's name)*	Approved by	Entry into force	Number of changes up to June 20, 2023	Aproximate number of text's characters	Entered into force
1	2	3	4	5	6	7
I *)						
II	2007-2013	GD 217 of February 28, 2007 [16]	March 29, 2007	0	9.500	At *the end of first quarter* in the first year of implementation
III	2014-2020	GD 929 of October 2, 2014 [20]	October 28, 2014	1	14.100	in the first part of *the fourth quarter* in the first year of implementation
Actions and activities of the NS-RDI-III continued also during 2021-2022						
IV	2022-2027	GD 933 of July 20, 2022 [21]	July 27, 2022	0	31.947	in the first part of *the third quarter* in the first year of implementation

*) For NS-RDI-I (2002-2006), we have not identified any regulatory act to be approved

Table 4 Records of 2002-2023 national research, development and innovation plans (NS-RDI)

NS-RDI	Period *(GD's name)*	Approved by	Entry into force	Number of changes up to June 20, 2023	Approximate number of text's characters	Entered into force
1	2	3	4	5	6	7
I *)						
II	2007 – June 30, 2014	GD 475 of May 23, 2007 [18]	May 31, 2007	27	14.100	At the middle of the second quarter in the first year of implementation

NS-RDI	Period *(GD's name)*	Approved by	Entry into force	Number of changes up to June 20, 2023	Approximate number of text's characters	Entered into force
III	2015-2020	GD 583 of 22 July, 2015 [19]	6 august 2015	5	17.400	at *the middle of the third quarter in the second year* of NS-RDI-implementation
Actions and activities of the NS-RDI-III continued also during 2021-2022						
IV	2022-2027	GD 1188 of September 29, 2022 [15]	October 5, 2022	0	19.900	in the first part of the fourth quarter in the first year of implementation

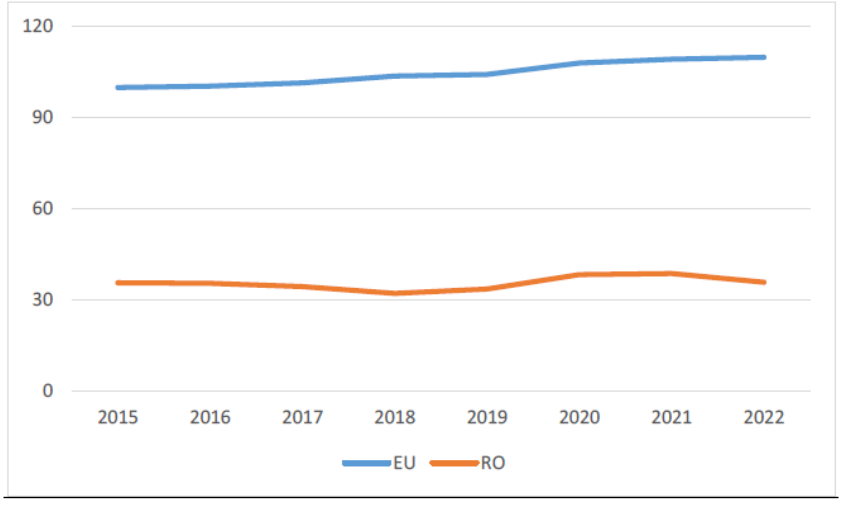
*) *For NS-RDI-I (2002-2006), we have not identified any regulatory act to be approved*

The impact on the results and performance of the RDI system

European evaluation of the entire RDI system in Romania

The analysis of efficiency of the results and performance of scientific research has been a constant concern of big research groups of theorists and practitioners. Nevertheless, the results were not positive and Romania was again ranked as an „*emerging innovator"* with the lowest innovation performance in the EU, according to 2022 Dashboard of European Innovation. Innovation performance of Romania accounts only for 50% of the average of emerging innovators, and the difference between performance of Romania and the EU is higher" [23] Figure 2 *2015-2022 Innovation Performance Chart* shows the evolution of innovation performance of Romania between 2015and 2022 compared to the European average [9, accessed on 07.06.2023].

Figure 2 2015-2022 Innovation Performance- 2022 Dashboard of European Innovation



Source: [9, accessed on 07.06.2023]

Recent evolution has not been encouraging, so Romania is an Emerging innovator with a 33,1% performance of the EU average. Performance grows at a lower rate than that

of the EU (8,5%). „Performance difference of the country compared to the EU is becoming higher" as shown by the 2023 Dashboard of European Innovation [45, accessed on12.07.2023]. If we correlate data in Table 3 and 4 with Figure 2, we may observe a tacit extension of 2014-2020 implementation period up to 2022 without the extension also of the plan of measures, which caused a decrease in innovation performance of Romania in 2022 compared to 2021. Setting the analysis, intervention and control parameters as variables differentiating and also enabling the comparison of results could be done by using such decisional models as that resented by the authors of the study on the Efficiency – Model for Scientific Research Evaluation (Nica & Tiţă 2013), or the PRA-nX decisional model, which was built, tested and validated in another recently published study (Gâlea, 2021).

Evaluation of data on Romanian Academy

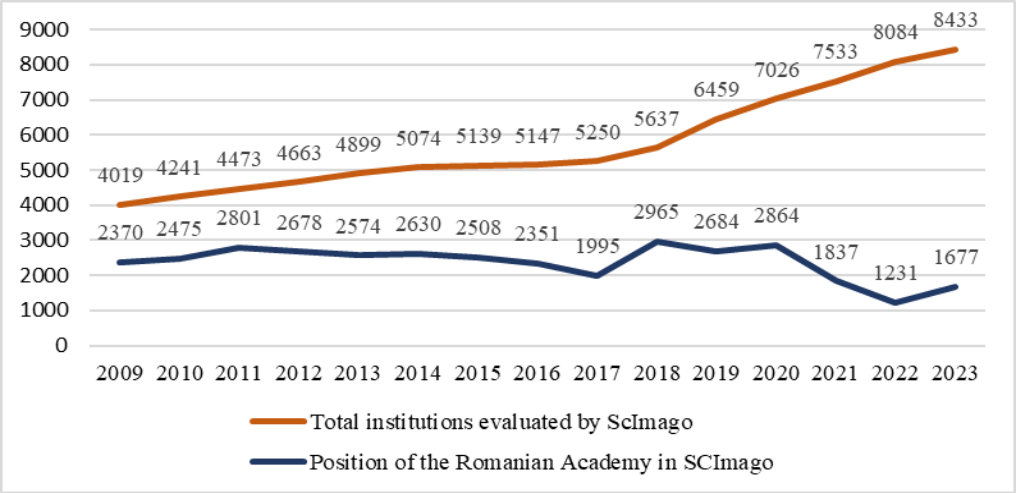
From the annual report of the Romanian Academy for 2021 [41, accessed on 09.06.2023], we find out that the institution displayed a set of *scientometrics,* of which, we would like to stress out *„* first place in the Romanian ranking of research, seventh place in the innovation ranking, (run by ICMPP) and seventh place in the societal impact ranking" (slide 19), the source of data being the SCImago Institutions Ranking. It should be noted that ICMPP (P. Poni Institute of Macromolecular Chemistry) holds a leading position in the 2021 innovation ranking. Taking into account that this research institute is part of the research structure of the Romanian Academy, we analysed the source of data and found that:

In the SCImago Institutions Rankings classification system, the Romanian Academy is registered as a governmental research entity with the main mission of nurturing „national history, language, literature, sciences and fine arts" and comprising 25 „subordinate organisations", almost all of them being research entities, except for the Menachem H. Elias Family Foundation, with the registered office in Bucharest [43]. According to the web page of the Romanian Academy, the institution comprises 74 research institutes [26, accessed on 15.05.2023], which means that the SCImago ranking includes data only of a third of its research entities.

We also note that in the list of governmental Romanian entities included in the SCImago ranking, besides ICMPP, there are other three institutes with the status of a legal personality in the structure of Romanian Academy, namely, the Institute of Cellular Biology and Pathology, Simion Stoilow Institute of Mathematics, the Institute of Physical Chemistry.

The Graph in Figure 3 shows the evolution of the total number of institutions evaluated by the SCImago ranking covering all sectors (governmental, universities, companies, not-for-profit and healthcare companies) during 2009 and June 2023, and also the evolution of the position held by the Romanian Academy during the same period. We found that the total number of ranked entities grew by 100%, from 4.019 in 2009 to 8.433 in June of 2023.

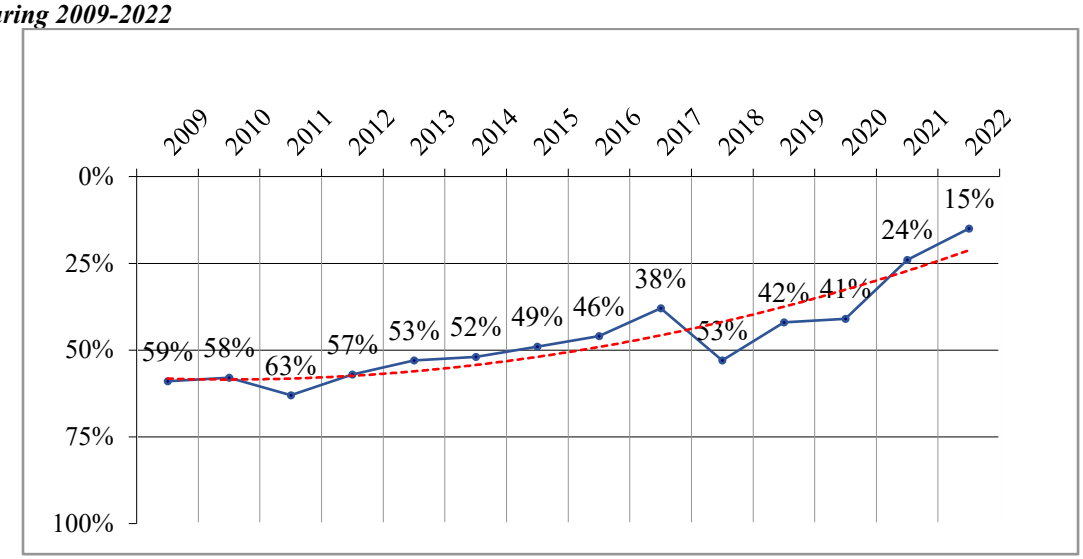
Figure 3 ***Evolution of the number of institutions evaluated by the SCImago ranking and the position of the Romanian Academy in the SCImago ranking betwen 2009 and June of 2023***



Source: Made by authors using data extracted from the application [43, accessed on 20.06.2023]

Regarding the evolution of the position held by the Romanian Academy in the ScImago ranking between 2009 and June of 2023, the lowest global position was held in 2022, namely, position 1.231. Matching data shown in Figure 2 and 3, we observe that the year when Romania had the lowest value of innovation performance, in line with the dashboard of European Innovation (Figure 2), the Romanian Academy held the highest position in the SCImago ranking. We continue the analysis and exclude data for 2023 from the data set (as the year has not finished yet), and analyse the proportionality of the Romanian academy position to total number of institutions ranked by SCImago in the period between 2009 and 2022. The results are shown in Figure 4. We may note that the Romanian Academy in the past two years (2021 and 2022) was situated in the first 25% of research institutions in the SCImago ranking, and in most evaluated years, the Romanian Academy position is above 50% of total evaluated institutions, and situated between 25% and 50% in 2015, 2016, 2017, 2019 and 2020.

Figure 4 Position of the Romanian Academy compared to total number of entities ranked by *SCImago during 2009-2022*



It enables us to draw two conclusions, on the one hand, the support elements for the monitored performance indicators in the two rankings (SCImago and EIS) are different. To achieve the comparability of results, specific elements are required that would update the results due to the fact that scientific research activity has its specificity (multiannual activities, type of results, impact over time on society). Also, we found that there is a need and it is important that administrative issues were sorted out, such as more accurate data uploading into databases as these data are used for calculating different indicators or in establishing the institutional affiliation of researchers to recognisable names of institutions.

2. Steps in solving the identified problems

There have been conducted over time several analyses regarding the functioning and performance of the RDI system in Romania. Representatives of institutions and individuals have discussed and written a lot on this subject. We will be discussing an issue that seems relevant for our study in an attempt to draw a conclusion on the cohesion, coherence and impact of strategic management instruments. There are several viewpoints on the matter of Romanian public sector research system fragmentation. We will be discussing just a few of them in a chronological order:

During 2005-2006, a large group of experts carried out a comprehensive analysis of the *national system of research, development and innovation* in *the context of its integration into the European research space* in order to develop the National RDI Strategy *for* 2007-2013, (Agachi *et al*., 2006). The SWOT analysis of the RDI system reported among its weaknesses the fact that „*the RDI system is fragmented both institutionally and by sector. There is also a lack of coordination between decision-makers of RDI policies on the issue of design and implementation of horizontal RDI policies*" (Agachi *et al*., 2006: 514). The study is highly detailed and includes an overview, many comparisons, as well as conclusions and recommendations.

After more than fifteen years, in the mid-2022, the country analysis of the Romanian research, development and innovation system, the Policy Support Facility - PSF [40: 22, accessed on 05.06.2023], in its sections on the „situation diagnosis" and in the analysis of the aspects related to „underfunding and non-funding" and „fragmentation and low efficiency of public research" provided the arguments supporting the idea that there is a „*vicious circle*", whose „*main component*" is *„the over-fragmentation of the public system of organisations"* made of „*institutions of different types and origin"* that „*have not been evaluated properly to clarify their individual and joint missions, and have not been reformed to ensure the efficiency in achieving those missions"*.

Also in mid-2022, the supporting document to the Government Decision for the approval of national research, innovation and smart specialisation strategy 2022-2027 [32] made no reference to the issue of fragmentation of the public RDI system in Romania, and therefore no legal act [21] included such a reference.

At the beginning of 2023, a legal act on the „voluntary integration of Romanian research, development and innovation entities into the European research space" [28] contains intervention measures for „*lowering the high degree of fragmentation of the national research and development system, such institutions being encouraged to use jointly their own resources and their infrastructure to improve their performance for a better integration into the European research space*" (Art. 1 (1)). In the presentation of

their reasons, the initiators of the regulatory act [10, accessed on 07.06.2023] state that their initiative is based on the general objectives and lines of actions included in the PNRR [37, accessed on 07.06.2023] which aims to develop a solid knowledge and innovation-based production system „*ensuring socioeconomic relevance and accelerating the integration into the European research space*" (pct. 2.1.). On the other hand, the introductory section related to the internationalisation and international and European cooperation of SNCISI, approved in July 2022, shows that „*the national system of research and innovation is integrated into the European research space and is open to international cooperation. Romania's participation in European programs is, at least, equal to the share of its researchers, and its contribution to international cooperation is closely linked to its strategic agenda*" [21].

A few months later, in May 2023, a working document of the European Commission anticipating the 2023 Country Report mentions in its sections on innovation that there is „*a high degree of fragmentation in the Romanian public research sector that led to a weak public research background. The system is made of four types of research institutions (national research and development institutes (INCD); research units of the Romanian Academy; affiliate academies of different ministries, higher education research institutions), all having a degree of autonomy, different funding rules and being under the responsibility of different ministries. They have not undergone a regular evaluation process or have not been subject to performance-based funding*." [9, accessed on 07.06.2023].

The study has found a lack of coherence and continuity in the content of the analysed managerial instruments, keeping in mind the issue of Romanian public sector system fragmentation that may impact negatively data collection and generate disruptions in achieving results and performance. We also have noticed that the strategic documents made by the Romanian entities differ from those generated by other working groups. The alignment of research evaluation standards and adaptation of strategic managerial instruments could give an opportunity to modernise governance in this field, which is often seen as a competitive advantage.

Conclusions

In theory, measuring public sector performance is easy to do but is complicated in practice, considering the nature of its results and when they are recorded. Lack of a clear link between the inputs and the outputs over a specific time frame calls for an intervention using weighting and control factors. It is even harder to evaluate the performance of the RDI results in terms of their impact on the external environment. Although it is believed that strategic planning is time-consuming (Bryson, 2002) and managerial tools are *complicated and hard to master* (Stenfors *et al*., 2007), the results in practice show that when interventions have been „systematic and ambitious", the results also appear without delay (Zajko, 2023). In case of Romania, lack of a national RDI strategy and a plan of measures for the 2021-2022 period, as well as other shortcomings in the system, have led to lowering in innovation performance. Other identified conceptual differences between NS-RDI-IV and PN-IV will be discussed in another study. As time passes, the regulatory legislation as management tools are becoming broader and more complicated trying to regulate as many contexts as possible. Therefore, the following risks may appear: (1)

extension and maintenance of bureaucracy, resulting in well-made documentation but to the detriment of research and its mission related to knowledge, progress and people's well-being, (2) over-regulation might turn into barriers to freedom that researchers need in order to express their creativity. That is why it is essential that a distinction should be made between „performance results" and tradition or context-based funding.

There are significant differences of vision and attitude towards strategic planning and management (for instance, *fragmentation of the Romanian public system of research*) that may have a negative effect on the results and performance of the RDI's system. We live in a global world and if we are connecting specific activities to comparative assessments and national or international rankings, it is highly recommended that we should be aware that apparently minor and bureaucratic issues could influence tremendously a ranking position and the image of an achieved performance. Speeding up the digitalisation of administrative activities could lead to lower bureaucracy and more efficient public system, with an immediate impact. The conclusion of our study lies in the fact that strategic planning tools may motivate the stakeholders of public institutions to attract interested parties and resources and may have a direct impact on stimulating and growing performance in the public research sector. Some models (Borgonovi *et al*., 2018) could provide strategic support to RDI. A modern framework is the eGovernment Economics Project (eGEP) which includes three essential factors for society: efficiency, democracy and efficacy. It was designed to perform a multidimensional evaluation of public value generate in a specific field. The impact on society's progress is still a long-term goal and it will be analysed in a future study.

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