

Research&Development&Innovation Sector in Romania. Management and Market Concentration

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Abstract

Research, development and innovation can represent the foundation of economic development and a way to increase economic competitiveness. The paper proposes an analysis of the national research system, highlighting the factors that lead to a reduced success rate of Romanian research. Information on system development has been collected from national and international statistical bases. The data were processed, statistically interpreted and represented graphically. The assessment of the degree of market concentration of the innovative companies in Romania was achieved through the Gini Struck and Herfindahl-Hirschman methods. The results of the study have led to a high concentration of the market. The development of private research is at an early stage in Romania, compared to Europe. Although strategic tools to promote research results have been proposed at national level, the low allocation of funds to the sector, a domestic fund dominated by foreign capital and inadequate legislation still lead to a lack of attractiveness of the sector and modest results.

Keywords: *R&D&I, Romania, management, analysis, concentration*

JEL classification : *M 10, O 32*

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1. Introduction

Innovation (I) is a benchmark in European economic strategies, aiming the use of applied research to solve economic, medical or social problems, creating new jobs and raising the level of welfare for citizens (European Union EU, 2014). The future of Europe is linked to innovation, and the strengthening of the global position is necessarily linked to the increase of competitiveness through the research-development-innovation activities (European Commission, 2016). The publications of Organization for Economic Co-operation and Development (OECD), namely Frascati Manual (2015), or Oslo Manual (2005), show the importance of economic development based on innovation, including the development and identification of improved methods for placing new or significantly improved products on the market. Research and development (R&D) activity is part of innovation activities and may include the acquisition of knowledge, machinery, equipment and other capital goods, training, marketing and design solutions, or the development of our current software applications,

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regardless of the way of organizing, starting from the individual to the macroeconomic, national or regional level. The National Research, Development and Innovation Strategy (NRDIS) 2014-2020, promoted by the Romanian Government through the Ministry of Research and Innovation (2014), proposes the development of national tools to increase the role of innovation as an economic instrument needed to improve national competitiveness. The strategic objectives were established in accordance with the need to bring Romania closer to the European average of the share of funds allocated to research. By 2020, the public spending on R&D&I will gradually increase to 1% of GDP and tax incentives for companies and private investment in research will reach 1% of GDP. After a significant increase in spending allocated to this field over the period 2005-2008, the sector's financing intensity, expressed as a percentage of GDP, fell from 0.58% in 2008 to 0.38% in 2014. Compared with other Member States, Romania is at the bottom of this index. Although a relative improvement in the budget allocation was observed in 2017, which reached 0.49% of GDP, in 2016 the share of RDI decreased to 0.48% of GDP (Eurostat, 2018).

Material and methods

Statistical data on international innovation was collected from the OECD studies of the Consumer Technology Association. At European level, information from the official studies and communications of the European Commission has been used. For national R&D&I assessment, national statistical information provided by the National Institute of Statistics (NIS) has been used. The data were statistically processed and represented graphically. Gini Struck Method was used to analyze the market concentration. The results have been interpreted and compared with information from specialized articles, from the Web of Science and Academic Google database.

Short literature review

The attractiveness of the Romanian agri-food sector for foreign investors is analyzed by Stanciu (2014), which shows that foreign research in the field of agri-food production is very low, Foreign Direct Investment being oriented towards trade, land acquisition and industrial food production. Bichescu, Chivu and Stanciu (2017) show that the human resource in the public system of Romanian research is not financially motivated, being tempted by the migration to better paid jobs in the country and abroad. In an analysis of the patents obtained by the Romanian researchers, Bichescu, Chivu and Stanciu (2017) indicated that the low visibility of Romanian patenting at European level is also due to the high costs of recognition at European level. Voinea and Siminonescu (2005) made a survey on the R&D aspects in 170 Romanian companies, the results of the questionnaire showing that the intensity of research and development depends on the turnover and geographical location.

Romanian R&D&I Sector

OECD statistics provide summary data on the status of Romanian innovation, our country being a candidate for this organization. OECD only presents an assessment of R&D expenditure by field of science and by type of cost in Romania (figure 1). Between 1993 and 2014, the global spending on R&D had an upward trend, with a peak in 2008, after which slight fluctuations were recorded around 2 billion RON.

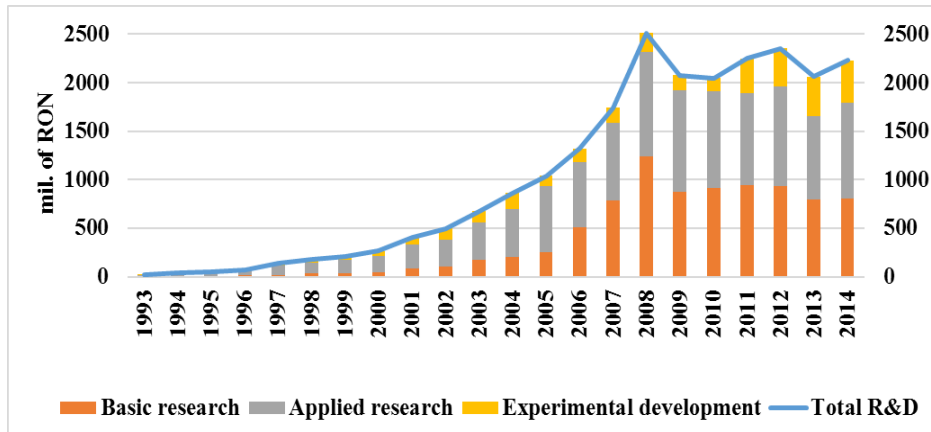


Figure 1. R&D spending in Romania

Source: Author, by processing OECD Data (2018)

An interesting evolution was the share of funds allocated for research, which registered a sharp decrease, reaching a share of 44.54%, compared to over 70% in the reference year 1993. In compensation the share of financial resources allocated to basic research (from 20% to 36%), in parallel with a fluctuating evolution of experimental development costs, ranging from 10-20%.

Romania holds a modest position at European level in terms of R&D &I results. According to Eurostat data (2018) and the specialist reports of the European Commission (2016), Romania has not been able to go beyond "modest innovators" stage in the last 16 years, falling within the category of countries with the lowest innovative performance (EC, 2017). Thus, our country was not able to align with the EC recommendations on sector development, although in the European strategy the "innovation capacity" was expressly mentioned as a determining factor of economic and social development. According to Innovation Union Scoreboard 2017 (EC, 2017), last year Romania took the last position among the 28 member countries on innovation performance measured by Synthetic Innovation Index SII, based on 25 relevant R&D&I indicators, ranking also after Bulgaria.

National statistics on R&D expenditure submitted by NIS are much more complex and more up-to-date. Thus, the data is up to date by 2016, with

breakdown by property category, development region, employee, research or innovation project (NIS, 2018). With the excellence of 2011-2014, the funds allocated to private sector research were higher than government allocations, reaching over 55% of the total in 2016 (Figure 2).

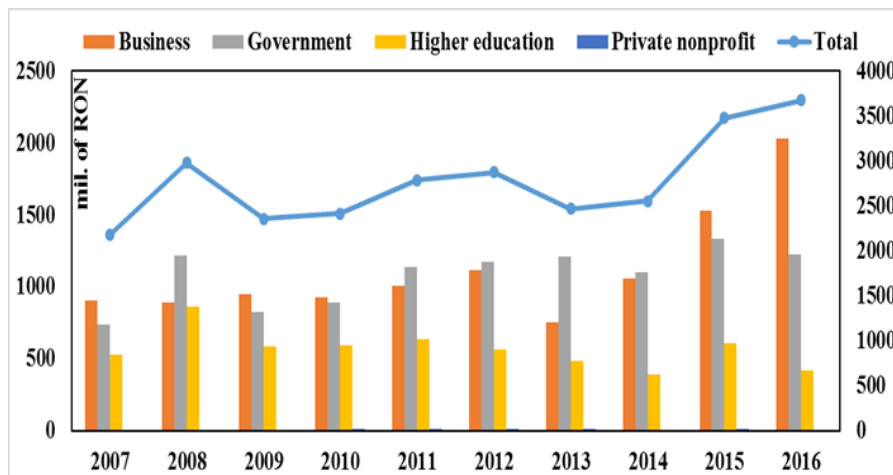


Figure 2. Distribution of R&D funds allocated by sources of origin
Source Author, by using NIS data (2018)

The interest of the local business environment in the development of RDI is extremely low, the share of private sector spending in this sector ranging from 23.3% in 2008 to 37.3% in 2015 (Eurostat, 2018). According to the KPMG study (2017), the main reason for the lack of interest in RDI financing from the private environment is the lack/ineffectiveness of appropriate fiscal stimulus measures in the business environment, government policy that in other countries has had favorable effects, being adopted at the right time. The contribution of funds allocated by non-profit foundations is generally insignificant in Romania, being in the order of 0.3-0.4%. The R&D spending for university research has declined steadily, reaching 11.5% in 2016, compared with nearly 25% in 2007.

Compared to Romania, the EU-28 average is characterized by a much higher share of the private contribution, which does not decrease under 60% of the total in 2007-2016 (Figure 3).

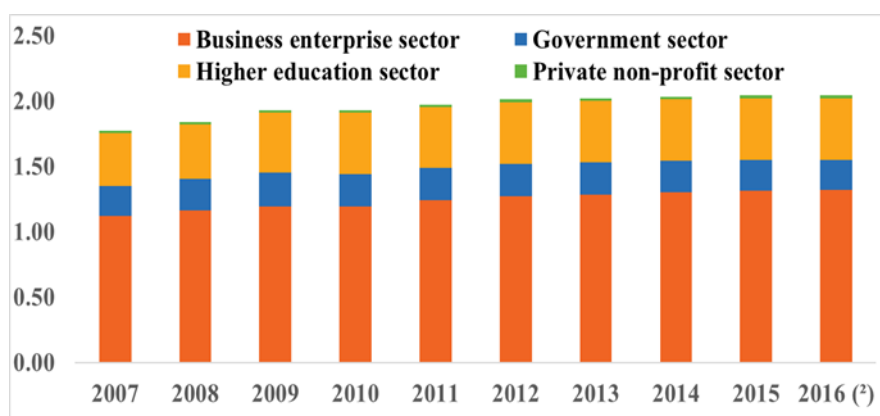


Figure 3. Gross domestic expenditure on R&D by sector (EU-28)

Source Author, by using Eurostat data (2018)

Romania's economic transition has reduced the demand for national research results. The financial crisis of production, coupled with the lack of incentives for investment in the modernization of technological processes, has been a major obstacle to the radical reform of industrial research. Structural changes in the Romanian economy have led some public research institutes to abandon their core business and initiate commercial activities in most unsuccessful situations. The lack of a coherent legislative framework for R&D, the tradition based on political micro-management, the perpetuation of bureaucratic practices, or the absence of a national strategy for restructuring the economy are the main problems faced by the reform of national research.

Investments in innovation in Romania reached a peak in 2008, after which they diminished in the context of the economic crisis, although state support maintained an upward trend in the field (Figure 4). Demand for business innovation increases with size. The increased inclination for innovation, specific to large firms, is explained both by the need to reduce the risks of introducing new technologies, and of a wider capacity to achieve and apply scientific research, due to the diversity of the commercial and technological activities portfolio (Agachi and Curaj, 2006).

If the enterprises are subsidiaries of multinational companies, the units located in Romania are predominantly focused on sales of products and services to customers, due to the characteristics of the Romanian market, characterized by the lack of domestic competition, the large number of consumers, the high volume of the general demand of products and services, the relatively high level of general training of the workforce. Multinational companies have specialized R&D&I centers with outstanding tradition and results, usually located in their home country. In the absence of good interests, given by the value of Romanian researchers, the prestige of research units, state support and / or tax incentives, etc. big companies do not target the development of R&D&I centers in Romania.

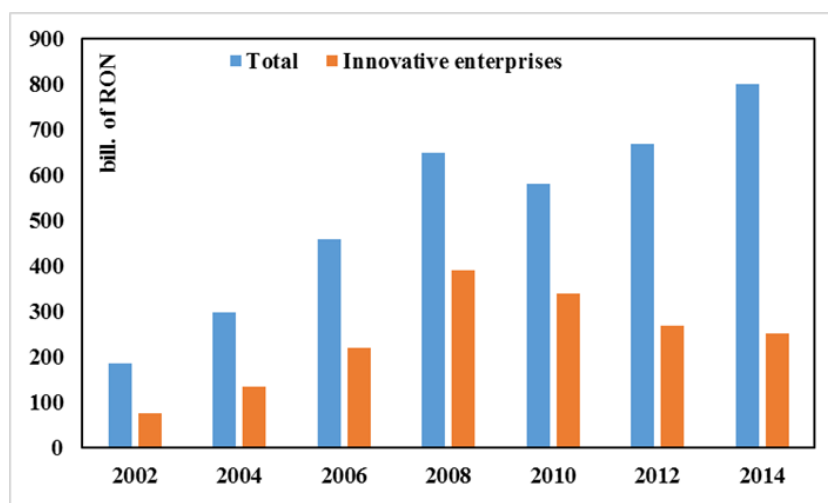


Figure 4. Turnover of innovative sector and enterprises

Source Author, by using NIS data (2018)

The example of Renault, which has developed a technology transfer center following concerted support from the Romanian state, is relevant (Gheorghe, 2012). Under these circumstances, investment in innovation by private companies is related to the facilities offered by the Romanian state.

The evolution of the total number of innovative firms in the period 2002-2014, by Romania's development regions, is presented in Table 1.

Table 1. Distribution of Innovation Companies by Development Regions

Region	2002	2004	2006	2008	2010	2012	2014
Northwest	440	675	909	1260	1106	593	401
Center	764	712	808	1316	896	838	463
Northeast	607	688	862	1554	1154	974	444
Southeast	395	923	1307	1409	1054	1108	560
South-Muntenia	391	458	573	961	919	520	353
Bucharest - Ilfov	848	1145	990	2388	2014	1186	1129
Southwest Oltenia	247	216	235	482	504	365	120
West	291	354	329	616	469	384	175
Total	3983	5171	6013	9986	8116	5968	3645

Source Autor, by using NIS data (2018)

According to NIS terminology (2018), innovative enterprises are enterprises that have launched, introduced new products (goods or services), or significantly improved on the market or new methods of organization or marketing.

The term covers all kinds of innovators, product innovators, process innovators, organizational methods or marketing methods, as well as enterprises with incomplete or abandoned innovations and refers to active enterprises. The period 2008-2010 was characterized by a significant increase in the number of innovative firms in Romania, followed by a reduction to a minimum recorded in 2014, the latest in national statistics. The assessment of the degree of concentration of the innovative companies' market in Romania may be achieved with the help of the Gini Struck Index (GSI), a method applied by Stanciu, Rizea and Ilie (2015) for characterizing the meat sector in Romania (formula 1).

$$GSI = \text{SQRT} ((n\sum gi^2-1)/n-1)) \quad (1)$$

The Herfindahl-Hirschman Index (HHI) measure of market concentration that is used to determine market competitiveness (Săvoiu, Crăciuneanu and Țaicu, 2010). HHI was calculated using formula 2.

$$HHI = \text{SQRT} (\sum gi^2) \quad (2)$$

where g_i represents the share of innovative companies in the region i from a total of 8 regions of Romania.

The evolutions of GSI and HHI for the period in which NIS has data in national statistics is shown in Figure 5.

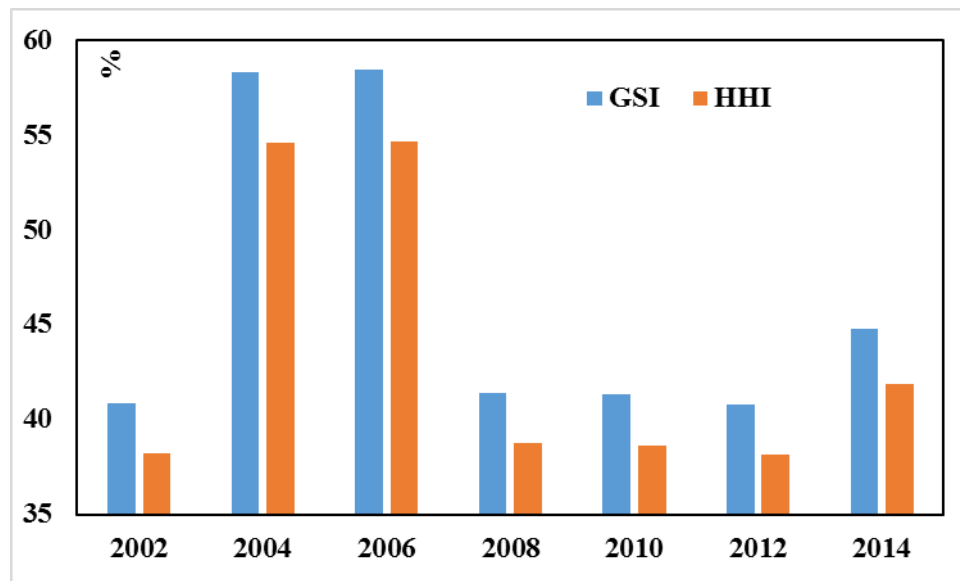


Figure 5. Evolution of GSI and HHI (2002-2014)

Author Source, own calculations

The maximum value of GSI 54.67% was in 2006, and minimum of 38.16% being registered in 2012. Except for the 2 years (2004, 2006), the GSI values were relatively constant, varying around the average 38%. By regions, the Bucharest Ilfov area occupied constantly the first position as the number of innovative firms.

HHI took values between 38% and 55 %, with a peak in 2004-2006, due to a high level of market concentration.

Conclusions

The research market generally manages intangible products and has a time horizon long enough to obtain direct economic benefits. Romania has trained, educated staff, specialized in research, but the lack of adequate economic measures reduces the competitiveness of the national research sector. The innovation market in Romania is unbalanced, the high concentration pointing to an unfair distribution of innovative firms on national territory and areas with high concentration of innovative companies.

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