

ECO-INNOVATION - A WAY FOR A SUSTAINABLE ECONOMY**PhD. Student Nucă Dumitrița***Stefan cel Mare University of Suceava, 720229, Romania
dumtrita.n@gmail.com***Abstract**

In a world of climate change, dwindling natural resources, hazardous waste, water pollution, carbon dioxide emissions, and many other types of environmental pollution, sustainable development is the key to restoring the balance between man and nature. In this context, a new type of economy is emerging for the protection of the environment and innovative processes, playing a key role in creating this process, known as eco-innovation. Eco-innovation, as a way to improve the protection of the environment and the efficiency of the economy in terms of resource use, contributes to increasing competitiveness. Although global and European organizations have taken a number of concrete steps to stimulate eco-innovation, it still does not enjoy widespread application, with companies continuing to avoid this model, either because of costs or other reasons. Therefore, it is necessary to extend the scope from environmental technologies to innovation policies, which target processes, products and services for the environment.

Key words: *eco-innovation; sustainability; organic products; diminishing resources.*

JEL Classification: *O31.*

I. INTRODUCTION

Today, humanity is facing a number of important problems such as climate change, depletion of natural resources, but also the loss of biodiversity. Thus, there is a need for new economic and social models supported by new technologies in order to create concrete environmental benefits. Therefore, society should take concrete measures to maximize resource efficiency.

Environmental innovation can support the creation of sustainable solutions by the company that make better use of these precious resources and reduce the negative effects of the economy on the environment (Burciu, A., Bostan, Condrea & Grosu, 2010; Cosmulese & Axentioi, 2017). Therefore, eco-innovation could become a solution to the environmental problem by increasing the more efficient use of resources, while also becoming an impetus for green economic growth (Cosmulese & Zlati, 2019).

The goal of eco-innovation leads to a more competitive, redistributive and more sustainable economy, for three main reasons: it improves resource efficiency and satisfies production processes with a reduced supply of materials and energy; minimizes environmental damage due to lower use of natural resources and thus reduces pollution, and last but not least generates new demand for services and products, which translates into new sources of employment and entrepreneurship (Alvarez, Fernández & Romera, 2014; Cosmulese, 2019).

Interest in eco-innovation is mainly in OECD and European countries. They see eco-innovation as the key to future development and a key tool for addressing the growing scarcity of resources and environmental issues such as climate change.

Currently, the growing interest in eco-innovation derives from concrete action plans, such as The OECD Project on Sustainable Manufacturing and Eco-innovation (OECD, 2009), Eco-Innovation Observatory of European Union (2012) and the Eco-innovation Action Plan (EcoAP) (2011), all of which are part of the European 2020 Strategy for smart, sustainable and inclusive growth (European Union, 2010). All are considered relevant for a more competitive and resource efficient Europe.

Even if the eco-innovation of the enterprise promises a number of opportunities for its development, a much greater effort is needed to implement this process. The difference between economic models, the lack of stimulating legal frameworks, as well as other influencing factors, are barriers to the growth of eco-innovation.

The purpose of this article is to clarify the concept of eco-innovation by presenting its typology and its impact on increasing competitiveness, specifying how the European Commission strives to encourage businesses to apply eco-innovation to a sufficiently high level, and identifying elements that can contribute to a large-scale application of eco-innovative solutions in Romania.

II. ECO-INNOVATION – A PERSPECTIVE OF THE SUSTAINABILITY OF THE FUTURE

In order to maintain a high level of quality of life in Europe, it is essential to have a clean and healthy environment, but also a competitive economy that works "healthy".

According to the United Nations Environment Program (UNEP) eco-innovation "is the development and application of a business model, built on a new business strategy that includes sustainability in all business operations, based on life cycle thinking, in cooperation with partners throughout the value chain. It involves a coordinated set of changes or new solutions for products (goods / services), processes, marketing and organizational structures, which lead to increased performance and competitiveness of the company " (Ardelean, 2015).

Investments in the field of eco-innovation are a necessity in order to create and ensure a resource efficient society. In other words, this could be a solution for resource management. In the European vision, the efficiency of the resource circuit in the eco-innovation process is determined by 4 important stages: raw materials, production, consumption, waste prevention and management. All these are part of the normal circuit of resources, but a special emphasis must be placed on the last stage, namely "waste prevention and management", because this is the key point where the ecological reuse of resources generates new "raw materials" (see Figure 1).

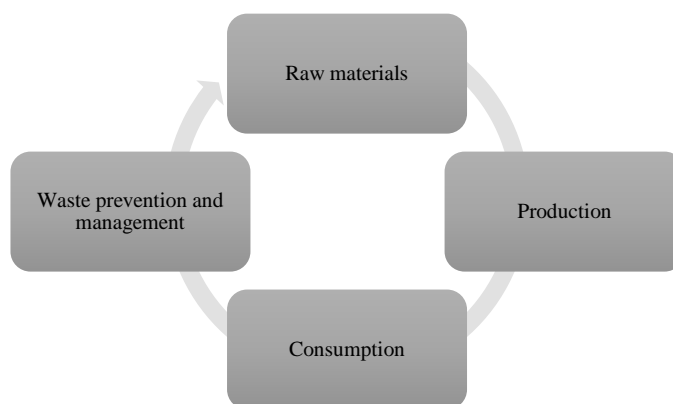


Figure 1 – Resource efficiency in eco-innovation

Source: https://ec.europa.eu/environment/green-growth/eco-innovation/index_en.htm

According to the "Measuring Eco-Innovation" project carried out by the European Commission's Directorate-General for Research in collaboration with Eurostat, the European Environment Agency (EEA) and the European Commission's Joint Research Center (JRC), eco-innovation can be classified into the following categories (Raport ECOPartner):

- A. Environmental technologies;
- B. Organizational innovation for the environment;
- C. Innovation of products and services, offering environmental benefits;
- D. Ecological innovation of systems.

In this context, eco-innovation appears as a relevant tool for organic production, with different types depending on its objective:

- A. Environmental technologies:
 - Pollution control technologies, including wastewater treatment technologies;
 - Depollution technologies that treat pollutants before they are released into the environment;
 - Clean technologies: manufacturing processes that are less polluting and / or more efficient in terms of resource use than the relevant alternatives;
 - Waste management equipment;
 - Monitoring the environment and necessary tools;
 - Green energy technologies;
 - Water supply;
 - Noise and vibration control.

B. Organizational innovation for the environment: introduction of organizational methods and management systems to solve environmental problems related to production and products. A more detailed classification is given below:

- Pollution prevention schemes: aim at preventing pollution by substituting input materials, more

efficient operation of processes and changes in production plants (avoiding or stopping leaks and similar events);

- Environmental management and audit systems: formal environmental management systems involving measurement, reporting and responsibilities for resolving issues related to the use of materials, energy, water and waste (eg EMAS and ISO 14001);
- Supply chain management: cooperation between companies so as to close the supply loops of materials and avoid damage to the environment within the value chain (from birth to end).

C. Innovation of products and services offering environmental benefits - new or improved products and useful services for the environment:

- New or improved material products (goods), including green houses and buildings;
- Green financial products (such as green rentals or climate mortgages);
- Environmental services: solid and hazardous waste management, water and wastewater management, environmental consulting, testing and engineering, other testing and analysis services;
- Less polluting services that consume less resources (for example, shared cars).

D. Ecological innovation of systems:

- Alternative production and consumption systems with low impact on the environment: for example, organic farming and the energy system based on renewable sources.

Eco innovation is seen as a new source of competitive advantage and also as a promise of new business opportunities with greater added value and technological content for companies. However, in addition to the opportunities offered, it is subject to the influence of less positive factors.

Eco-innovation is determined by several factors. Most of them have a double perspective, ie on the one hand they can act as accelerators of innovation, but they can also be a barrier in the development of this phenomenon. For example, if the company has advanced technology, it operates in a market without problems of eco-innovation and expects to have high market demand. However, the same factor can act as a barrier to eco-innovation if the company has low technological capacity or operates in a sector with problems of learning eco-innovation or if the potential demand for eco-innovation is low.

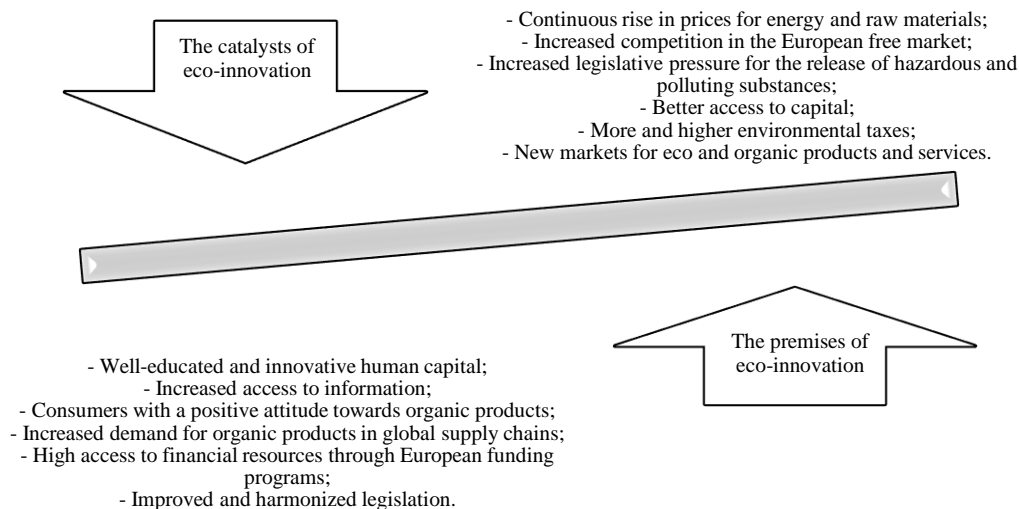


Figure 2 – The premises of eco-innovation versus the catalysts of eco-innovation

Source: <https://www.premiilepentrumediucurat.ro/wp-content/uploads/2016/09/147428645572502.pdf>

The determinants of eco-innovation are universal, and they can be classified into two categories (see Figure 2). There are many determinants of eco-innovation, such as the type of eco-innovation, the sector of activity or its more or less polluting nature, ecological ethics and improving the company's image (Pereira & Vence, 2012).

Kemp and Foxon (2007) differentiate between primary (more relevant) and secondary (minor) eco-innovation drivers. The primary factors relate to regulation and legislation, cost reduction, marketing benefits and community pressure. Among the secondary factors we find the improvement of the technical efficiency or the increase of the

market share.

In the European Union, environmental legislation has traditionally been one of the main drivers of eco-innovation and the development of strong European industries (eg in the water sector, air pollution, waste management, etc.) (European Commission, 2011).

As mentioned above, many of the drivers of eco-innovation can also act as barriers to this. The ecological innovation capacity of a company is subject to numerous internal and external barriers and is conditioned by the sectoral, national and international innovation systems on which it depends (Carrillo et al., 2011).

Among the barriers to eco-innovation we find: lack of funds within the company (36%), uncertain market demand (34%), uncertain return on investment or too long payback period (32%), lack of external financing (31%), insufficient access to existing subsidies and tax incentives (30%), as well as others. Other negative factors for the dissemination of eco-innovation are the lack of incentives and subsidies available for SMEs, the lack of qualified staff, the market dominance of established companies, limited access to external knowledge, etc. Although many of the barriers to eco-innovation are similar to those faced by innovative companies in general, they tend to be more serious for eco-innovation-focused companies (European Commission, 2011).

Therefore, eco-innovations refer to products that, rather than being "cleaner" than the relevant alternatives, are completely different from the latter, ie we are talking about radical innovations. Examples of such innovations would be renewable energy or organic farming.

Finally, generically speaking, eco-innovations are those that are related to the emergence of new technological paradigms, in the case of today's society - mainly related to the diffusion of ICT, biotechnology and nanotechnology.

III. ECO-INNOVATION IN ROMANIA

At EU level, the performance of eco-innovation is quantified using the Eco-Innovation Scoreboard (Eco-IS), which covers the various aspects of eco-innovation by applying 16 indicators grouped into five dimensions: eco-innovation contributions, eco-innovation activities, ecological innovation, results of ecological innovation, resource efficiency and socio-economic results. This index measures the efficiency of Member States in terms of the 3 dimensions of eco-innovation (economic, environmental and social) compared to the EU average and shows their strengths and weaknesses.

According to Eco-IS, the leaders of eco-innovation are Luxembourg, Germany, Sweden, Finland, Austria and Denmark. For example, the Luxembourg authorities have focused mainly on co-financing sustainable technological developments, setting up and supporting pilot projects in various fields, federating the public and private actors and building an ecosystem for the circular economy, the latter being the main pillar of development. eco-innovation. Germany, on the other hand, is an important leader in waste management, adopting new packaging legislation, with a particular emphasis on a systematic perspective on the life cycle of packaging, as well as on the "recycling" of waste. In Sweden, leader of Eco-IS 2017, eco-innovation is part of the national strategy, and this has fostered the development of new technologies in areas such as bioenergy, smart grids, green building, waste and recycling, green vehicle technologies, resource management water, ocean energy and solar energy (European Commission, 2017).

Figure 3 shows the main trends of EU countries in terms of eco-innovation presented by Eco-IS 2018. As for Romania, it is in the category of countries with a low degree of eco-innovation. This phenomenon is mainly due to high consumption of materials, water and energy, and low productivity of resources. One of the main problems is waste management, both locally and industrially. In Romania, waste recycling rates are about 5%, ie very low compared to waste disposal rates of up to 85%.

Among private companies, however, there is a growing trend of investment in the eco field, about 30% of which implement energy saving measures and waste reduction. Also, many of the entrepreneurs have identified opportunities to develop "green" businesses, such as cycling, various reuse and repair services, etc. It is estimated that in the next two years, Romania will offer ecological products and services, increasing by 19% compared to 2018.

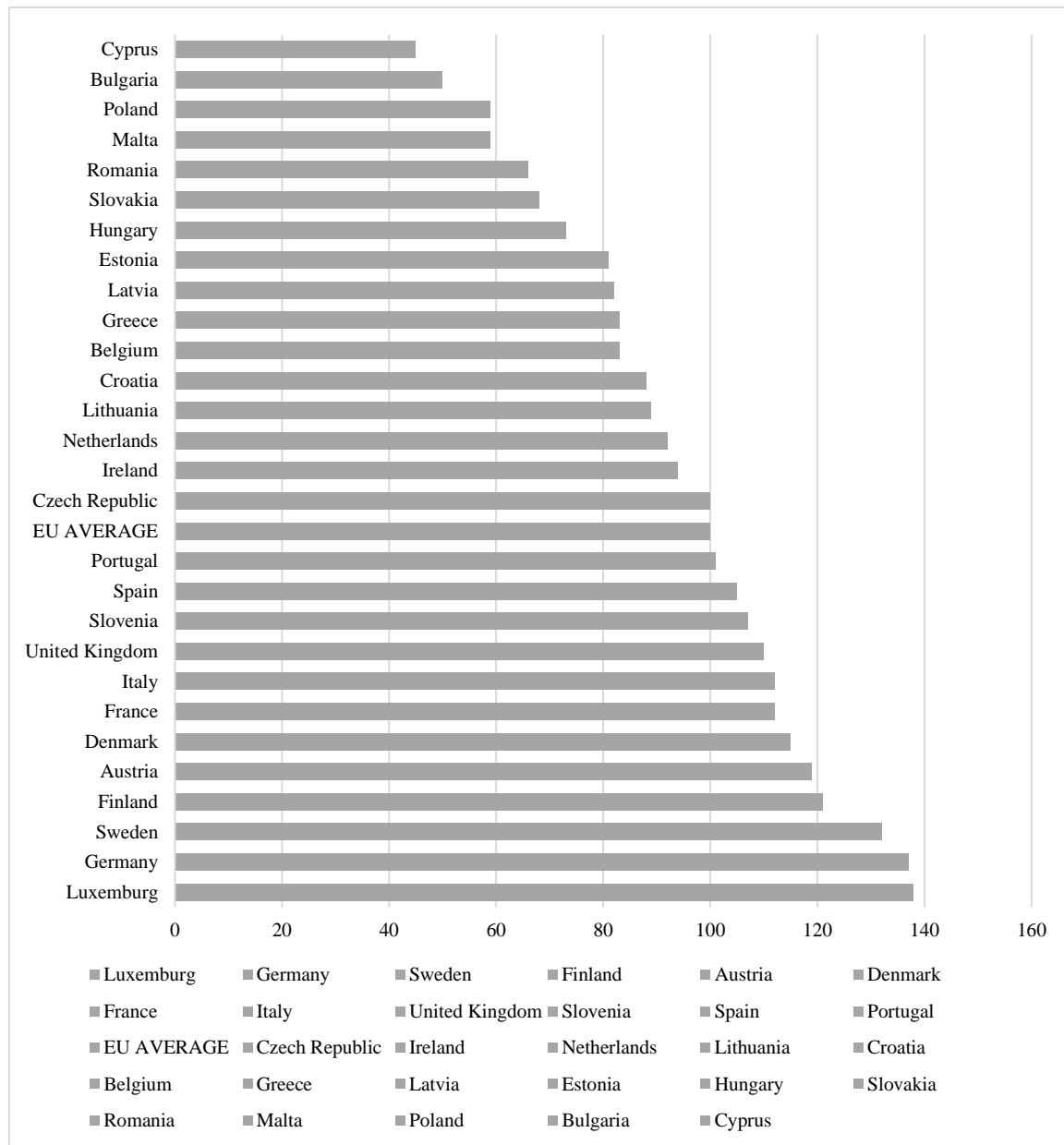


Figure 3 – Eco-innovation index in 2018 (EU = 100)

Source: https://ec.europa.eu/environment/eoap/indicators/index_en

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However, despite the actions taken in this direction, the basic problem is that the Romanian business environment does not adopt the circular economy thinking, but continues to perceive the costs of environmental actions as a burden and do not add value to the company. Therefore, more emphasis should be placed on this new wave of development, on eco-entrepreneurship education, but also on improving the regulatory framework and implementation policies.

If the adoption of the General Waste Management Plan in 2017 resulted in the fulfillment of one of the last conditions for receiving European funds, then the elimination of the used car tax resulted in a substantial decrease in the funds of the National Environmental Fund budget, which led to the reduction environmental projects (see Figure 4). There is a need to improve current policies and expand their scope to further focus on waste prevention and the development of "circular" thinking, in the sense that the life cycle of products is continuous and constantly

requires future steps.

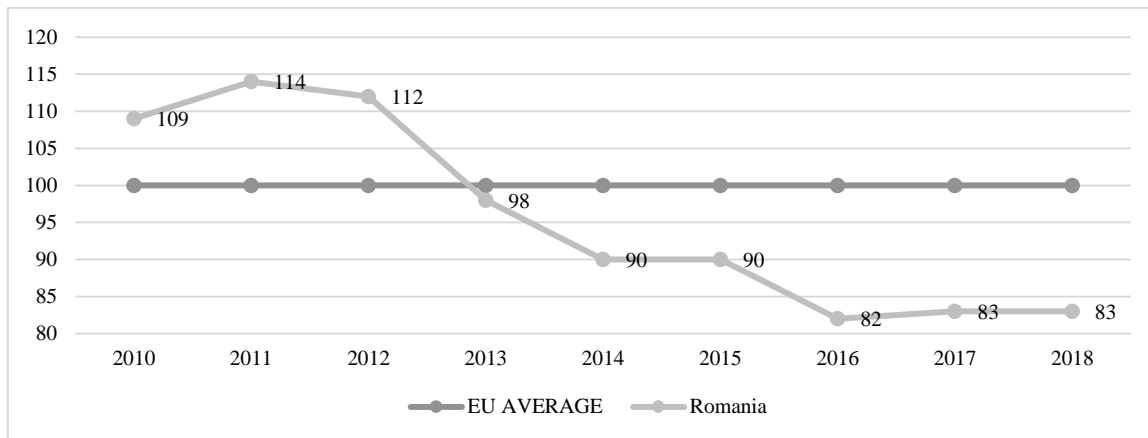


Figure 4 – Evolution of Romania's eco-innovation index compared to the EU average (EU = 100)

Source: https://ec.europa.eu/environment/ecoap/indicators/index_en

The main barriers for eco-innovation in Romania are:

- ✓ Lack of government support for research and development in terms of funding, infrastructure and policies;
- ✓ Lack of legislative framework and mechanisms to support eco-innovation initiatives in the industry and services sector and stimulate the development of products and services with low environmental impact;
- ✓ Lack of knowledge of the economic and environmental benefits, at company level, regarding the efficient use of resources and minimization of waste and emissions. It is estimated that environmentally focused corporate investments account for 16% of total investments. On average, companies allocate only 1% of turnover to environmental issues, and most of these amounts are allocated to legal compliance, audits and environmental certifications;
- ✓ Lack of awareness and understanding within organizations, especially SMEs, of thinking based on the life cycle of products, as well as the economic benefits resulting from eco-innovative approaches;
- ✓ Reduced availability to finance platform initiatives or sustainable production and consumption projects. According to the Romanian Ministry of Environment, approximately 17% of Romanian SMEs, compared to 26% of EU SMEs, have capitalized on the ever-increasing demand for green services;
- ✓ Limited technical knowledge of existing experts and expert organizations, as well as research institutions;
- ✓ Lack of cooperation between stakeholders in supporting the introduction of eco-innovation.

For Romania to grow in an eco-innovative way, it will have to find the appropriate solutions to reduce the barriers stated above.

Romania has not yet established a clear policy and legislative framework to support eco-innovation. The implementation of European Union regulations is not enough if it is not followed by concrete support mechanisms: incentives, education policies, sustainable production and consumption policies, access to finance and institutional development.

IV. CONCLUSION

Implementing eco-innovation is a challenging process and not all companies will be able to apply it. Therefore, understanding both the barriers and the opportunities at the level of each business and the main gaps in policies and education could become a real support in building a favorable environment for eco-innovation in Romania.

The potential for eco-innovation is important and must be taken into account even in a less developed country in this respect such as Romania. The right approach to existing premises and potential could turn into agents of change, but concrete action measures are essential for this.

In order to be sustainable, businesses should be encouraged to apply eco-innovation to the highest possible level, which is a key element in increasing competitiveness. These economic incentives would promote strategies of "eco-innovation", "cleaner production" or "pollution prevention", which would materialize through changes in the productive and organizational processes of companies to reduce the impact of activities on the environment.

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