Eco-Innovation – Pioneer of the Green Economy in the Development of the Entrepreneurial Environment. Study Case: Eco-Innovation Performance across Post-Socialist Countries in Europe

Maria Orhean Vrânceanu
Ancuța Lucaci
Carmen Eugenia Nastase
"Ștefan cel Mare" University of Suceava, Romania
maria.vranceanu@usm.ro
ancuta.lucaci@usm.ro
carmen.nastase@usm.ro

Abstract

Innovation has the potential to increase the competitiveness and efficiency of economies. Environmental innovation helps companies improve the use of valuable resources and generate sustainable solutions that reduce the negative impact of the economy on the environment. In this paper, we provide a background on eco-innovation and methods to measure it. The purpose of this study is to underline the importance of eco-innovation for business reputation and to identify the main discrepancies between the post-socialist countries in terms of eco-innovation. Despite significant differences between countries and economic sectors, there are not enough companies implementing eco-innovation on the scale that is needed. Of all the post-socialist countries, the Czech Republic is the best practical example for eco-innovation activities. Despite the opportunities that environmental innovation presents to companies, more efforts are required to close the implementation gap.

Key words: eco-innovation, green economy, entrepreneurship, sustainability
J.E.L. classification: Q32, Q56

1. Introduction

The green economy focuses on creating sustainable businesses and developing a powerful and sustainable economy. As a driver of the green economy, eco-innovation is a relatively new concept, but its significance and impact are far-reaching.

Eco-innovation is an opportunity for companies because it reduces costs, drives new opportunities for growth and innovation, and strengthens the reputation of companies. Furthermore, green solutions will inspire a new generation of manufacturing and high-tech services, increase the competitiveness of Europe and create green jobs.

Recent world conferences have recognized that environmental degradation and climate change have reached crisis levels and, if no urgent action is taken, could result in irreversible changes in people, economies and ecosystems.

Innovation and entrepreneurship are considered the main drivers of economic development, and the innovation process is considered to be a key element of economic growth.

The development of society in general and the economy in particular strongly depends on technological and scientific progress and the emergence and implementation of innovations. Innovation is the basis for economic development.

Entrepreneurship and innovation are becoming interconnected elements of economic progress. Innovation enables entrepreneurs to emerge and develop, and entrepreneurship generates innovation. All entrepreneurial approaches must be market-orientated.

On a corporate level, innovation is considered a mean to increase sales and capture new market segments. At the national level, innovation becomes the driving force behind economic growth and the most important asset in global competition.

Figure no. 1. Drivers of value added from eco-innovation (own adaptation)

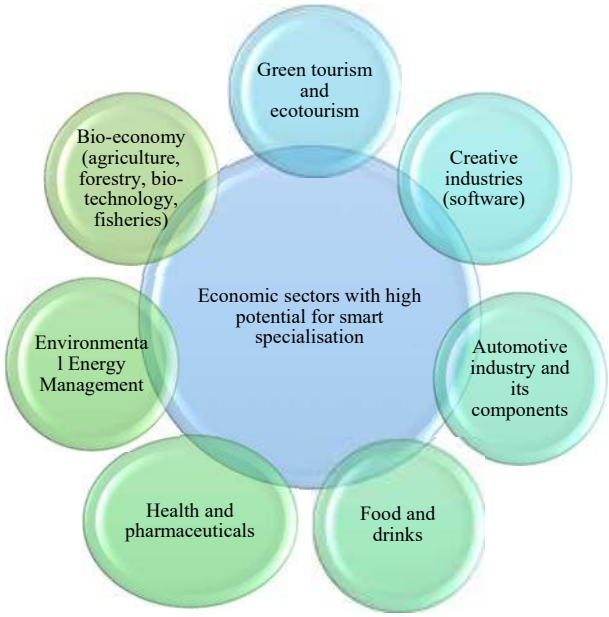
Source: https://www.unep.org/eco-innovation

This approach enables the creation of sustainable value chains with competitive businesses and compliance with environmental standards.

Innovation, when used properly, is an inexhaustible source of growth for any company. New technologies, devices, tools, and designs are needed to overtake, and even surpass, market leaders.

Eco-innovation, briefly, involves harnessing the talents of many people and enhancing competitiveness in the global marketplace. Economies are driven by new ideas and new processes.

Figure no. 2. Strategic priorities - economic sectors with high eco-innovation potential (own adaptation)



Source: https://www.unep.org/eco-innovation

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2. Literature review

People are currently using more natural resources than the planet can sustain in the long term. The biological capacity of the earth (including the capacity to extract and absorb wastes and emissions) has already been exceeded by about 50% (WWF et al., 2012).

Innovation always produce effective ways to give people what they want or need. Entrepreneurship aims to create new opportunities and achieve economic profit, and these opportunities can emerge through innovation (Roșca-Sadurschi L., 2017).

Eco-innovation has a key role in promoting and implementing green growth, as it promotes all forms of innovation that reduce environmental impacts and strengthen resilience to environmental constraints (Jang et al., 2015).

Therefore, the European Commission defines the concept of eco-innovation as "any innovation that leads to significant progress towards the goal of sustainable development by reducing the environmental impact of our production patterns, increasing the resilience of nature to environmental pressures, or achieving a more efficient and responsible use of natural resources" (European Commission/Environment - Eco-innovation, the key to Europe's future competitiveness).

A similar definition is given by other authors in their article, whereby eco-innovations are activities focused on innovation in products, processes, and organizational philosophies to improve the state of the environment (Mavi & Mavi, 2021).

According to Europe INNOVA (2006), eco-innovation is the creation of new and competitively priced goods, processes, systems, services and procedures designed to meet human needs and provide a better quality of life for everyone, with minimal life-cycle use of natural resources per unit of production and minimal release of toxic substances.

Ryszko (2016) stated that businesses can, through technological eco-innovation, not only improve their corporate image and achieve higher customer satisfaction, but also generate increased market share, increased profit, sales profitability, etc. As technological eco-innovation reduces environmental impact and improves business performance, it simultaneously contributes to the environmental and economic pillars of sustainable development.

The "Eco-Innovation Action Plan (EcoAP)", which was part of the Europe 2020 strategy approved by the European Commission, aims to achieve sustainable development goals. The essential objective of the EU Eco-Innovation Action Plan is to "fund opportunities to bridge the gap between technology and market penetration to increase European competitiveness. The Plan includes seven actions directed at both supply and demand, research and industry, and policy and financial instruments".

The actions, which are foreseen in this plan, are undertaken by the European Commission, national and regional authorities, industries and research organizations (European Commission/Environment - Eco-innovation, the key to Europe's future competitiveness).

Through eco-innovation, the UN Environment Package supports SMEs in the regions to develop and implement a business model that will enable the creation of sustainable businesses throughout their life cycle and throughout the value chain in which they will participate.

Eco-innovation involves a series of changes or new solutions for products (goods/services), processes, market analysis, and organizational structures that lead to improved performance and competitiveness of a company. This approach can help small and medium enterprises (SMEs) penetrate new markets, increase productivity, attract new business investment, increase profitability along the value chain, and help them comply with regulations and standards (UNEP, Eco-Innovation).

Eco-innovation is the protection, adoption or operation of a product, production process, service, management or business method that is new to the organization (development or adoption) and that leads, during its life cycle, to a reduction in environmental risk, pollution and other negative impacts of resource use (including energy use) compared to relevant alternatives" (Kemp and Pearson, 2007).

3. Research methodology

The research methodology included an analysis of statistical indicators on the annual European Eco-Innovation Index. The Eco-Innovation Index shows the performance of each European country in terms of eco-innovation inputs, activities, and outputs. Moreover, the index compiles resource efficiency outcomes and socio-economic outcomes. The years considered for the index considered for research are 2022 and 2023. This index is important for observing the progress of EU countries in terms of environmental innovation. Furthermore, each European country must identify the areas that can be improved in the field of eco-innovation, because the future of the European landscape includes aspects related to sustainability and green practices.

4. Findings

In this section, we have conducted an analysis of eco-innovation performance across post-socialist countries in Europe: Romania, Bulgaria, Slovakia, Hungary, Czech Republic, and Poland.

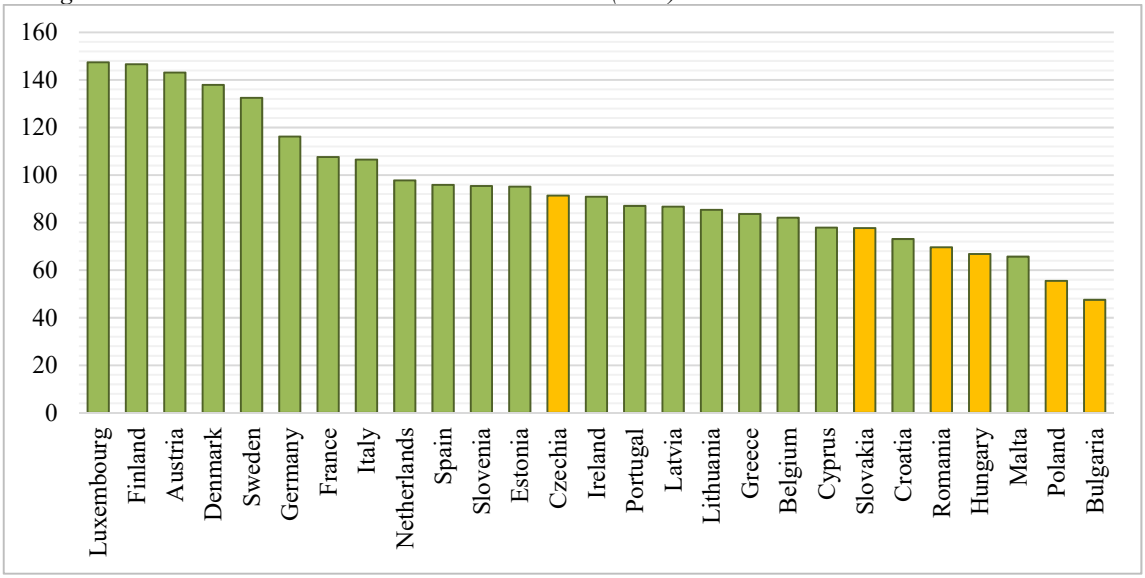
The **Eco-Innovation Index** is a European tool that highlights the gaps between member states in environmental innovation. The main areas covered by this index are eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency outcomes, and socio-economic outcomes. The figure below shows the scores of European member states in terms of eco-innovation. The performances recorded by each member state are grouped into three performance groups:

- Eco-Innovation Leaders group;
- Average Eco-Innovation performers group;
- Eco-Innovation Catching-up group.

In 2023, the leaders in eco-innovation are Luxembourg, Finland, Austria, Denmark, Sweden and Germany. Of the six European states included in the analysis, it can be seen that the Czech Republic occupies a higher position than the other states. The Czech Republic is within the average eco-innovation performers group. In the last two places are Bulgaria and Poland, which are classified as European countries catching up with eco-innovation. Furthermore, Hungary, Romania and Slovakia are also countries catching up with eco-innovation. All six European countries are former-industrial countries characterized by struggles in becoming more sustainable.

The Czech authorities ratified the Strategic Framework for Sustainable Development in 2010. This regulation aimed to establish long-term sustainable objectives for the effective use of resources. The Czech economy evolved positively over the last years and the environmental quality of life has improved. Furthermore, the Czech EIT Climate-KIC Regional Innovation Scheme (RIS) Hub is an initiative that targets environmental innovation and climate change (Climate-KIC, 2023). Climate change has become an active subject of debate in the Czech Republic. Other drivers of eco-innovation in this country are government policies, investments in research and innovation, environmental education among citizens, and public-private partnerships.

Figure no. 3. Eco-Innovation Index within EU countries (2023)

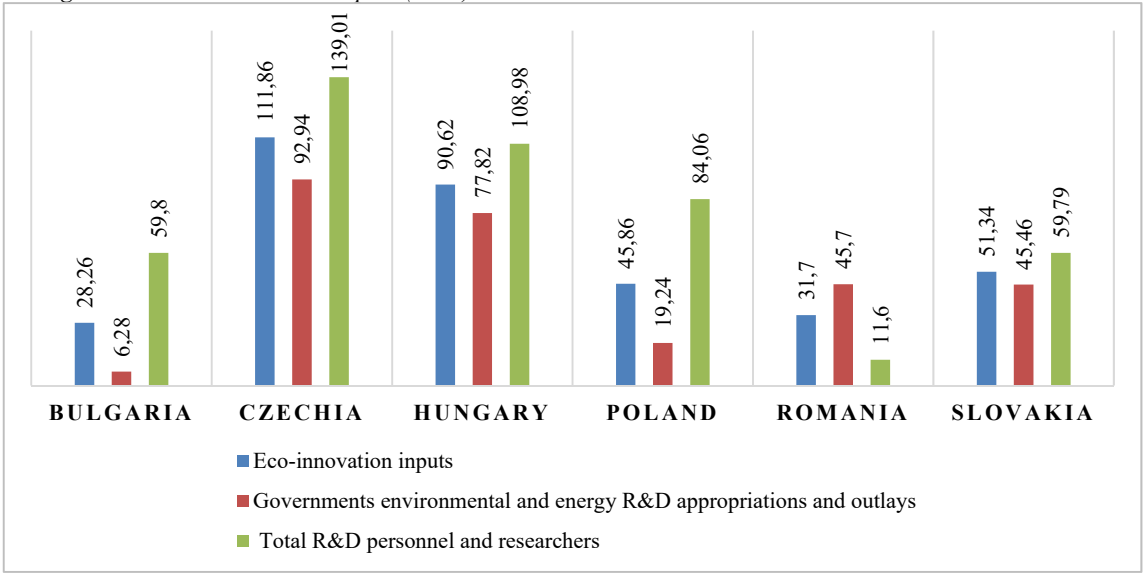


Source: Author's elaboration based on the European ECO-Innovation Scoreboard 2023

In terms of **eco-innovation inputs**, we have analyzed two indicators: governments environmental and energy R&D appropriations and outlays and total R&D personnel and researchers. The first indicator shows the attention paid by the governments of the European states to investments in protecting the environment. An example in this case is renewable energy. The second indicator concerns the people involved in research and development activities. The ultimate purpose of both indicators is to trigger eco-innovation activities within the European countries.

Eco-innovation inputs recorded higher scores in Czech Republic and Hungary. Therefore, these two countries have made greater investments in protecting the environment, by addressing research and development opportunities. Moreover, Poland shows an increased progress in terms of total R&D personnel and researchers, compared with Slovakia, Bulgaria and Romania. Romania and Bulgaria have the lowest scores related to governments' environmental and energy R&D appropriations.

Figure no. 4. Eco-innovation inputs (2022)

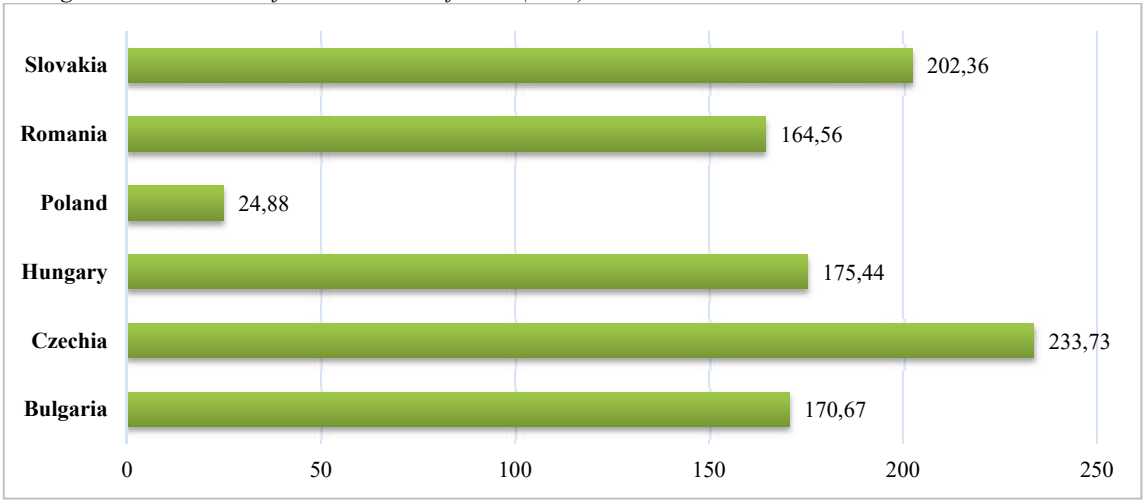


Source: Author's elaboration based on the European ECO-Innovation Scoreboard 2022

ISO 14001 certification is an essential instrument for companies that want to manage their environmental impact in a responsible and sustainable manner. Nowadays, consumers are more interested in companies that are aware of environmental issues and that implement sustainability issues in their long-term strategies. From this perspective, ISO 14001 certification enables businesses to promote their products and services on local, national and international markets and thereby achieve a competitive advantage. The future of the European market will encompass a growing commitment to sustainable development and to developing goods and services in a sustainable way, without compromising resource scarcity and the natural environment. Environmental protection, recycling, waste minimization, energy efficiency, less pollution, social responsibility are all concrete examples of measures that companies with ISO 14001 certification are undertaking for environmental management in accordance with international practices.

Among the six countries considered in the analysis, it can be noted from the table below that most ISO 14001 certifications are owned by enterprises in Czech Republic, Slovakia and Hungary. The Czech Republic is one of the medium-sized group of eco-innovation performers. The rest of the countries are part of the eco-innovation catching-up group, which suggests that they must work very hard to achieve a real progress in this field in coming years.

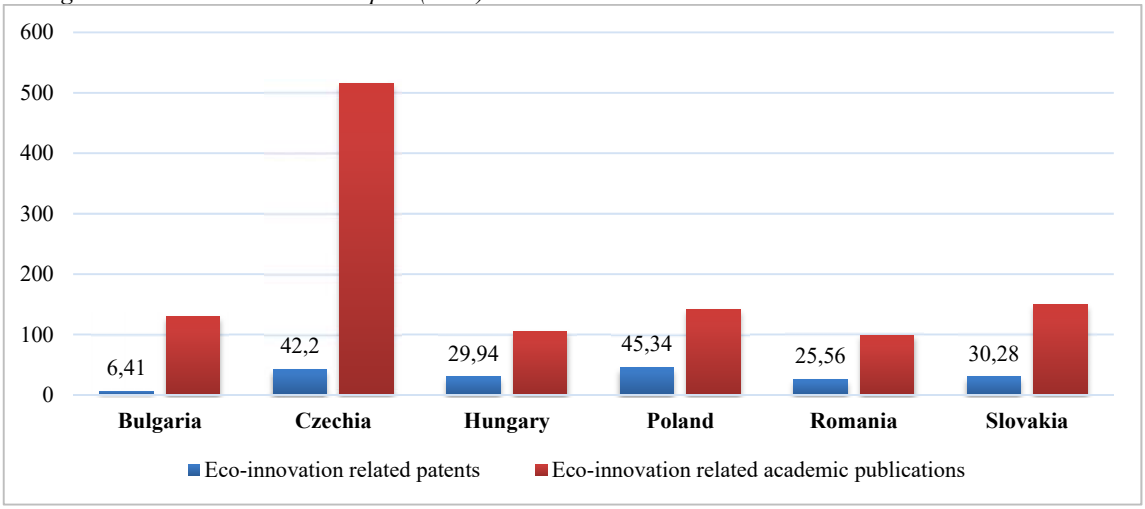
Figure no. 5. Number of ISO 14001 certificates (2022)



Source: Author's elaboration based on the European ECO-Innovation Scoreboard 2022

Eco-innovation outputs is another indicator of significant importance in the field of eco-innovation. As a structure, it includes two indicators: eco-innovation patents and eco-innovation related academic publications. Patents suggest new investments made in the field of eco-innovation. From this point of view, Poland is the leader in eco-innovation patents. Eco-innovation related academic publications signify the number of scientific publications in the field of environmental innovation. The Czech Republic is the leader in terms of eco-innovation publications.

Figure no. 6. Eco-innovation outputs (2022)

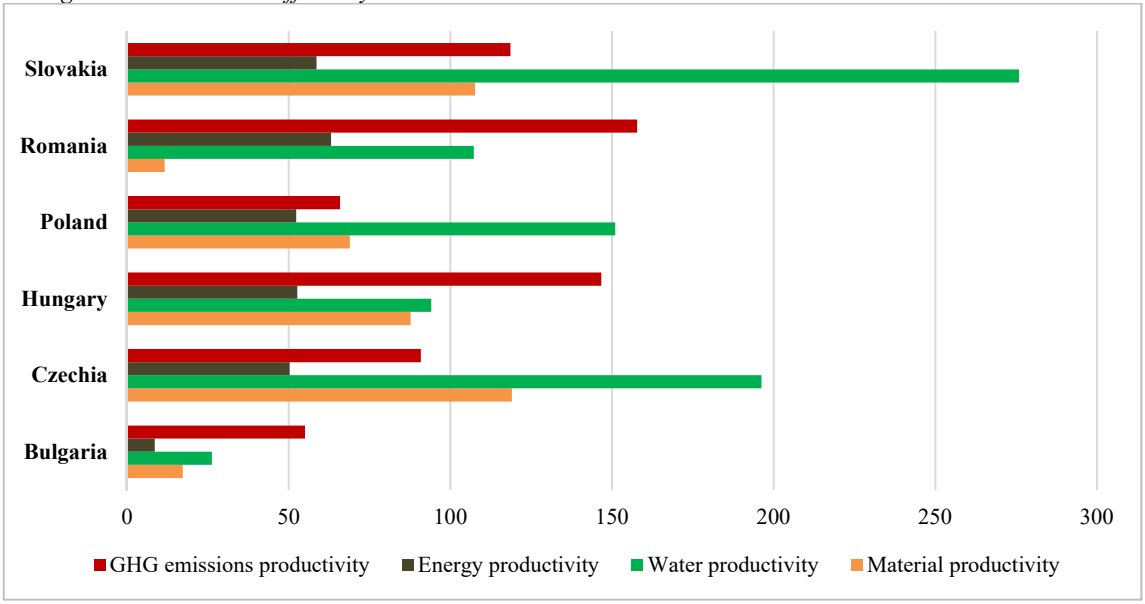


Source: Author's elaboration based on the European ECO-Innovation Scoreboard 2022

Resource efficiency outcomes refer to practices to improve resource productivity. An example of resource efficiency is renewable energy, which began to be implemented in many European states after the war in Ukraine disrupted supply chains. GHG emissions productivity, energy productivity, water productivity, and material productivity are the main resource efficiency indicators that have been considered for the Eco-Innovation Index.

In terms of GHG emissions productivity, which means greenhouse gases, Romania and Hungary display the highest scores. Bulgaria and Poland reported in 2022 the smallest GHG emissions productivity. Furthermore, energy productivity scored higher in Romania and Slovakia, compared to the other post-socialist countries. It can be seen that water productivity presents higher scores in Slovakia and Czech Republic. Finally, the Czech Republic and Slovakia are leaders in terms of material productivity.

Figure no. 7. Resource efficiency outcomes

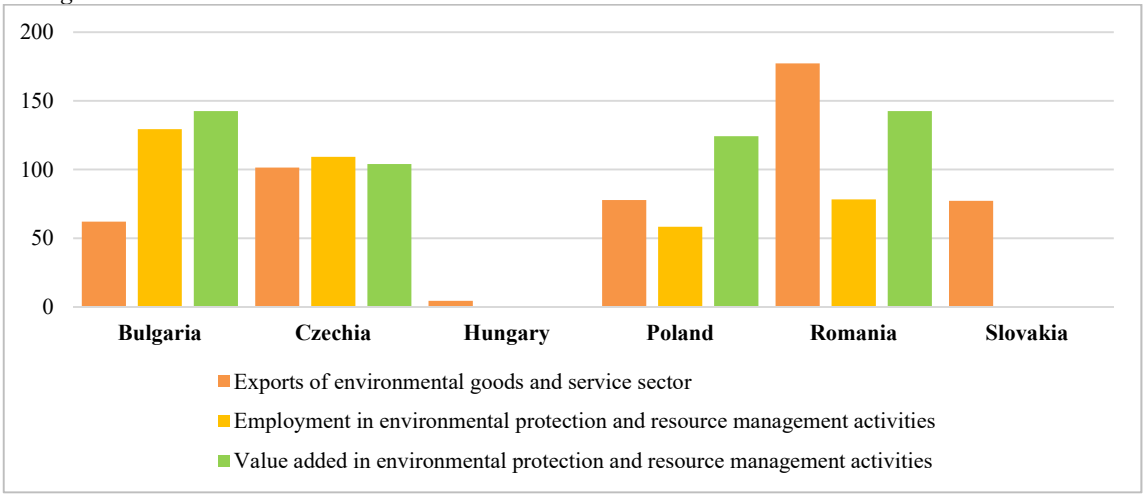


Source: Author's elaboration based on the European ECO-Innovation Scoreboard 2022

Socio-economic outcomes highlight the significant effects that eco-innovation activities have on the economy as a whole. From this perspective, the main indicators are exports of environmental goods and service sectors, employment in environmental protection and resource management activities, and value added in environmental protection and resource management activities.

When examining the exports of environmental goods and services sector, it can be observed that Romania is a leader in this section. Therefore, eco-innovation activities, although they are not so developed in Romania, contribute to the export activities of the country. In addition, Bulgaria and the Czech Republic have stated a high level of employment in environmental protection and resource management activities. A low level of employment in eco-innovation activities can be observed in Poland and Romania. Finally, the value added to environmental protection and resource management activities is superior in Romania, Bulgaria, and Poland.

Figure no. 8. Socio-economic outcomes



Source: Author's elaboration based on the European ECO-Innovation Scoreboard 2022

The Czech Republic, located in the center of Europe, is a state that stands out in the field of eco-innovation, achieving high scores for most indicators specific to this field. This situation reflects the commitment of this state to environmental conservation, strong policies, and an active approach to promoting innovation in sustainable practices.

The more forms of cooperation are based on fundamental principles such as responsiveness, flexibility, trust, professionalism, and diversity, the healthier and more attractive the entrepreneurial ecosystem will be for companies.

In Romania, as a prerequisite for achieving long-term socio-economic development goals and overcoming the current crisis, the establishment of an innovative economy requires both at the national level and at the level of the main actors of entrepreneurship. There is a need for the dynamics of the innovation process at the level of ecosystems and individual economic agents.

Table no. 1. Directions and prerequisites of eco-innovation

Directions	Prerequisites
Raising awareness about environmental issues and sustainable development to promote behavior change.	Well-prepared and innovative human Capital
Forming a Green alliance with IFI and other UN agencies.	Access to European funding programs
Improve environmental knowledge and skills to promote low-carbon technologies, resource efficiency, employment opportunities and economic growth.	Improved access to information
Promoting green jobs and economic opportunities with a focus on small and medium-sized enterprises.	Increasing demand for organic products
Extending measures to make urban development more sustainable and improve the quality of life.	Consumers with a positive attitude towards organic products

Source: Author's elaboration

At the micro level, eco-innovation marks a transition to a green economy, and SMEs are implemented by SMEs to introduce eco-innovative processes and therefore green business models.

5. Conclusions

The implementation of eco-innovation is a difficult process and is not suitable for all small and medium-sized businesses. Therefore, understanding the barriers and opportunities at the individual company level, as well as the main gaps in policy and education, can help to better understand the context and conditions of eco-innovation in Romania.

At the European level, the Czech Republic and Slovakia are the post-socialist countries that are the most developed in terms of eco-innovation activities, mainly in the areas of eco-innovation inputs, ISO 14001 certificates, and eco-innovation outputs. Furthermore, Romania is a leader in terms of the exports of environmental goods and services sector.

The Romanian business environment suffers not from a lack of ideas, but from a decrease in the ability to implement ideas. In order to develop Romania's business environment, it is necessary to invest in entrepreneurial education, innovation and digitalization. At the same time, we need programs and public policies that encourage and support the creation of new businesses.

The practicality of this study is also evident from the research results, which highlight the fact that Romania is one of the countries with the worst performance in adopting eco-innovation and that it is important to consider opening up new research opportunities.

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