THE EDUCATION AND RESEARCH SYSTEM IN ROMANIA: A COMPARATIVE ANALYSIS WITH THE EU MEMBER STATES[1]

DORINA CLICHICI
Institute for World Economy, Romanian Academy
Calea 13 Septembrie nr. 13, Sector 5, Bucureşti, ROMANIA
dorina.clichici@iem.ro

ANGELA TIMUȘ
National Institute for Economic Research, Academy of Economic Studies of Moldova
Strada Ion Creangă 45, Chișinău, REPUBLIC OF MOLDOVA
ince.timush@gmail.com

CORINA CHIRONACHI
Academy of Economic Studies of Moldova Doctoral School
str. Banulescu-Bodoni 61, MD-2005, Chișinău, REPUBLIC OF MOLDOVA
corinachironachi@gmail.com

Abstract: The education and research system is one of the most powerful tools of a state through which long-term economic growth can be ensured, employment and income growth can be achieved, innovation stimulated, and institutions strengthened. Romania lags severely behind other European Member States regarding economic development, while the quality of education and research remains quite scarce, undermining the economic convergence process of the country. Against this background, the objective of the paper is to investigate the degree of Romanian education and research convergence with the European Union (EU). Moreover, it uncovers how the education and research system in Romania is financed and assesses its performance compared to other EU Member States.

Key-Words: education and research system, Romania, EU Member States, expenditure on education, R&D expenditure, innovation index
JEL Classification: I20, I23, H52, O57

1. Introduction

The education and research system is one of the most powerful tools of a state through which long-term economic growth, employment and income growth can be ensured, innovation stimulated, and institutions strengthened. A performing education system is one that forms human resources with cognitive skills necessary for a constantly changing economic environment, capable of using the latest technological capabilities and creating new ones. Moreover, an educated workforce facilitates the absorption of advanced technologies imported from more developed states, thus contributing to increasing the level of technological modernization of the economy. In other words, in the absence of a high-performing educational system, the sustainability and economic competitiveness of the state cannot be ensured.

2 Literature review

High-performing education system has a multitude of positive effects of on economic growth, on personal income, but also on long-term well-being. Using the results of international student assessment tests, Hanushek and Kimko (2000) revealed a significant positive effect of education quality on economic growth. Their estimates suggest that high performance on these tests would produce roughly one percentage point higher

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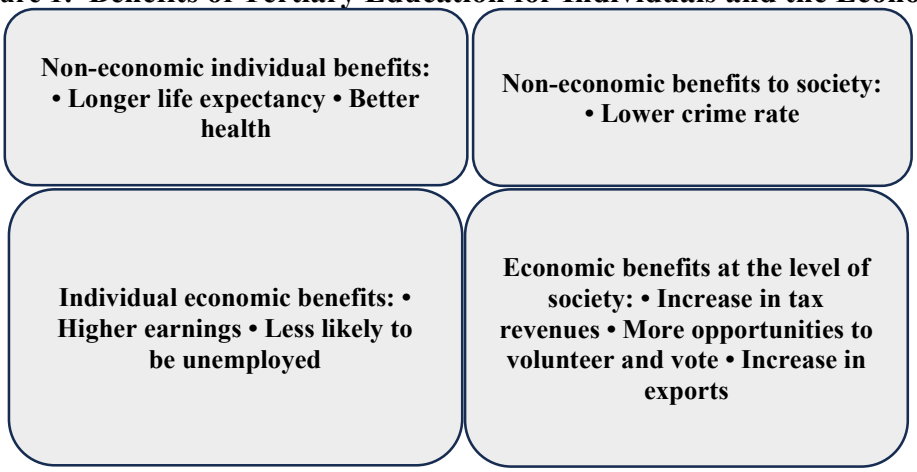
annual economic growth. Another study, conducted by Barro (2013), highlighted the major role of the quality of education and the average number of years of schooling for economic growth. Although the impact of years of schooling is positive and significant, the empirical results of the study suggest a greater positive impact of the quality of education, as measured by international assessment test scores, on economic growth.

Moreover, the major role of tertiary education for the economy is recognized in the specialized literature. It increases employment and ensures higher wage earnings, spurs productivity and innovation, provides a higher level of social stability, increases the efficiency of public administrations, the level of civic engagement and the level of health of the population (Murthi et al, 2021). The contribution of tertiary education to economic growth was also investigated by the OECD (2012), which showed that, on average, about half of the economic growth of OECD member states is related to the growth of the labour income of people with a university degree. In France, Norway, Switzerland, and Great Britain, more than 60% of GDP growth is generated by individuals with tertiary-level education. In addition, according to the results obtained by Patrinos (2016), each additional year of education produces a surge in individual income received by approximately 5-8% per year. Globally, the returns generated by tertiary education are the highest, followed by primary education and then secondary education. Given these factors, the author suggests that decision-makers must consider the further expansion of university education, increasing the access of young people to this level of studies. Another study that emphasized the benefits that higher education generates both for individuals and for society in general is that conducted by Willetts (2023). According to the author, the benefits can materialize in the form of economic gains or non-financial social gains (Figure 1).

Figure 1: Benefits of Tertiary Education for Individuals and the Economy



Source: Author representation based on Willetts (2023).

Valero and van Reenen (2019) explored the link between the increase in the number of universities and the average increase in GDP per capita and revealed the existence of a positive correlation between these two variables. Specifically, results suggest that a 10% increase in the number of universities in a region generates a higher increase in GDP per capita by about 0.4%.

The research system is another important pillar that contributes to sustainable economic growth, through the creation of knowledge, products, and new technologies, being a vital component for reducing the competitiveness gap between states (European Commission, 2021). However, the research and development (R&D) system is closely related to the performance of the education system, which is the main pillar of providing human resources capable of using the latest technological capabilities and creating new ones. In other words, without a high-performing educational system, it is impossible to ensure the creation of an effective research system, which in turn would undermine the country's economic growth and competitiveness The intensity of research and development activity is determined both by the performance of the education system, but also by the expenditures allocated by governments for R&D activity. Thus, for example, Sokolov-Mladenovic et al. (2016) investigated the influence of R&D spending on economic growth in the EU over the period 2002-2012. The results showed that a 1% increase in R&D spending as a share of GDP would increase the real GDP growth rate by 2.2%. Other studies that empirically validated the causality between R&D spending and GDP were conducted by Köhler et al. (2012), Inekwe (2015), Bilas et al. (2016) and Szarowská (2018).

In conclusion, the education and research system represent the basic pillar of economic growth and sustainable development of any state, specialized studies revealing the major role of the quality of the educational act, but also of the research activity. Romania is one of the EU Member States that lag severely behind other European states regarding the quality of education and research, which undermines the economic convergence of the country. Against this background, the objective of the paper is to investigate the degree of Romanian education and research convergence with the EU. Moreover, it uncovers how the education and research system in Romania is financed and what is the level of its performance compared to other EU Member States.

2. Methodology and data

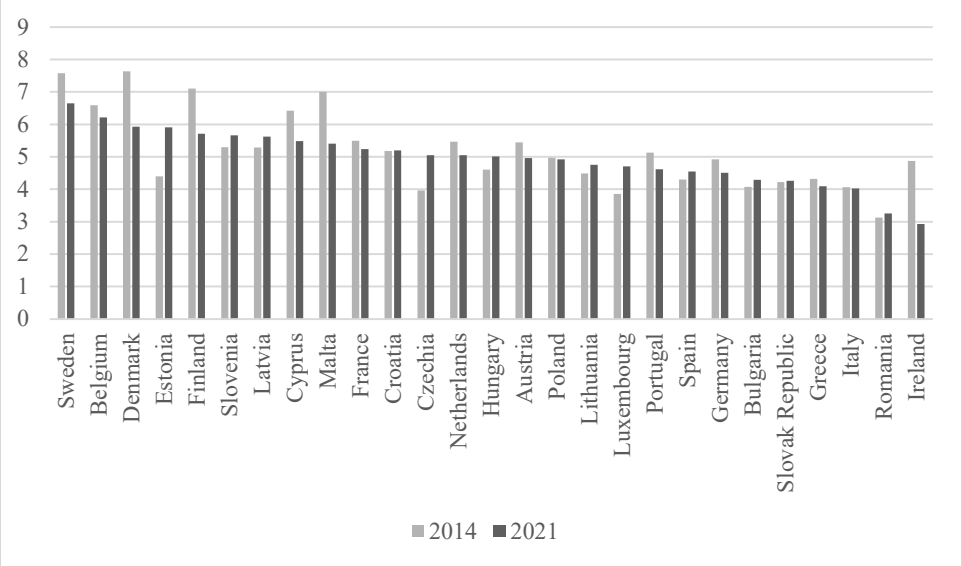
Based on qualitative and quantitative analyses, we have conducted a comparative analysis of the education and research system in the EU countries for 2014 versus 2021. In addition, we have carried out a quantitative analysis of the education and research system funding characteristics in the EU Member States. Moreover, we have used the case study of Romania to provide in-depth information about how the education and research system in Romania is financed and its performance level. The data on the education and research system funding in Romania and other EU countries were gathered from the Eurostat and World Bank database (2024), while the education and research performance level indicators were retrieved from the European Innovation Scoreboard (2024). However, this research is limited by the availability of data, with the latest figures accessible only up to 2021, while for the expenditure on tertiary education the latest figures are up to 2016.

3. The education and research system in Romania: a comparative analysis

Financial resources allocated to the education system in relation to GDP reflect the degree of importance that political decision-makers give to it. The comparative analysis of the expenditures made by the EU Member States for the education system reveals several important conclusions.

The largest financial resources were allocated to education by Sweden, Belgium, and Denmark, reaching 6.6%, 6.2% and 5.9% of GDP respectively in 2021. Despite the increase of these expenditures by Romania in the last seven years, from 3.1% in GDP in 2014 to 3.3% in GDP in 2021, their level is still extremely low, placing it in second last place in the EU (Figure 2). At the same time, we note that other states in Central and Eastern Europe have given important financial support to the education system, specifically, the Czech Republic (5.05%), Hungary (5.01%), Poland (4.92%) or Bulgaria (4.29%).

Figure 2: Government expenditure on education, in 2014 and 2021 (% of GDP)

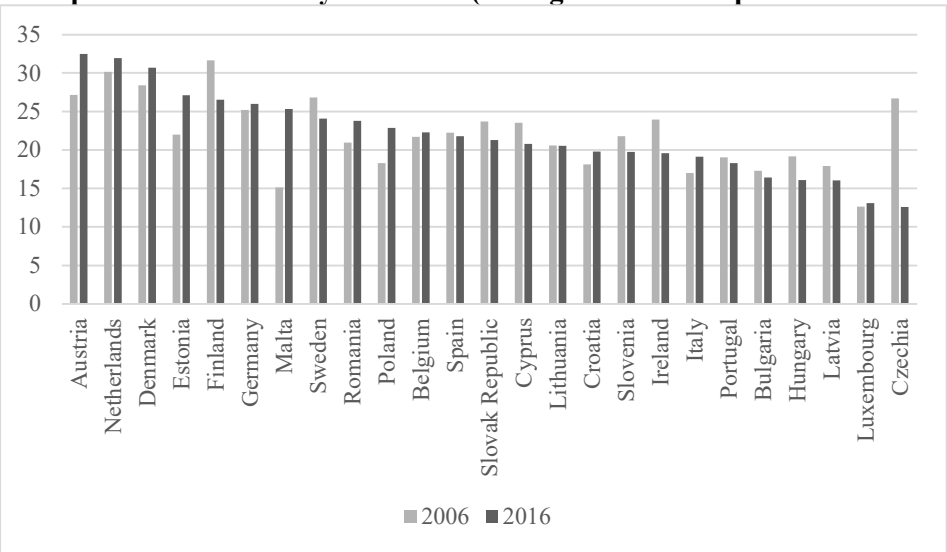


Source: Author representation based on World Bank data (2024).

Considering the significant role of tertiary education highlighted by specialized studies, the highest public expenditures in this sector were made by Austria (32.5%), the Netherlands (31.9%), and Denmark (30.6%). On a positive note, Romania has allocated to tertiary education a consistent volume of financial resources compared to the total value of public expenditure for education, ranking ninth of the 27 states and registering an

upward trend, from 20.9% in 2006 to 23.7% in 2016 (Figure 3). However, it should be noted that these data have not been updated since 2016, so the current situation could be significantly different.

Figure 3: Expenditure on tertiary education (% of government expenditure on education)

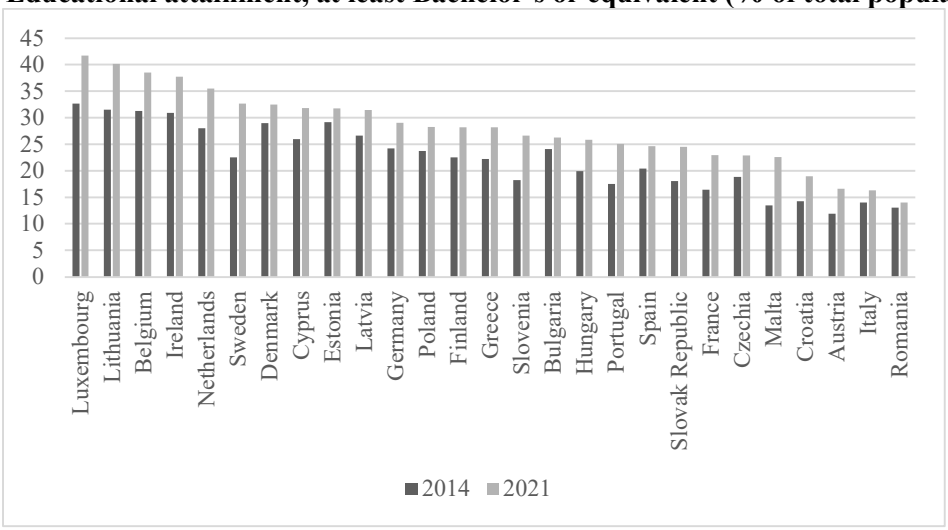


Source: Author representation based on World Bank data (2024).

The performance of an education system determines the number of graduates of bachelor's, master's, and doctorate university studies, which form human resources with cognitive skills necessary for a constantly changing economic environment, able to use the latest technological capabilities and support a high level of innovation.

From Figure 4 it can be noted that Romania has the lowest level of graduates with bachelor's degrees compared to the population over 25 years old, occupying the last place in the EU, with a level of only 13.9%. The best performing EU states according to this indicator were Luxembourg, Lithuania, and Belgium, with values of 41.7%, 40.11% and 38.5%, respectively. At the same time, we note that the states in Central and Eastern Europe managed to reach a high level for this indicator, with Poland reaching the value of 28.2%, Bulgaria, 26.2%, and Hungary, 25.8% (Figure 4).

Figure 4: Educational attainment, at least Bachelor's or equivalent (% of total population 25+)

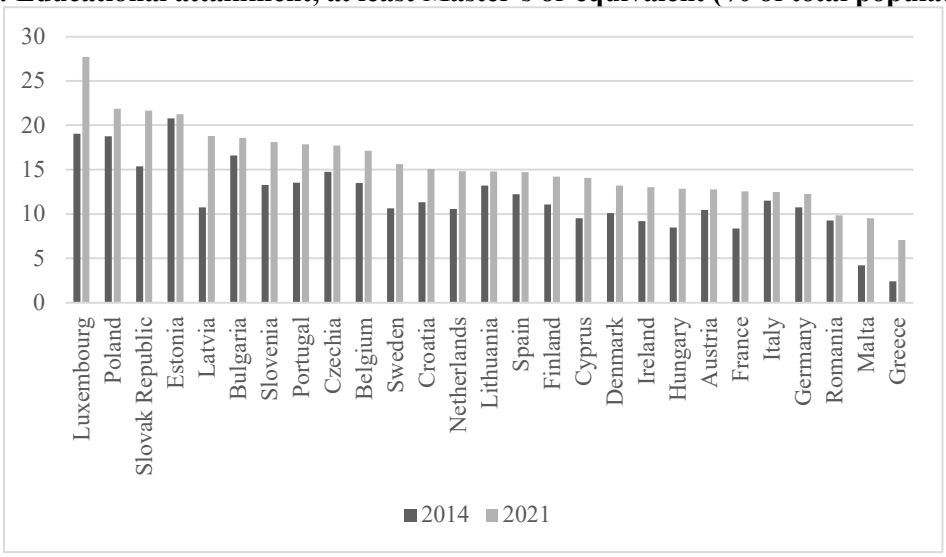


Source: Author representation based on World Bank data (2024).

At the same time, graduates of master's degree studies in Romania have experienced a growth trend in recent years, so that their share in the population over 25 years old reached the level of 9.84% in 2021 compared to 9.21% in 2014 (Figure 5). This indicator placed Romania in 25th place out of the 27 member states, while

other states in Central and Eastern Europe had significantly higher values, e.g., Poland (21.9%), Bulgaria (18.5%), Czech Republic (17.7%) or Hungary (12.3%).

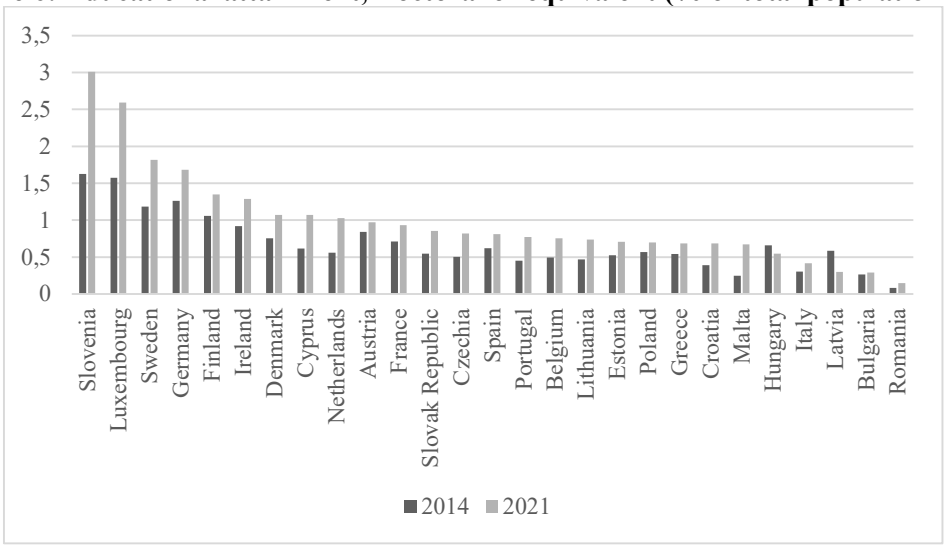
Figure 5: Educational attainment, at least Master's or equivalent (% of total population 25+)



Source: Author representation based on World Bank data (2024).

Regarding the graduates of doctoral university studies, Romania ranked last in the EU, with a share of only 0.14% in the population over 25 years old. On a positive note, a trend of their growth can be observed in the last seven years, from a value of only 0.08% in 2014. However, Romania is surpassed by all other states in Central and Eastern Europe (Figure 6).

Figure 6: Educational attainment, Doctoral or equivalent (% of total population 25+)



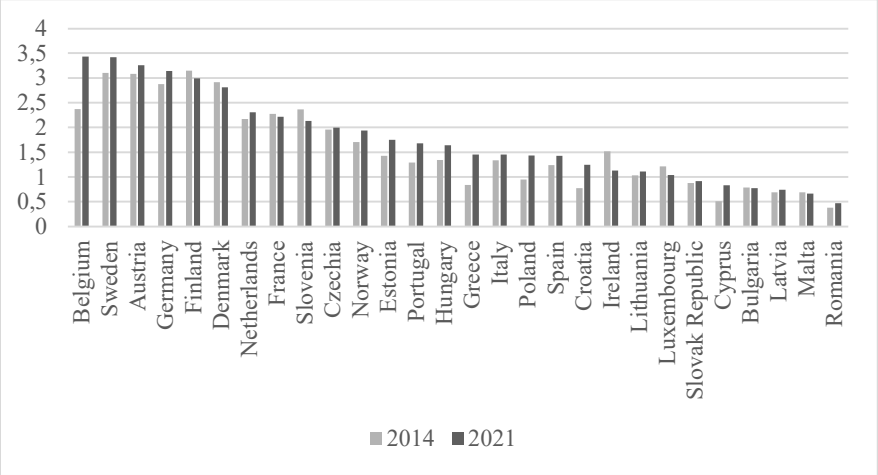
Source: Author representation based on World Bank data (2024).

The results of the education system, but also the expenses allocated by governments for R&D activity determine the degree of development of research and innovation of a state.

The data presented in Figure 7 show us to what extent R&D activity is stimulated in Romania compared to EU Member States and what is the role of R&D for the economy. Expressed by the share of total R&D expenses in GDP, the intensity of R&D activity in Romania recorded the lowest level in the EU, of only 0.47% in GDP in 2021. However, their increasing trend can be noted over the past seven years, by 0.1 percentage points. The highest shares in GDP of the financial resources allocated for R&D in the EU were registered by countries such as Belgium (3.43%), Sweden (3.41%) and Austria (3.25%), all of which are experiencing an upward trend of them compared to 2014 (Figure 7). At the same time, states from Central and Eastern Europe, such as the Czech

Republic (1.99%), Hungary (1.64%), Poland (1.43%) or Bulgaria (0.77%), significantly surpassed Romania on this indicator.

Figure 7: Gross domestic expenditure on R&D, 2012 and 2022 (% of GDP)

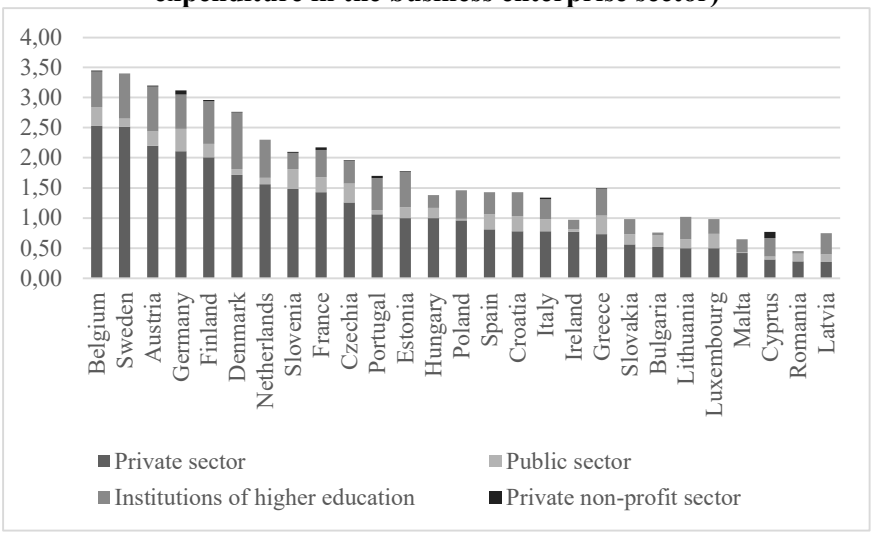


Source: Author representation based on Eurostat (2024).

The analysis of expenditures for R&D activity by sectors of the economy highlights the fact that the differences between countries in terms of the performance of the research system are often explained by the different level of involvement of the private sector of enterprises in this activity. Thus, from Figure 8 it can be noted that the private sector of enterprises is the one that makes the largest investments in R&D activity in most of the EU states, Belgium, Sweden, and Austria recording the highest values of the expenditures of the private sector of enterprises compared to GDP of 2.53%, 2.51% and 2.11% respectively in 2022.

In a negative way, we can observe that the private sector of enterprises in Romania is involved to an extremely limited extent in the R&D activity. According to the data, the expenses for the R&D activity carried out within this sector in Romania reached the level of only 0.28% of GDP in 2022, placing it in the penultimate place in the EU. At the same time, states in Central and Eastern Europe have experienced greater attention paid by the private sector of enterprises to R&D activity, such as the Czech Republic (1.26% in GDP), Hungary (1% in GDP), Poland (0, 96% in GDP) or Bulgaria (0.52% in GDP).

Figure 8: Gross domestic expenditure on R&D by sector, 2022 (%, relative to GDP, ordered by the expenditure in the business enterprise sector)



Source: Author representation based on Eurostat (2024).

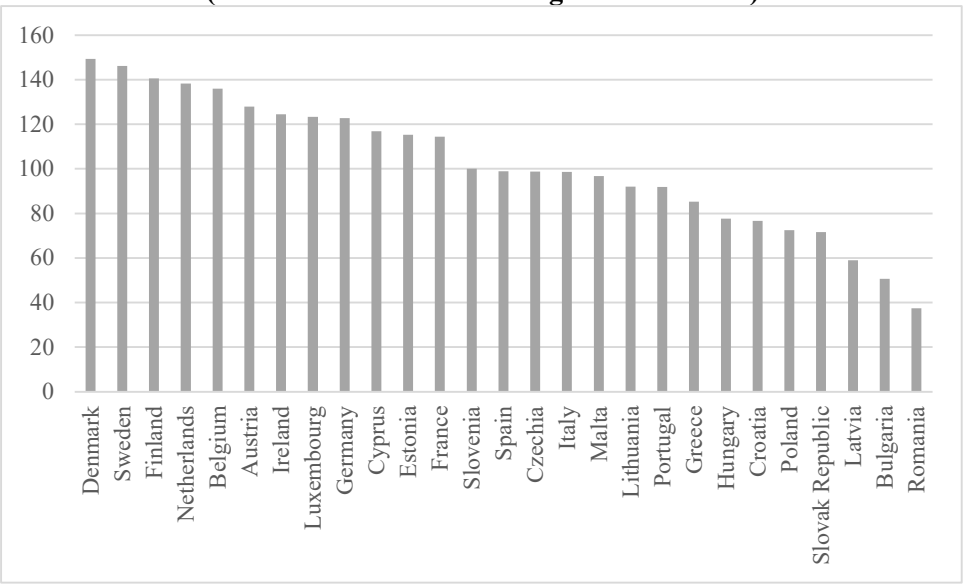
At the same time, the public sector in Romania registered a large share of expenditure for R&D activity in GDP, of 0.13% in 2022, placing Romania in 19th place out of the 27 member states. A reduced involvement in R&D is noted in the case of higher education institutions in Romania, which experienced a value of these

expenses compared to GDP of only 0.04%, the lowest value in the EU. At the same time, the non-profit private sector did not make such expenditures.

The low level of financial resources allocated to the education and research system in Romania, but also the low number of undergraduate, master's and doctorate university graduates are reflected in the extremely low level of innovation activity.

More precisely, Romania recorded the lowest score of the innovation index in 2024, of only 37.4 in relation to the EU average, being still included in the category of emerging innovative states. At the same time, it can be noted that Romania is surpassed by states from Central and Eastern Europe such as: the Czech Republic (98.7), Hungary (77.6), Poland (72.5) and Bulgaria (50.6). At the same time, the highest scores were obtained by Denmark (149.3), Sweden (146.2) and Finland (140.6) (Figure 9).

Figure 9: Index of innovation activity in EU Member States in 2024 (in relation to the EU average = 100 in 2017)



Source: Author representation based on European Innovation Scoreboard data (2024).

In conclusion, the analysis carried out in this chapter highlighted the extremely low level of funding of the Romanian education system, which represents one of the most important obstacles in achieving the real economic convergence with the EU Member States. Despite some positive trends regarding the indicators that reflect the performance of the education and research system, Romania still registers the lowest score of the EU innovation index.

4. Conclusions

The analysis of the way in which the education and research system in Romania are financed and the level of their performance revealed some conclusions. Firstly, some positive trends were noted regarding the financial resources allocated to the education and research system in Romania, more precisely, the public expenses allocated to the education system, the public expenses allocated to tertiary education, the total expenses for R&D activity increased. Also, there has been an increase in the number of bachelor's, master's, and doctorate university graduates, as well as in the number of researchers involved in R&D activity in recent years. Secondly, despite the positive evolution of the financial resources allocated to education and research in Romania, the level of performance of education and research materialized through a reduction in the innovation index registered by Romania in 2024. Romania has the lowest innovation index score in 2024 compared to the EU average, being still included in the category of emerging innovative states.

To ensure a contribution of education and research to economic growth, decision makers should pursue several objectives. First, ensure that all citizens have access to education and training, by creating youth education programs enshrined in legislation, but also by investing in lifelong learning and job creation programs to help adults to improve their lifelong skills. Second, to adjust and adapt educational programs as technologies and skill requirements change, enabling a skilled workforce to compete effectively in the global marketplace. Third, invest

in teachers and innovative teaching methods. Ensuring that education systems have enough qualified teachers is essential, but so is implementing high-quality learning practices that are responsive to change. Furthermore, to enhance the positive impact of education on the economy, it is also important that education systems react quickly in times of crisis.

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