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## THE ROMANIAN NATIONAL INNOVATION PERFORMANCE IN THE EU CONTEXT

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### Abstract

Innovation represents an essential resource for sustainable economic development, being the central element of regional, national and international development policies, thus benefiting from legislative support to foster innovation among organizations. The aim of this paper is to present the situation of Romania in terms of innovation performance according to the latest annual report published by the European Commission.

**Keywords:** innovation, innovation process, European innovation

### Introduction

One of the five headline targets of the Europe 2020 strategy is that the European Union allocates 3% of the Gross domestic product (GDP) to Research and Development (R & D) activities. In this paper, I will present the most relevant statistics that measure innovation activity at European level. Compared with other member countries (Maier, 2018; \*\*\*, 2017), Romania can be considered a modest innovator (spending less than 1% of GDP on research - development - innovation) but seeking to increase its innovative capacities implementing a national innovation strategy.

The Government of Romania approved the *Third National Research and Development Innovation Plan* for the period 2015-2020, which is one of the main instruments for the implementation of the National Strategy in this field, comprising five programs of major importance (\*\*\*, 2017):

1. Development of a National Research and Development System (research projects to stimulate young researchers and independent teams, etc.);
2. Increasing the competitiveness of the Romanian economy, providing support for the development of models and solutions for products;
3. European and international cooperation program;
4. Fundamental and frontier research designed to maintain and develop niche areas;
5. Research in areas of strategic interest, support program led by institutions with a scientific role for the development of research institutions.

The main objectives pursued by implementing this plan are (\*\*\*, 2017):

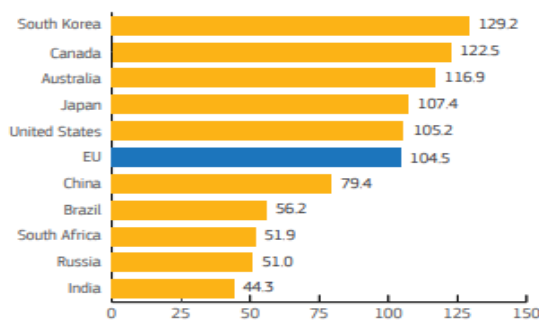
- Development of a national Research – Development – Innovation (RDI) system and its transformation into a functional, efficient, performance-related national system and to have an impact on the European level;
- ensuring a critical mass of researchers in the system and developing new generations of international competitive researchers;
- Increasing effective public funding by pooling resources in areas of economic relevance demonstrating research potential (especially intelligent specialization areas) and stimulating private spending for research, development and innovation through public co financing to reach, by 2020, a level of 1% of GDP.

### The innovation performance in the EU Member states

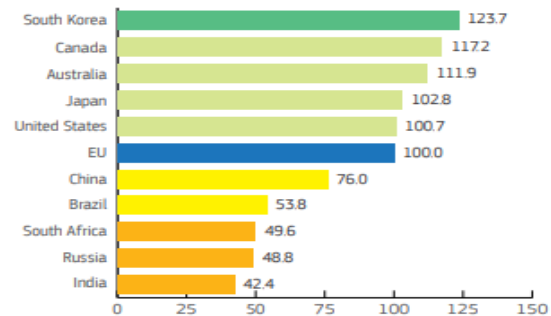
At European Union level, an Innovation Scoreboard of the Member States, called the European Annual Innovation Scoreboard (EIS), is produced annually. It presents a benchmarking of the research and innovation performance of the EU Member States and selected third countries as well as the relative strengths and weaknesses of their research and innovation systems. It helps countries evaluate the areas where they need to focus their efforts to achieve improved innovation performance.

The most recent study (\*\*\*, 2018d) published in 2018, entitled European Innovation Scoreboard, indicates that the EU's innovation performance continues to grow and that progress in this direction has accelerated in recent years. In the near future, new improvements are expected, but progress remains uneven across the EU.

At global level (Figure 1), the EU continues to improve its position comparing to the United States, Japan and Canada. The EU lags behind South Korea, but in the coming years it is expected that a process of gradual recovery of the gap will occur. China is coming up with a growth rate of innovation performance three times that of the EU. The superiority of EU performance towards Brazil, India, Russia and South Africa is considerable. The 2018 edition of the European Innovation Scoreboard shows a positive trend in most EU Member States - particularly Malta, the Netherlands and Spain, Sweden remaining the EU's leading innovation leader. The EU reduces the gaps in the main competitors such as Canada, Japan and the United States of America. But removing this syncope in the field of innovation and maintaining the advantage over China will require a concentrated effort to strengthen Europe's innovation potential. The findings support the new agenda for research and innovation, recently launched by the European Commission, which invites EU leaders to act now to help Europe become the engine of global innovation (\*\*\*, 2018d).



Bars show countries' performance in 2017 relative to that of the EU in 2010.



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Figure 1- The innovation Global performance (adapted from (\*\*\*, European Commission 2018)

The columns indicate the performance of the Member States in 2017 compared to those of the EU in 2017. The broken lines indicate the performance limits of the performance groups in 2017.

On average, EU innovation performance has increased by 5.8 percentage points since 2010. However, there has been no convergence between lower-performing and higher performance EU Member States. Based on the average results of their performance, as calculated by a synthetic indicator called the "synthetic index of innovation", Member States are divided into four different performance groups (Figure 2).

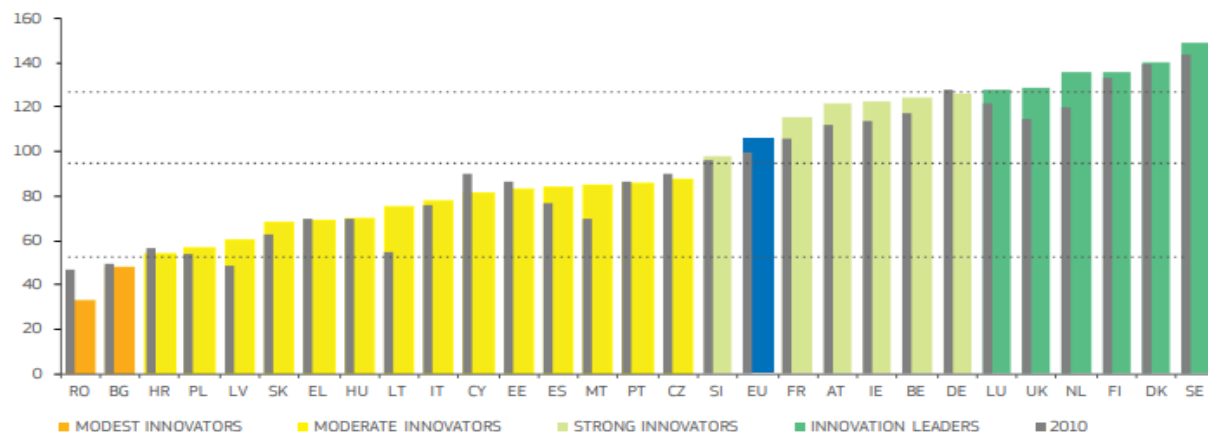


Figure 2 –Performance of EU Member states’ innovation system (adapted from (\*\*\*, CO. Euro 2018))

The colored columns indicate the performance of the Member States in 2017, using the latest data for 27 indicators compared to those in the EU in 2010. Horizontal horizons indicate performance in 2016 using the latest data for 27 indicators compared to those of the EU in 2010. The gray bars indicate the performance of Member States in 2010 compared to those of the EU in 2010. For all years, the same measurement methodology was used. Interrupted lines indicate the limit values between performance groups in 2017 by comparing the performance of Member States in 2017 with those of the EU in 2017.

For 24 Member States, performance in innovative human resources improved between 2010 and 2017, Slovenia's highest performance growth rate (51.8%). Two Member States have experienced massive declines in innovative human resources: Romania (-18.3%) and Portugal (-23.1%).

From the analysis of the performance situation obtained through innovation and innovative processes (Figure 2) it can be noticed that Romania is the last in the European Union in innovation performance, according to the European Union Scoreboard 2018, an annual report published by the European Commission. Romania has zero score for small and medium-sized Romanian companies (SMEs) with innovations. And in the 2018 edition of the European report, Romania and Bulgaria are placed in the group of EU states considered "modest innovators". Romania is the last in the EU and the human resources in the field of innovation. "Modest innovators perform weakest, Romania being the weakest performer" in the field of innovative human resources, warns the European Commission (\*\*\*, 2018d).

### Romania's Innovation Situation at European Level

The Romanian innovation system is based on the public sector, with only 29% of the research done by the business sector (the European average is 63%), and therefore the most important results should be provided by the public sector. For example, the approval of the *Romanian National Plan 2015-2020* allows the launch of new large-scale competitions, precisely to enhance performance in areas such as automotive, ICT, new technology, energy, nanoscience and nanotechnology and security.

Public - private collaboration remains undeveloped even though it has promising initiatives for the development of clusters in the economic sectors (automobile, IT) and research (life sciences, nuclear physics). These clusters bring together researchers, business people, politicians and make it possible to attract funding from European or national sources. Investments in research and innovation of the private sector and existing measures promoting private investment for research and innovation are not fully dimensioned to the challenges faced by local innovation enterprises, multinationals and small European companies. Furthermore, what needs to be considered is that there is a visible mismatch between the skills and knowledge required by the market and the qualifications offered by the academia.

The key challenge for Romania remains its low competitiveness, which has significant consequences for the research and innovation system. In terms of intensity (Maier, 2018; \*\*\*, 2017), Romania currently has the second lowest intensity in Europe in terms of research and development, with less than a quarter of the 2% target for 2020.

The main causes that lead to the low results of the Romanian research and innovation system are (\*\*\*, 2018 a-c):

- insufficient management experience;
- lack of "try and error" strategies;
- lack of promptness in correcting mistakes;
- insufficient funds or poor management of available funds;
- lack of incentives to support R & D in the private sector;
- Low absorption capacity of EU funds through framework programs.

The evolution of innovation performance (Figure 3) shows that Romania had one of the lowest R & D intensities in the EU (0.19% of GDP and was ranked 26th out of 28) and an annual average rate of growth - 6.8% between 2007 and 2010. For example, no Romanian firm is in the European top 1000 companies with R & D investment.

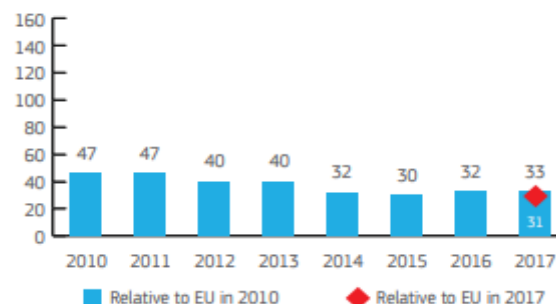


Figure 3 - *Evolution of innovation performance in Romania* (adapted from (\*\*\*, CO. Euro 2018))

Romania operates well below the European average in all dimensions and with all indicators. The weakest relative performance in terms of size has to do with links and entrepreneurship, the worst performance is also observed for patent applications in social challenges.

Romania's performances are similar to the European average for a number of indicators, such as: young people with upper secondary education (secondary education), exports of medium and advanced technology products, and employment in fast-growing companies in innovative sectors.

A high increase in the indicators is seen for patents and patents from abroad (17%) and community design (14%). The most severe decline in performance is observed in venture capital investments (-23%), sales of new innovative products (-21%), innovation expenditures for non-research and non-development (-17%). Innovative SMEs (-17%) and SMEs with product or process innovations (-17%).

The low performance is related to the economic structure and weak synergies between the research system and business activities. It is worth mentioning the lack of large Romanian multinational production companies and the division of lab or within international companies.

Romania is a powerful actor in the export of computerized services, but also has significant exports of road transport services, which are not classified as intensive knowledge. Therefore, performance is very close to the European average in terms of intensive knowledge services and below European average for innovative companies that are rapidly developing in innovative sectors.

The National Romanian Statistics Institute carried out a data analysis showing that out of 28 380 enterprises, only 12.8% have engaged in innovative activities, of which 3334 are successful innovators and the rest are enterprises that have abandoned the concept of innovation (\* \*\*, 2018c). National data were collected in statistical surveys based on questionnaires completed by companies that have as their own, main activity industry-wide research, and some services.

If we look at the classification of innovative enterprises by type of innovation, it is noted that the new forms of organizational practices in business, organization at the workplace and external relations of the enterprise, registered the highest share, of 6.7%. Businesses that have implemented a new concept or marketing strategy that they have not used before had a 6.6% share. By field of activity, service enterprises were more innovative, with a share of 13.1% of all enterprises, while the industrial sector accounted for only 12.6% of all enterprises (\*\*\*, 2017).

The economic activities of the industrial sector, such as production, accounted for 95.2%; the remaining sectors have lower weights: water reserve, sewerage, waste management, rehabilitation activities 2.3%, electricity, gas, hot water and air conditioning 1.4%, mining and exploitation 1.1%.

In the services sector, the activities representing the largest share of innovative enterprises are massively owned by 39.2%, followed by the transport and storage sector by 16.8%, information and communication 26.0%, professional, scientific and technical activities 13.1%, financial and insurance activities 4.9%.

According to the enterprise class and the number of employees, the most innovative enterprises are 27.0%, followed by the average 15.0% and the lowest 11.5%. Order remains in the industry and service sector [154].

According to the location of the services sold, 90% of the enterprises claimed to sell their local or regional products (regardless of other markets), 72.2% on the domestic market (regardless of other markets), 48.5% on the European market (regardless of other markets) and 23.5% % of businesses sell their products in other markets.

During the study, out of 1,840 enterprises with innovative products or processes, 313 enterprises only innovated, 511 companies only innovated, 705 enterprises innovated both products and processes, and 311 enterprises abandoned the concept of innovation.

The study results (\*\*\*, 2018a) show that 9.4% achieved organizational and / or marketing innovations, regardless of the implementation of other types of innovation, such as product innovations or processes. Of all businesses with innovation in marketing, 2.8% were only innovative in the organization, 2.7% were innovating in marketing and 3.9% were both innovative in organizing and marketing. The share of the industry sector was 9.7% and that of services 9.0%.

According to the survey, the turnover of innovative enterprises was 31.3% of the total turnover of enterprises. The share of enterprises with innovation in marketing or innovation in the organization was 23.1%, and the turnover of enterprises with product innovation or process innovation was 20.6%. The turnover of new or significantly improved products in total business turnover was 13.7% in 2014. Of the total turnover of new or significantly improved products, 28.8% represents the turnover of enterprises with improved products, and 18.9% represent the turnover of new products on the market. The turnover of enterprises with unchanged products was 52.3%. The Romanian public RDI sector is quite fragmented (\*\*\*, 2018b), while the private research sector is underdeveloped. Over the past 10 years, investment in research and development in Romania has grown from 0.37% of GDP in 2000 to 0.58% of GDP in 2008, then to just fall to just 0.48% of GDP in 2016. Currently, Romania has one of the lowest R & D investment rates in the EU with less than a quarter of the 2% target for 2020. In 2011, Romania had one of the lowest business rates in the EU research and development with a value of 0.17% (ranked 25th out of 27) and an average annual rate of -3.4% between 2000 and 2011.

The European Commission analyzed the strengths and weaknesses of the Romanian research and innovation system (\*\*\*, 2018c) and showed that Romania has scored well (above the European average) in terms of the number of science and technology graduates. The two indicators are linked to the performance potential of the research system as they relate to the provision of highly qualified human resources for research. However, overall, the underfunding of research and innovation in 1990 has created an emigration effect for high-skilled people, and this has made Romania a major exporter of researchers.

*The Innovation Scoreboard* launched by the European Commission in 2013 (\*\*\*, 2017) measures the extent to which ideas from innovative sectors can reach the market, delivering better jobs and building a more competitive Europe. The indicator focuses on four policy axes:

Grow through technology (patents);

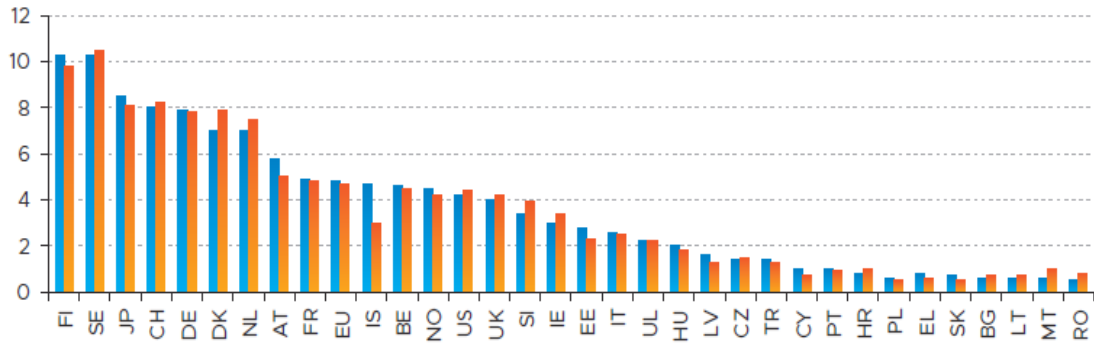


Figure 4 - *The performance of patents for EU countries* (adapted from (\*\*\*, 2017))

Jobs (intensive knowledge-based employment);

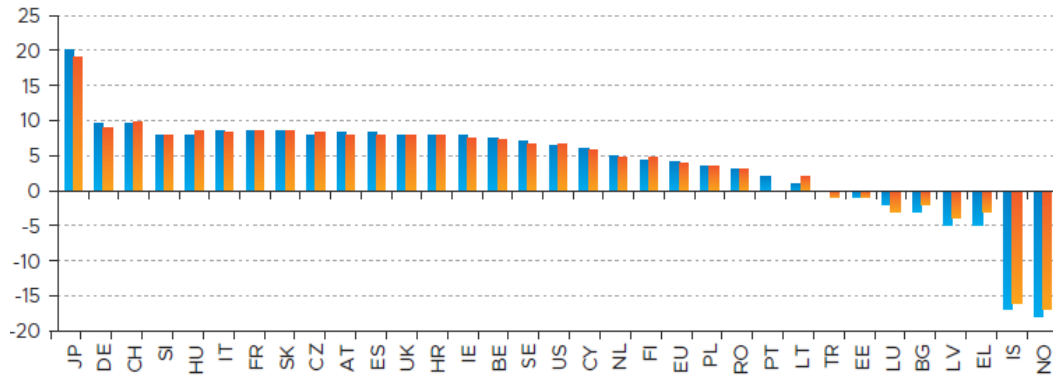


Figure 6 - *Trade between medium and advanced technology convenience in EU countries* (adapted from (\*\*\*, 2017))

Future business opportunities (jobs in innovative firms)

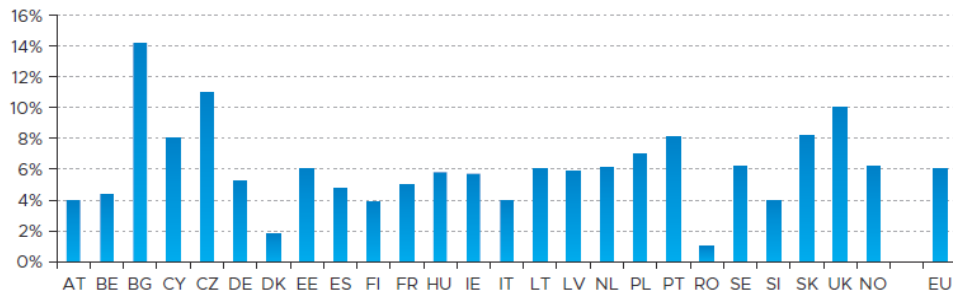


Figure 7 - *The employment situation in innovative firms in EU countries* (adapted from (\*\*\*, 2017))

The key concepts for this new Romanian strategy are smart, sustainable and inclusive growth, but the assessment criteria for achieving the Europe 2020 objectives are mainly quantitative, based on indicators that often do not reflect the real extent to which these objectives are met. In recent years, Romania has spent enough resources on numerous and diverse research projects, yet their applicability, relevance and utility have been very rarely proven (\*\*\*, 2017).

## Conclusion

Romania, according to the latest annual report published by the European Commission, is placed in the group of EU states of "modest innovators" being the last one to innovation.

Sweden is the leader in innovation, followed by Denmark, Finland, the Netherlands, the UK's leading innovation leader - and Germany.

In specific areas of innovation, EU leaders are: Denmark - human resources and environment conducive to innovation; Luxembourg - attractive and active research systems of an intellectual nature; Finland - funding and support; Germany - business investment; Ireland - innovation in SMEs and impact on employment; Belgium - innovation networks and collaboration; United Kingdom - sales effects

In conclusion, in many European countries, especially in those with low intensity in research and innovation (such as Romania), budgets are strongly tense by rising budget deficits, recession, weak economic growth, and growing competition on international markets

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