(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Bridging the Innovation Gap for Sustainable Development: Romania's Position in the European Innovation Ecosystem

Otilia Cramariuc [1], Paul Pașcu [2] and Mihai Popescu [3]

[1)2)3)] "Ștefan cel Mare" University of Suceava, Romania

Abstract. *Background: Romania remains the EU's lowest-performing country in innovation, classified as an "emerging innovator" in the European Innovation Scoreboard. This paper explores the sustainability implications of this innovation gap by assessing Romania's position within the EU innovation ecosystem. Methods: Using a mixed-methods approach, the study combines quantitative analysis of key indicators—such as R&D intensity, intellectual property output, digitalization, and entrepreneurial activity—with qualitative evaluation of policy documents and institutional frameworks. Results: The results reveal persistent structural deficiencies, including chronic underinvestment in research and development, weak university-industry collaboration, and limited innovation commercialization. While Romania has made progress in digital infrastructure—achieving broadband penetration above the EU average—and improved some aspects of research quality, these advances are undermined by declining public R&D funding, low venture capital availability, and high brain drain. The findings suggest that Romania's innovation gap poses significant challenges to achieving sustainable economic growth and alignment with the 2030 Sustainable Development Goals, particularly SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation and Infrastructure). Closing this gap will require integrated policy reforms, long-term investment strategies, and institutional modernization. Conclusions: The paper concludes that fostering a stronger innovation ecosystem is essential for enhancing Romania's competitiveness, resilience, and sustainable development trajectory within the EU.*

Keywords: innovation performance, sustainability, R&D Investment, entrepreneurial ecosystem, European Innovation Scoreboard

JEL Codes: O30, O38, Q01, F63, L26

How to cite: Cramariuc, O., Pașcu , P., & Popescu , M. (2025). Bridging the Innovation Gap for Sustainable Development: Romania's Position in the European Innovation Ecosystem. *Journal of Economic Development, Environment and People*, *12*(3), 1–18. https://doi.org/10.26458/jedep.v12i3.898

1. Introduction

Empirical studies highlight that the impact of innovation and entrepreneurship on economic growth and development varies depending on a country's stage of development. According to the economic theory of development stages proposed by Porter et al. (2002) [1], economies go through three stages: factor-driven, efficiency-driven, and innovation-driven.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

According to the Global Competitiveness Report 2012–2013 by the World Economic Forum, out of the 27 EU member state economies, two are efficiency-driven economies (Romania and Bulgaria), five are in transition from stage 2 to stage 3 (Estonia, Hungary, Latvia, Lithuania, and Poland), while the rest are innovation-driven economies. Competitiveness growth in less advanced countries can be achieved through the adoption of existing technologies or incremental improvements in other areas. However, in countries that have reached the innovation stage, such measures are no longer sufficient to increase productivity. Firms in these countries must design and develop cutting-edge products and processes to maintain a competitive advantage.

2. Materials and Methods

This study employs a mixed-methods research design to assess Romania's innovation performance in the context of European sustainable development. The analysis combines quantitative and qualitative methods, ensuring a comprehensive understanding of the country's innovation ecosystem and its alignment with sustainability goals.

Quantitative data were drawn from multiple internationally recognized sources, including the European Innovation Scoreboard 2024 (European Commission) [2-29], Eurostat, the Global Competitiveness Report 2012–2013 (World Economic Forum) [30], the Global Competitiveness Ranking 2024 [31], and the World Competitiveness Yearbook 2023 (World Competitiveness Center, IMD) [32]. These databases provided key indicators such as GDP per capita, R&D expenditures, innovation index scores, patent and trademark applications, entrepreneurial activity, and broadband penetration.

In parallel, a qualitative policy analysis was conducted, focusing on strategic documents such as the Report on the Future of European Competitiveness – Part A by Mario Draghi [33], and Romania's 2023 Country Report issued by the European Commission [34]. Additional national-level funding instruments and policy frameworks—such as the Start-up Nation program, Competitiveness Operational Programme 2014–2020, and initiatives supported by the Executive Agency for Higher Education, Research, Development and Innovation Funding—were also reviewed to capture the institutional and financial landscape affecting innovation.

This methodological triangulation enables a critical and contextualized evaluation of Romania's innovation system, identifying structural bottlenecks and strategic levers for achieving sustainable, innovation-driven development in line with SDG 8 and SDG 9. This methodological framework allows for an integrative understanding of how Romania compares with other EU countries in terms of innovation performance and economic competitiveness, and identifies critical areas requiring intervention to enhance national innovation capacity.

3. Results

3.1. Innovation indicators of EU countries

In order to identify the innovation level of each EU country, indicators reflecting the degree of development (GDP per capita; GCR score), dynamics, and entrepreneurial performance (Turnover share SMEs) were identified and analyzed. However, the focus was especially on the potential and performance in innovation of these countries (Summary Innovation Index, Innovation, Intellectual assets). According to the Innovation Union Scoreboard EU, based on their average innovation

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

performance, expressed through the composite indicator Summary Innovation Index, which summarizes the performance of research and innovation systems at the country level, EU member states are grouped into four performance categories.

These are:

- Innovation Leaders: Denmark, Finland, the Netherlands, and Sweden
- Strong Innovators: Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Germany
- Moderate Innovators: Slovenia, Spain, Czech Republic, Italy, Malta, Lithuania, Portugal, Greece, and Hungary
- Emerging Innovators: Croatia, Poland, Slovakia, Latvia, Bulgaria, and Romania.

The innovation performance of countries (see Table A1 in Appendix A) is based on 25 different indicators that have been grouped into 8 innovation dimensions, incorporated into 3 main types of indicators: facilitators (key factors of innovation), business activities, effects of innovation at the company level, and the results/effects of business innovation activities.

It can be observed that efficiency-based economies and those transitioning from stage 2 to stage 3, the Baltic countries, and those in Eastern Europe have a lower GDP per capita, while innovation-based economies, primarily the older member states, have a higher GDP per capita.

The graph depicting the situation of EU countries in terms of the two indicators, namely GDP per capita and the Innovation Index, is presented in Figure 1**.**

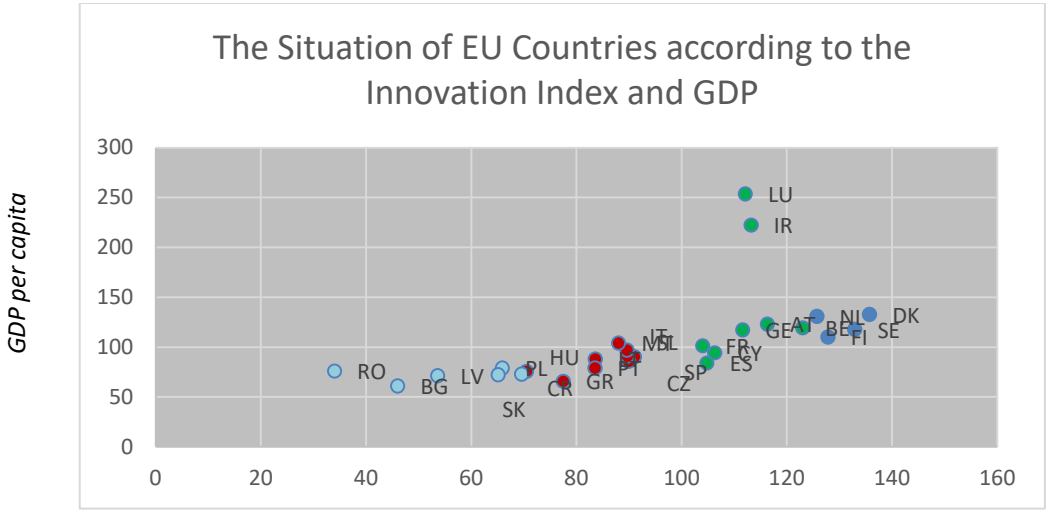


Figure 1. The Situation of EU Countries According to the Innovation Index and GDP
Source: European Comission, European Innovation Scoreboard 2024, Country Profiles

It can be observed that the level of development of countries is directly proportional to their innovation potential and performance, with these two indicators influencing each other. Therefore, one can state that, at the EU level, innovative performance is a factor that drives economic development. A

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

direct and strong relationship has been identified between the Innovation Index (Summary Innovation Index) and GDP per capita. Thus, the gaps between countries in terms of economic development can be explained by disparities in innovative performance. In countries such as Bulgaria, Latvia, Lithuania, and Romania, where innovative performance is well below the EU average, a similarly low GDP per capita has been identified. This highlights the need to increase innovative performance in these countries in order to boost national competitiveness and progress.

Countries belonging to the innovation leaders group, primarily those from north-western Europe, have a slightly higher quality of innovation systems than their GDP per capita levels, which is similar to the GDP per capita recorded by most countries in the strong innovators group. Various research studies show that economic development largely depends on innovation and the innovation capacity of enterprises, an aspect that is particularly observed in innovative entrepreneurship through start-ups and spin-offs. The Situation of EU Countries according to the 2024 Global Competitiveness Ranking is presented in Figure 2.

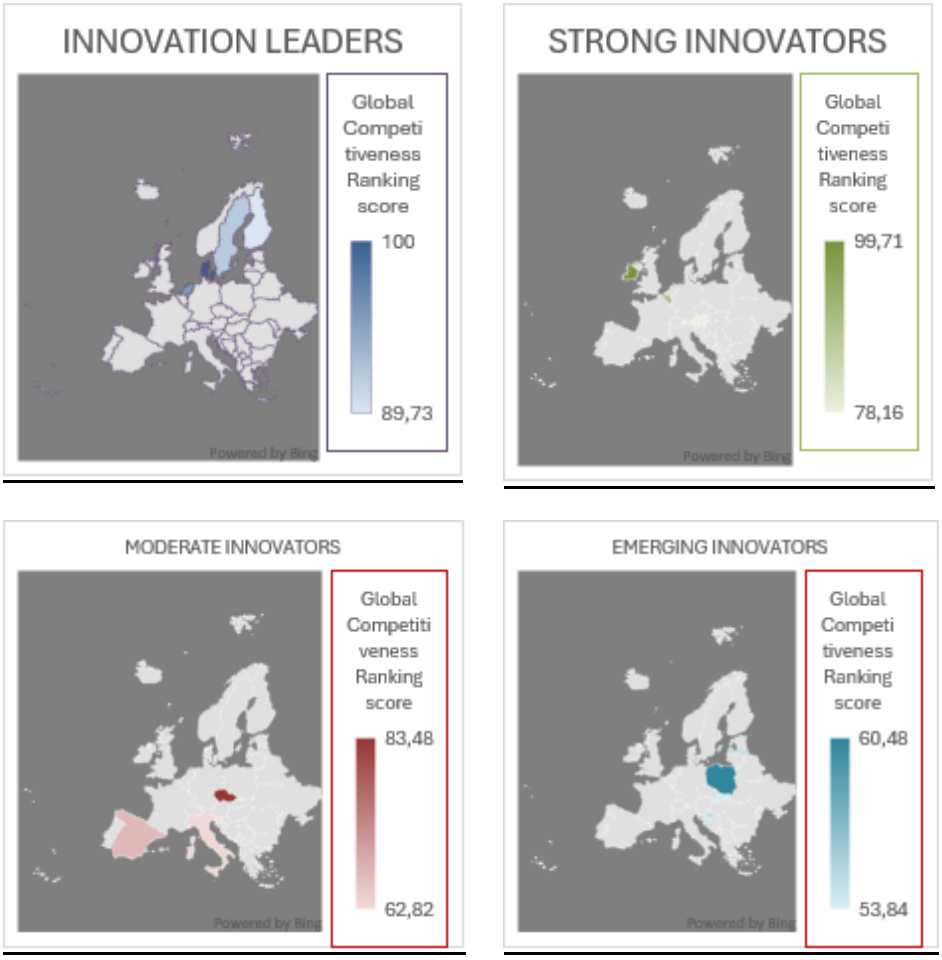


Figure 2. The Situation of EU Countries according to the 2024 Global Competitiveness Ranking

Source: European Comission, European Innovation Scoreboard 2024, Country Profiles

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Regarding the position in the Global Competitiveness Ranking for the year 2024, it is worth noting that the measurement of a country's competitiveness involves multiple factors, which are grouped into 12 pillars organized into 4 main categories (see Figure 3).

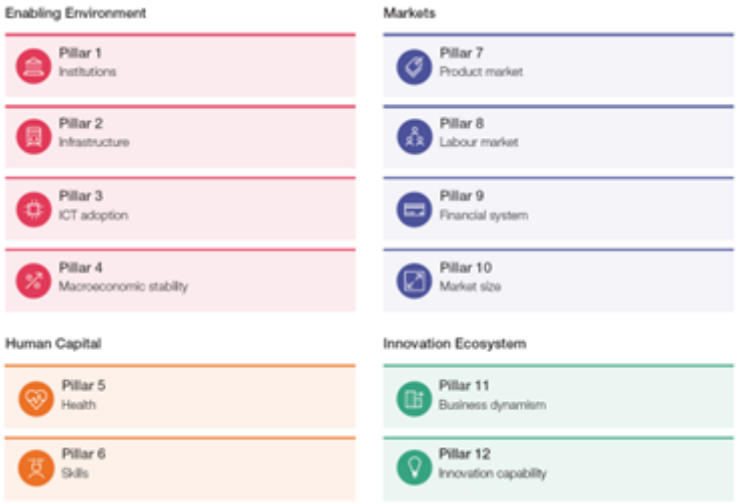


Figure 3. Pillars of Global Competitiveness

[1] Source :Global Competitiveness Report 2012–2013 by the World Economic Forum

Global Competitiveness Ranking for the year 2024

The global competitiveness ranking provides valuable insights into countries' innovation capacity by highlighting categories of indicators that have only recently been considered, thereby increasing the accuracy of countries' positioning on the global innovation map. As disruptive technology redefines how we live, the GCR score measures the aspects most important for long-term growth, emphasizing less tangible factors that are becoming increasingly relevant. These factors signal a country's readiness and adaptability to change, including the agility of all national stakeholders involved in this process.

The innovation deficit is a reality both for Romania within the EU and for the EU in a global context. The Report on the Future of European Competitiveness – Part A – Competitiveness Strategy for Europe by Mario Draghi draws attention to ways of counteracting the innovation deficit. Among these, the ones targeting European innovative entrepreneurship include:

- Europe must facilitate the transformation of inventors into investors and support the scaling-up of successful businesses. The EU should become as attractive to inventors as other global innovation-leading regions. In this respect, several measures are proposed to support the transition from invention to commercialization in Europe:

- To overcome bureaucratic barriers in universities and research institutions in managing intellectual property rights with their researchers, a new model of fair and transparent royalty-sharing is recommended.
- To reduce application costs for young companies and provide uniform intellectual property protection, the adoption of the unitary patent in all EU member states is proposed.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

- The EU should conduct an in-depth assessment of the impact of digital and other regulations on small companies, to exempt SMEs from rules that only large companies can comply with.
- A better financing environment is needed for disruptive innovation, start-ups, and scale-ups, especially as barriers to growth in European markets are being dismantled:
- Expansion of incentives for business angels and early-stage venture capital investors.
- Extension of the EIB Group's mandate to allow co-investment in companies requiring higher capital volumes, also enabling it to take on more risks to attract private investors.
- Supporting and expanding research and innovation will also be crucial for key manufacturing sectors, such as the pharmaceutical industry.

To reduce the innovation gap between the EU and countries like the US and China, the same report highlights current challenges Europe faces from the research and innovation perspective:

- EU companies spend significantly less on R&D (EUR 270 billion less than their US counterparts in 2021) because they are specialized in mature technologies with limited discovery potential.
- The EU public sector spends about the same on R&D as the US relative to GDP, but only a tenth of these expenditures occur at the EU level.
- Despite having talented researchers, entrepreneurs, and patents, Europe fails to translate innovations into commercialization, and innovative companies seeking to scale in Europe are hindered at every stage by incoherence and restrictions.
- Many European entrepreneurs prefer to seek venture capital in the US and expand in the US market (between 2008 and 2021, almost 30% of "unicorns" founded in Europe—startups later valued at over USD 1 billion—relocated abroad, with the vast majority moving to the US).

3.2. The evolution of Innovation in Romania

Romania is an "emerging innovator," with the weakest innovation performance in the EU. According to the 2022 European Innovation Scoreboard, Romania's innovation performance is only 50% of the average of emerging innovators, and the gap between Romania and the EU is widening.

Nevertheless, Romania has seen a significant improvement in the quality of its research system, with a notable 33.8% increase in 2024 compared to 2017. Additionally, there was a remarkable 12.8% rise in the share of foreign doctoral students, indicating a research environment that is increasingly diverse and has more competitive potential. Despite this progress, the attractiveness of Romania's research systems stands at only 37.7% of the EU average in 2024.

However, human resource challenges constrain Romania's innovation development, as the country performs below the EU average. Romania registered a 23.2% decrease in the number of new doctoral graduates since 2017, negatively affecting the country's innovation potential.

In terms of digitalization, Romania has made substantial progress, highlighted by a 36.9% increase in this dimension compared to 2017 and a performance of 144.4% of the EU average in 2024 regarding broadband penetration (ranking first among EU member states). Still, digital skills remain a challenge in Romania, with a very modest share of the population possessing above-basic digital skills – the country performs at just 21.3% of the EU average in this area in 2024.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Another aspect offering sustainable prospects for Romania's innovation environment is the improvement of the legal framework governing research activity in the country and the entry into force of legislative changes that foster a more favorable environment for public and private investments in research, development, and innovation.

The 2023 Country Report on Romania [1]highlights key weaknesses regarding Romania's innovativeness in the context of sustainable development in Europe, such as:

- Low quality and limited RDI spending affect industrial capabilities.
- Very low investments in RDI activity. Public RDI investments have steadily declined in recent years: €8.9 million in 2017 (0.005% of GDP), €6.9 million in 2018, €1.2 million in 2019, and €200,000 in 2020 (less than 0.001% of GDP).
- Romania has the lowest overall RDI intensity in the EU. At 0.48% of GDP in 2021, this is far below the EU average (2.26%) and Romania's own target of 2% (set for 2020). Notably, public RDI expenditure has dropped in recent years, standing at 0.19% of GDP in 2021—just a quarter of the EU average (0.76%), reflecting severe underfunding. The absence of a multi-annual budget further increases unpredictability for the RDI community.
- Private sector RDI spending has stagnated and, at 0.29% of GDP, amounts to about one-fifth of the EU average (1.53% in 2020). Spending is driven by a few large companies and lacks direct government support.
- Innovation commercialization results are weak: patent application performance has declined and is the lowest in the EU. The expansion of national innovative companies is also hindered by the limited size of the local venture capital market.
- Innovation results remain weak, and RDI investments (0.5% of GDP in 2019) are far below the EU average of 2.3%. Only the capital region exceeds the national RDI intensity average (1.1% of GDP), due to higher employment in high-tech sectors and knowledge-intensive services.

Romania Key Innovation-Related Indicators and the Innovation Index

The main innovation-related indicators in Romania for the period 2010–2021 are presented in Table 1.

Table 1. The main innovation-related indicators in Romania for the period 2010–2021 (percentages)

Romania	2010	2015	2019	2020	2021	EU Average
Key indicators						
CDI Intensity (GERD as % of PIB)	0,46	0,49	0,48	0,47	0,48	2,26
Public expenses with CDI as % of PIB	0,28	0,27	0,20	0,19	0,19	0,76
Enterprises expenses with CDI as %	0,18	0,21	0,28	0,27	0,29	1,49

[1] https://economy-finance.ec.europa.eu/publications/2023-country-report-romania_en

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

of PIB						
Cooperation between Academia and Business sector						
Scientific publications in collaboration between the public and private sectors, as a % of total publications	3,9	4,2	6,2	5,8	6,1	7,1
Human capital and skills availability						
New graduates in science and engineering per thousand inhabitants, aged 25-34	18,4	11,2	10,9	12	-	16

(Source European Commission, European Innovation Scoreboard 2024; Country profile Romania)

It can be observed that, regarding public R&D expenditures (as % of GDP), Romania has shown a decreasing trend, while business R&D expenditures (as % of GDP) are on the rise. However, both categories remain below the European average.

A favorable aspect is the cooperation between the academic and business sectors, which is increasing and approaching the EU average, offering encouraging prospects for the technological transfer of research results and their valorization. The existence of human capital with research and innovation competencies is another favorable factor that will have an impact on the quality and efficiency of research in Romania.

In graphical terms, the situation of the innovation-related indicators in our country is presented in Figure 4**.**

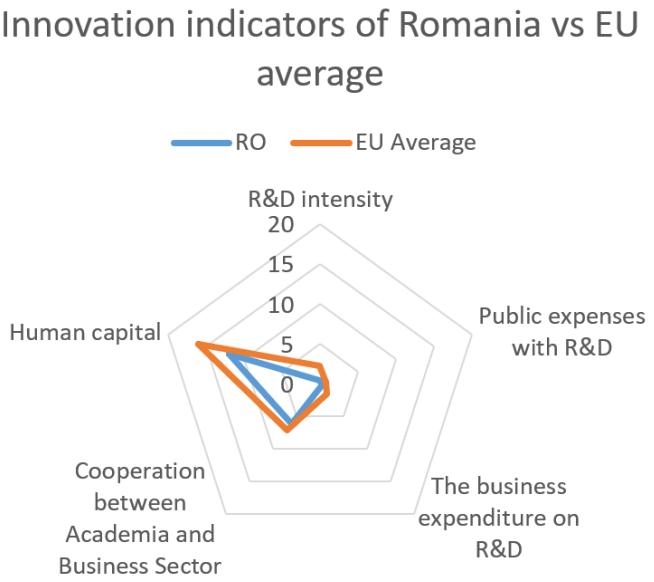


Figure 4. Innovation indicators of Romania vs EU average

Source:European Commission, European Innovation Scoreboard 2024; Country profile Romania

The evolution of Romania's innovation index in the European context from 2017 to 2024 is presented in Table 2 and Figure 5.

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Table 2. The evolution of Romania's innovation index in the European context from 2017 to 2024

Indicator	2017	2018	2019	2020	2021	2022	2023	2024
Summary Innovation Index - Romania	35.9	36.7	35.5	35.5	36.2	38.2	39.0	34.0
Summary Innovation Index - EU	100	100.5	101.2	104.0	105.2	107.9	109.4	110.0

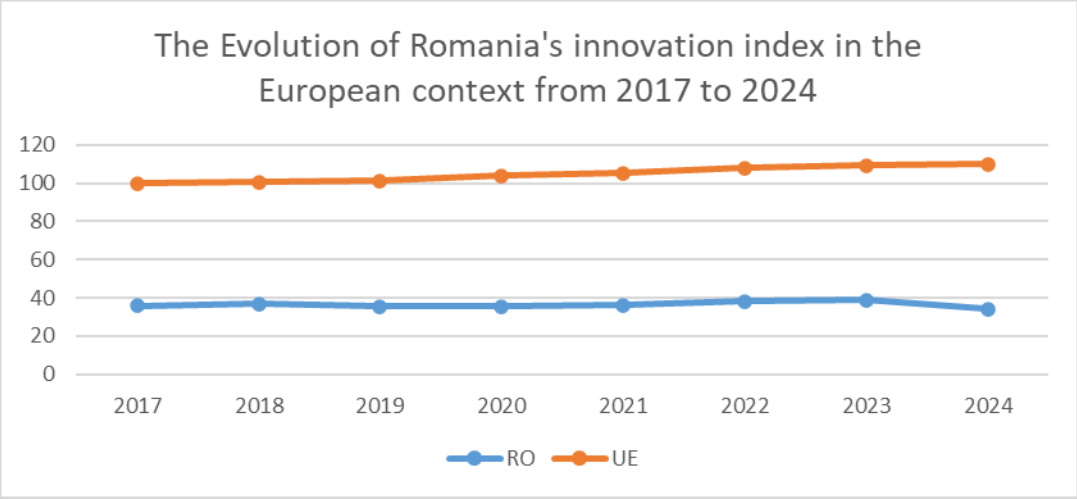


Figure 5. The evolution of Romania's innovation index in the European context from 2017 to 2024

(Source:European Commission, European Innovation Scoreboard 2024; Country profile Romania)

Regarding Romania's innovation index for 2024, it is observed that it has decreased compared to both 2017 and the previous year. Additionally, its trend is downward, despite the favorable innovation context in Europe.

Romania Key Innovation-Related Indicators and the Innovation Index

Funding and support available for research and development have decreased by 6.5% over the past eight years, marked by a continuous decline in public sector research and development expenditure. Government support for research and development in businesses, both direct and indirect, has decreased by 8.9% since 2017, with a 10.0% increase in venture capital funding for research and development, which partially covers the funding gap for research and development.[2]

[2] European Commission, European Innovation Scoreboard 2024, Country profile Romania

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Firm investments have decreased, with Romania performing at 14.1% of the EU average in 2024 on this dimension. This decline is largely influenced by a 33.5% decrease in non-R&D innovation expenditures compared to 2017, compared to the modest 5.2% increase in firms' research and development expenditures. Additionally, there is a 4.5% increase in innovation expenditures per employee, indicating greater efficiency of innovation potential within firms.

The 2023 Country Report for Romania mentions that one of the issues faced by companies in innovative sectors is the limited and unequal access to funding from one region to another. Access to financing continues to be an issue for companies, especially for the smaller ones that are expanding.

Both during the 2014-2020 period and the 2021-2027 period, cohesion policy funds have significantly contributed to sustainable development goals (SDGs). These funds support 11 of the 17 SDGs, especially SDG 9 "Industry, innovation, and infrastructure" and SDG 8 "Decent work and economic growth."

Innovation funding in Romania is provided through various mechanisms and funds, including both public and private sources. Notable programs include the "Start-up Nation" initiative, the Operational Competitiveness Program (POC) covering three programming periods (2007-2013, 2014-2020, and 2021-2027), and investment programs developed by BCR, such as the Start-up Accelerator and BCR Seed Starter fund. Venture capital (VC) offers a fast route for innovation funding, with negotiable conditions, as well as funds from MIPE for "Proof of Concept" projects, and ADRs allocated funds for innovative projects. Additionally, private investment funds and funding through the Executive Agency for Higher Education, Research, Development and Innovation support research initiatives.

In Romania, non-reimbursable funding for innovative companies, particularly start-ups and spin-offs, has been provided by the Ministry of European Funds through the Sectoral Operational Program for Economic Competitiveness (POSCCE), with significant financial allocations between 2007 and 2020. These programs aim to stimulate technology transfer from academia to industry, fostering spin-off companies. The Ministry of Research, Innovation, and Digitalization [3]has also supported innovation through the POC 2014-2020, funding initiatives like Action 1.2.1, which stimulates demand for innovation projects by companies. Additionally, the "Start-up Nation – Romania" program, active since 2017, offers up to €250,000 in non-reimbursable funding to early-stage businesses developing around a patented research outcome.

Innovation activities in Romania

Innovation activities in Romania present a nuanced landscape, with both strengths and weaknesses across various indicators. A notable weakness lies in the links within the innovation ecosystem, as evidenced by a 3.6% decrease in this dimension compared to 2017, with Romania performing at only 6.9% of the EU average in 2024. This decline is mainly attributed to a significant 11.8% decrease in the mobility of human resources involved in science and technology since 2017, which hinders the flow of knowledge and expertise between sectors, as well as a 7.0% decrease in the number of innovative SMEs collaborating with others, reflecting weak industry-science connections. Despite these challenges, public-

[3] https://events.mcid.gov.ro/contact.php?lang=en

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

private co-publications have increased by 19.6% since 2017, suggesting enhanced collaboration between academia, industry, and government in research and knowledge dissemination, though this progress still represents only half of the EU average.

Romania has seen a 6.3% increase since 2017 in the number of SMEs introducing product innovations, indicating a growing capacity among businesses to develop and bring new products to market. However, the country's performance on this indicator remains far below the EU average, at only 5.9% of the EU average in 2024. While Romania has recorded a 4.4% improvement in intellectual property assets, it still only reaches 35.2% of the EU average in 2024. This increase is primarily driven by a substantial 19.3% rise in trademark applications since 2017 and a 5.4% increase in design applications.

The innovative entrepreneurial environment in Romania

The indicators of the Romanian entrepreneurial environment compared to the EU are presented in Table 3.

Table 3. Indicators of the entrepreneurial environment in Romania vs the EU(%)

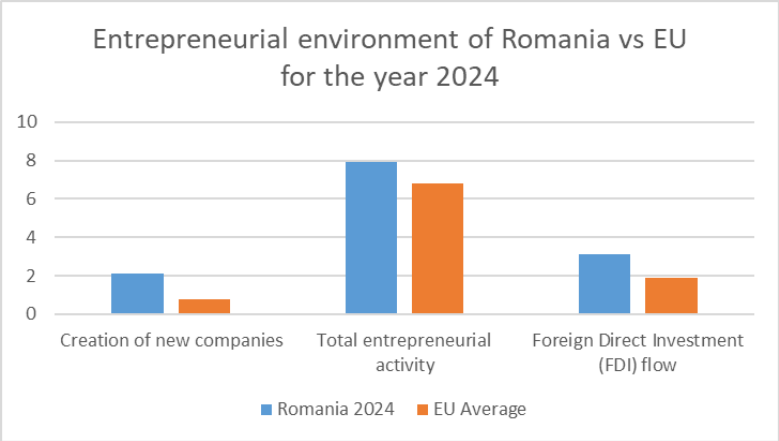
Entrepreneurial environment	Romania 2024	EU Average
Creation of new companies (%)	2.1	0.8
Total entrepreneurial activity (%)	7.9	6.8
Foreign Direct Investment (FDI) flow (%)	3.1	1.9

Source: [1] European Commission, European Innovation Scoreboard 2024, Country profile Romania

The launch of new businesses in Romania is significantly higher than the EU average, with a rate of 2.1% compared to 0.8%, indicating a vibrant entrepreneurial environment and a higher rate of new business creation. Furthermore, total entrepreneurial activity is also above the EU average, standing at 7.9% compared to 6.8%, reflecting a higher level of entrepreneurial engagement in the economy.

Additionally, net Foreign Direct Investment (FDI) flows in Romania surpass the EU average, with a notable 3.1% compared to 1.9%. This influx of FDI reflects strong investor confidence and interest in Romania's market and economic potential.

The comparative situation of the entrepreneurial environment indicators of Romania vs the EU for the year 2024 is presented in Figure 6.



(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Figure 6. Entrepreneurial environment of Romania vs the EU for the year 2024
(source:[1]European Commission, European Innovation Scoreboard 2024, Country profile Romania)

These positive indicators highlight Romania's dynamic entrepreneurial landscape and its attractiveness to foreign investors, emphasizing opportunities for economic growth and continued development in the country.

Romania's innovative entrepreneurial environment is characterized by modest performance, both in terms of the high brain drain of skilled labor and the limited transfer of research results to the industrial sector. Although Romania ranks last in innovation within the EU (according to the 2024 European Innovation Scoreboard), several innovation-enabling dimensions perform significantly above the EU average, including:

- A favorable innovation environment
- Sales impact
- High-speed internet penetration and exports of medium and high-tech products
- A high proportion of STEM graduates, among the highest in the EU

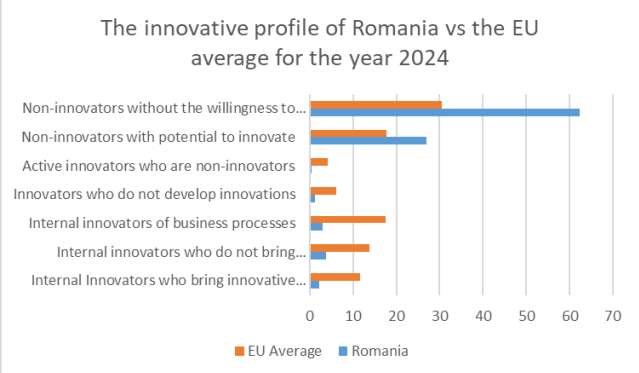
Nevertheless, several barriers have been identified nationally in both the innovation and entrepreneurial ecosystems, along with recommendations for overcoming them (Table A2 in Appendix A).

The innovative potential of Romania

The indicators of Romania's innovative profile compared to those of the EU are presented in the Table 4 and **Figure 7**.

Table 4. The indicators of Romania's innovative profile vs. the EU

Innovative profile	Romania 2024	EU Average
Internal innovators who bring innovative products to the market	2.2	11.7
Internal innovators who do not bring innovative products to the market	3.8	13.7
Internal innovators of business processes	2.9	17.6
Innovators who do not develop innovations themselves	1.2	6.1
Active innovators who are non-innovators	0.5	4.2
Non-innovators with potential to innovate	27	17.8
Non-innovators without the willingness to innovate	62.4	30.6



(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Figure 7. The innovative profile of Romania vs the EU average for the year 2024

Regarding innovation, Romania demonstrates a mixed performance compared to the EU average, reflecting both strengths and weaknesses in various indicators. However, overall, Romania tends to perform below the EU average in several key areas.

Firstly, Romania has a higher percentage of non-innovators with potential to innovate, standing at 27% compared to the EU average of 17.8%. This suggests a larger group of companies or individuals who have the capacity to innovate but are not currently doing so. Additionally, the number of non-innovators without the willingness to innovate is considerably higher in Romania, with 62.4% compared to 30.6% in the EU, indicating a significant portion of entities not inclined to engage in innovation activities.

On the other hand, Romania lags behind the EU average in several innovation performance indicators. For example, active non-innovators involved in innovation make up only 0.5% in Romania, compared to 4.2% in the EU. This signifies a lower rate of engagement in activities supporting innovation among non-innovating entities. Similarly, innovators who do not develop innovations themselves are at 1.2% in Romania, a significantly lower indicator compared to the EU average of 6.1%, suggesting potential gaps in translating innovative ideas into tangible outcomes. Furthermore, internal innovators in business processes represent 2.9% in Romania, contrasting with 17.6% in the EU, highlighting a lower adoption of innovative practices within business operations.

4. Discussions

The findings of this study confirm that Romania's innovation system remains structurally misaligned with the European Union's sustainable development trajectory. Despite targeted policy efforts and EU funding mechanisms, Romania continues to face chronic underinvestment in R&D, limited institutional support for innovation, and weak commercialization outcomes. These issues are compounded by demographic challenges such as brain drain, as well as a fragmented entrepreneurial ecosystem with minimal risk tolerance.

While broadband penetration and ICT infrastructure have improved significantly, these digital advances have yet to translate into high-impact innovation outputs or economic resilience. The stark contrast between Romania's high proportion of STEM graduates and its low levels of patent activity and innovation intensity reveals systemic inefficiencies in knowledge valorisation and technology transfer. This misalignment suggests that Romania's innovation potential is hindered not by lack of capacity, but by the absence of coherent, long-term innovation governance and investment.

Moreover, the country's positioning as an "emerging innovator" underlines the need for institutional reform, including better alignment of national research agendas with industrial needs, stronger incentives for public-private partnerships, and legal frameworks that stimulate innovation activity. Strengthening Romania's innovation performance is essential not only for its national competitiveness but also for achieving the EU's overarching sustainability objectives, particularly SDG 8 and SDG 9.

5. Conclusions

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Romania remains classified as an Emerging Innovator with the weakest innovation performance in the EU. Its Summary Innovation Index was only 34.0 in 2024 – about 34% of the EU average – placing Romania at the very bottom of EU member states. In other words, Romania's innovation score is a fraction of the EU norm, and its recent growth in innovation capacity has lagged behind almost all peers.

The country's innovation system exhibits persistent weaknesses. Romania's gross R&D intensity is extremely low (~0.48% of GDP in 2021, versus an EU average of ~2.26%), and public R&D spending was only ~0.19% of GDP in 2021 (about one-quarter of the EU mean). Business R&D (BERD) is likewise minimal (roughly 0.29% of GDP, or about one-fifth of the EU level), and the domestic venture capital market is almost non-existent (≈0.009% of GDP versus ~0.074% in the EU). These funding gaps translate into scant outputs and commercialization: for example, Romania's PCT patent applications per GDP are only ~0.1 (compared to ~3.5 in the EU), underscoring very weak intellectual asset development. In short, both public and private innovation spending remain limited, and Romania's firms produce few high-tech or patentable innovations.

Some positive trends have emerged recently. Romania has made marked progress in digital infrastructure: broadband penetration now exceeds 140% of the EU average, and nearly the entire country has access to very high capacity networks (fiber coverage ~96% vs ~56% EU). These improvements – along with rising ICT training and digital skills – provide a stronger base for innovation. Foreign direct investment has also increased: FDI inflows reached roughly €9 billion in 2021, helping to bring new technologies and know-how into Romania's economy. Such gains in connectivity and investment signal opportunities to leverage international technology and skill transfers.

Despite these gains, structural barriers continue to impede innovation. Chronic brain drain has eroded Romania's talent pool, as many skilled researchers and engineers emigrate. Links between academia and industry remain weak, and there is a generally conservative investment culture. For example, the Romanian SME sector shows little collaboration on innovation, and venture financing is scarce. This risk-averse environment hampers commercialisation of research and new firm creation.

Addressing these challenges will require targeted reforms and investment. The government has signaled intent to boost public R&D funding (e.g. pledging to raise it towards 1% of GDP), and EU cohesion and recovery funds offer resources to strengthen research infrastructure. Continued policy efforts – such as improving technology transfer mechanisms, incentivizing university-industry partnerships, and easing access to venture finance – are critical to narrow the innovation gap. In sum, Romania's innovation system has deep deficits relative to EU norms, but strategic investments and structural reforms could gradually build capacity. Sustained commitment to R&D funding, talent retention, and entrepreneurial support is essential if Romania is to converge toward the perfor-mance of its EU peers.

Firstly, a significant increase in public R&D investment is needed, with the establishment of a multiannual, predictable funding framework. This would enhance institutional trust, reduce uncertainty, and attract private co-financing. Secondly, innovation policies should be tailored to support SMEs and start-ups through tax incentives, simplified procedures for accessing grants, and targeted support for high-risk, high-reward projects. Developing the venture capital ecosystem and supporting public-private partner-ships are also essential to improve commercialization of research.

Legislative reforms should promote technology transfer and fair benefit-sharing mechanisms between universities, researchers, and industry. Additionally, policies must counteract brain drain by

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

creating career opportunities for young researchers and by increasing the attractiveness of the Romanian innovation ecosystem for diaspora and for-eign talent.

Finally, continuous monitoring and evaluation systems should be implemented to assess the impact of innovation policies in alignment with the Sustainable Development Goals (particularly SDG 8 and SDG 9), ensuring adaptive, evidence-based policymaking.

6. Acknowledgements

The research benefited from publicly available data provided by the European Commission, Eurostat, the World Economic Forum, and other international organizations. The authors also acknowledge the support of academic colleagues and institutional resources that facilitated the completion of this study.

7. References

[2] Porter M., Sachs J, McArthur J. (2002), Executive Summary: Competitiveness and Stages of Economic Development, in The Global Competitiveness Report 2001-2002

[3] CE, European Innovation Scoreboard 2024, Country Profile, https://projects.research-and-innovation.ec.europa.eu/en/statistics/performance-indicators/european-innovation-scoreboard/eis-2024#/eis?country_scope=eu&year=2017

[4] European Commission, European Innovation Scoreboard 2024, Country profile Austria

[5] European Commission, European Innovation Scoreboard 2024, Country profile Belgium

[6] European Commission, European Innovation Scoreboard 2024, Country profile Bulgaria

[7] European Commission, European Innovation Scoreboard 2024, Country profile Croatia

[8] European Commission, European Innovation Scoreboard 2024, Country profile Cyprus

[9] European Commission, European Innovation Scoreboard 2024, Country profile Czechia

[10] European Commission, European Innovation Scoreboard 2024, Country profile Denmark

[11] European Commission, European Innovation Scoreboard 2024, Country profile Estonia

[12] European Commission, European Innovation Scoreboard 2024, Country profile Finland

[13] European Commission, European Innovation Scoreboard 2024, Country profile France

[14] European Commission, European Innovation Scoreboard 2024, Country profile Germany

[15] European Commission, European Innovation Scoreboard 2024, Country profile Greece

[16] European Commission, European Innovation Scoreboard 2024, Country profile Hungary

[17] European Commission, European Innovation Scoreboard 2024, Country profile Ireland

[18] European Commission, European Innovation Scoreboard 2024, Country profile Italy

[19] European Commission, European Innovation Scoreboard 2024, Country profile Latvia

[20] European Commission, European Innovation Scoreboard 2024, Country profile Lithuania

[21] European Commission, European Innovation Scoreboard 2024, Country profile Luxembourg

[22] European Commission, European Innovation Scoreboard 2024, Country profile Malta

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

[23] European Commission, European Innovation Scoreboard 2024, Country profile Netherlands

[24] European Commission, European Innovation Scoreboard 2024, Country profile Poland

[25] European Commission, European Innovation Scoreboard 2024, Country profile Portugal

[26] European Commission, European Innovation Scoreboard 2024, Country profile Romania

[27] European Commission, European Innovation Scoreboard 2024, Country profile Slovakia

[28] European Commission, European Innovation Scoreboard 2024, Country profile Slovenia

[29] European Commission, European Innovation Scoreboard 2024, Country profile Spain

[30] European Commission, European Innovation Scoreboard 2024, Country profile Sweden

[31] Global Competitiveness Report 2012–2013 by the World Economic Forum

[32] Global Competitiveness Ranking for the year 2024

[33] World Competitiveness Center – IMD World Competitiveness Booklet 2023

[34] The Report on the Future of European Competitiveness – Part A – The Competitiveness Strategy for Europe, Mario Draghi

[35] European Commission, 2023 Country Report on Romania, accompanying the Council Recommendation on Romania's 2023 National Reform Programme and including the Council Opinion on Romania's 2023 Convergence Programme

Appendix A

Appendix A.1

Table A1. Innovation Indicators of EU countries

Country	GDP per capita of the EU average 2024	Turnover share SMEs	GCR score 2023	Summary Innovation Index 2024	SMEs introducing product innovations	SMEs introducing business process	PCT patent applications	Trademark applications	Design applications
INNOVATION LEADERS									
Danemark	132.7	15.2	100.0	135.7	130.0	114.1	140.5	110.8	155.7
Sweden	117.7	11.5	91.86	132.9	155.2	113.5	143.1	120.6	94.2
Finland	110.0	13.5	89.73	127.8	139.8	112.2	143.1	110.5	106.5
Netherlands	130.7	15.7	95.58	125.7	111.0	106.4	122.3	106.1	106.9
STRONG INNOVATORS									
Belgium	119.3	15.2	89.69	123.6	146.2	173.9	99.9	92.4	68.0
Austria	123	14	78.16	116.3	124.3	129.7	118.6	133.6	179.1
Ireland	222.3	11.5	99.71	113.2	97.9	89.7	71.9	69.2	33.7
Luxembourg	253.7	13.9	82.46	112.1	87.8	80.8	80.6	165.5	101.5
Germany	117.3	9.7	80.47	111.6	104.3	130.8	130.3	106.4	119.3
Cyprus	94.3	18.3	60.21	106.3	166.5	173.9	51.0	206.4	87.6
Estonia	84.0	24.3	76.84	104.8	117.5	102.0	60.0	199.7	123.9
France	101.3	10.2	71.05	104.0	109.2	113.6	98.5	70.7	69.7
MODERATE INNOVATORS									

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Slovenia	90.3	16.5	62.82	91.0	151.7	94.6	76.0	118.5	74.5
Spain	85.7	14	67.22	89.9	58.0	49.9	68.7	110.3	69.2
Czech Republic	91	13.6	83.48	89.7	99.7	91.9	49.3	88.5	68.6
Italy	97	16.3	63.32	89.6	152.1	150.3	82.5	104.3	148.5
Malta	104	21	68.55	88.0	45.5	56.9	74.8	206.4	143.1
Lithuania	88	16.5	71.67	83.6	85.6	105.7	39.1	136.2	56.3
Portugal	79	15.1	65.54	83.5	104.8	99.0	54.8	105.9	79.4
Greece	65.7	16.7	55.12	77.5	203.2	166.4	42.9	93.6	25.5
Hungary	75.7	14	59.85	70.5	60.0	33.4	58.8	66.4	19.2
EMERGING INNOVATORS									
Croatia	73	15.7	54.93	69.6	145.4	119.8	36.8	70.5	33.7
Poland	79	13.8	60.48	65.9	43.1	47.5	40.6	92.8	151.0
Slovakia	72.3	14.2	53.84	65.1	48.4	43.3	40.5	80.3	36.2
Latvia	71.3	19.1	54.70	53.6	42.1	50.9	53.6	106.9	52.8
Bulgaria	61	17.2	46.83	46.0	44.4	17.0	38.3	118.9	147.6
Romania	76	14.1	55.34	34.0	5.9	0.0	22.4	63.1	24.6

(online) = ISSN 2285 – 3642
ISSN-L = 2285 – 3642
Journal of Economic Development, Environment and People
Volume 14, Issue 3, 2025

URL: http://jedep.spiruharet.ro
e-mail: office_jedep@spiruharet.ro

Appendix A.2

Table A2. Barriers of the Entrepreneurial Innovation System in Romania and Recommendations for Overcoming Them

Barriers of the Entrepreneurial System	Barriers of the Innovation System	Recommendations
The unpredictability of the fiscal environment and the high level of taxes, legislative complexity, lack of access to information, and difficulty in identifying opportunities	Poor alignment of research outcomes with needs and impact leads to stagnation in the development of the innovation ecosystem.	To inspire motivation among researchers: • Communicate and promote success stories • Develop guides from idea to market • Create mechanisms for promoting research skills • Simplify legislation
The portrayal of the entrepreneur as being primarily driven by financial gain causes many individuals with higher education or strong research performance to feel insufficiently motivated to pursue entrepreneurship.	Enhancing Romania's competitiveness through innovation is difficult to achieve in the context of the ongoing exodus of skilled labor	To encourage collaboration: • Promote collaboration between universities and research institutes • Develop networking with professionals from international innovation ecosystems
Weak opportunities for exploiting innovation at the national level: Romania is insufficiently attractive to the diaspora and foreign investors compared to other countries that offer adequate support, including tax incentives, and the Romanian market is still not sufficiently sophisticated for innovative products and services.	The legislation in 2024 (Law 83/2014 on service inventions) discourages employees from engaging in innovation. According to the Best Practice Manual for the Application of Service Invention Legislation, the system for remuneration, rewards, and benefit-sharing resulting from the exploitation of inventions should be motivational in order to stimulate the innovation process, but ultimately, it is left to the discretion of the employer. Innovators in Romania also show distrust in collaborations due to reported cases of intellectual property theft within the system.	To diversify and increase access to resources: • Direct financial and non-financial resources toward the early stages of innovation development • Develop expertise in technology transfer centers, incubators, and clusters for flexible management development • Develop an efficient technology transfer system through an "open innovation" approach and encourage co-creation between research and industry To develop reinvestment within the ecosystem: • Build a community of active researchers, specialists, entrepreneurs, and politicians who support the technology transfer ecosystem and innovation-based entrepreneurship • Create a mechanism for collecting, integrating, and aggregating data and information for monitoring and evaluating the performance of innovation-based companies to inform strategy development
Low risk culture/low risk tolerance	Lack of a culture for exploiting research results in the market	