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ECO-INNOVATION – AN IMPORTANT TOOL TO SUPPORT SUSTAINABLE GROWTH

Angela Albu¹, Cornelia Crucerescu^{2*}, Nicoleta Marinela Avram¹

¹Stefan cel Mare University, 13, Universității Str., Suceava 720229, România

²Technical University of Moldova, 168, Ștefan cel Mare str., Chișinău, Republic of Moldova

*Corresponding author: email: cornelia.crucerescu@emin.utm.md

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Abstract. The whole development process along the history of the society was based on the innovation and the applications of the innovation in different areas. Especially during the last century, innovation was considered the engine of the development due to its huge importance in reaching and maintaining a high rate of growth for the world's economies. The innovation process has now a specific feature, namely the orientation to the environmental problems which affect the whole planet; according to this orientation, a new type of innovation is recognized – the eco-innovation. Our paper aims to introduce and characterize the eco-innovation, to present the importance of this process in the context of sustainable development, to highlight the EU environmental policies which include the concept of eco-innovation and to exemplify some positive achievements in the field.

Keywords: *eco-innovation, eco-innovation scoreboard, efficient use of resources, environmental protection, sustainable development, sustainability dimensions.*

Introduction

One of the challenges of the XXI century is, undeniable, the sustainable development, in which the society tends towards a new form of development for humanity that harmonize growth with care for the environment. In recent decades, innovation has become the first rule in achieving sustainable economic growth for everyone involved in industrial development on a global scale, but current trends in environmental protection, sustainability and competitiveness have led to a new concept, namely eco-innovation. Eco-innovation is a new concept, which refers to a favorable impact on the environment, exerted by the production processes or the use of goods. This includes new solutions or improvements, made in order to rise the productivity of the resources and especially to minimize the negative impact on the environment, introduced at any stage of the product life cycle. In addition to these aspects, any organization that is interested in eco-innovation uses it as a lever to increase its market competitiveness. For EU, eco-innovation has become a major policy objective through the Lisbon Treaty and the 2006 Environmental Technologies Action Plan [18]. Since then, the European Commission has gradually stepped up its support for eco-innovation, which today is subject to the activities of several General Directorates and integrates into their main programs and initiatives.

The eco-innovation concept is directly connected with a broader one – sustainable development. This became a buzz word since the environmental problems are now one of the biggest challenges of the humanity. If up until now it was considered more important

the performance of the economic system, in the last period it is emphasized the need to include sustainability as a central element of development, approached in the broad and long term. The economy of the environment has undergone an accelerated development lately, namely in this sector a series of innovative and complex projects are started with a special value, both economically and ecologically [2]. The integration of the sustainability in all economic decisions represents our chance to limit the negative impact of our actions and to support the positive impact, simultaneous with the economic growth.

Discussion

The EU policy for a sustainable economic growth

The specialized literature for the study and analysis of sustainable development is very extensive, especially at international level. There are a lot of books, scientific papers, reports, statistics and projects in the field of sustainable development. According to the World Bank, sustainable development refers to people, a better life today and a healthier planet for future generations. According to David Pearce, sustainable growth means that each generation should transfers at least the same "capital" from the one acquired. Pearce defines capital as being composed of physical capital (machines and infrastructure) intellectual capital (knowledge and technology) and environmental capital (natural resources) [10]. The most quoted definition of sustainability is provided by the Brundtland Commission: development that "meets the needs of the present without compromising the chances of future generations to meet their own needs" [4].

Sustainable economic growth is a very important issue of humanity. This phrase represents a method of resource use, a so-called "usage pattern", which seeks to meet the needs of people in a way that sustains natural resources and the environment for future generations, also. The essence of the sustainable growth of the economy is outlined by the current and future management of the natural resources, energy, material and informational resources, in close relation to the objectives of the economic growth and guaranteeing a better quality of life and the environment. The key to sustainable development is the harmony between meeting basic material needs and preserving the state of the environment, as the only method for increasing the quality of life [17].

In September 2015, at the General Assembly of the United Nations, a large number of countries signed the 2030 UN Agenda for Sustainable Development and its 17 sustainable development goals, thus establishing a list of actions for the planet and especially for people [8]. The adoption of the 2030 Agenda and the set of sustainable development goals represent a change in the paradigm of international policies on development cooperation [16]. The EU is committed to implementing the goals of sustainable development in both internal and external policies. In the table no.1 are presented the main characteristics of the objectives of sustainable development with an ecological aspect and with an emphasis on industry, innovation and resilient infrastructure.

The 17 Sustainable Development Goals (SDGs) or Global Goals, cover a wide range of topics that promote global action in three main areas of sustainable development: economy, society and environment. The 17 SDGs are equally addressed to both underdeveloped and developed countries and regions. In order to promote sustainable development around the world, the EU will continue to cooperate with external partners, using all the tools available in its foreign policies and, in particular, supporting the efforts of developing countries.

Table 1

**The sustainable development goals related to eco-innovation,
according to 2030 UN Agenda**

The sustainable development goal	Explanations
Goal 6. Ensure availability and sustainable management of water and sanitation for all	According to studies, the water deficit affects more than 45% of the world's population, and this figure will increase with climate change. The strategy emphasizes the importance of developing water and sewerage infrastructure, managing drinking water to substantially reduce the number of people suffering from water scarcity, eliminating waste, reducing pollution and increasing the efficiency of water use in all sectors.
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all	The EU is committed to helping developing countries provide access to sustainable energy services for 500 million people by 2030. In 2015, the EU launched the Global Climate Change Alliance (GCCA +), a seven-year landmark program to help the world's poorest and most vulnerable regions cope with climate change, including the energy dimension, providing financial, technical and political.
Goal 13. Take urgent action to combat climate change and its impacts	The strategy calls for measures to mitigate and adapt to climate change in order to combat the dangers of climate change and raise awareness of climate change.
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	The EU is a party to relevant international conventions on the prevention of marine pollution and the sustainable conservation and management of marine resources. The strategy includes measures to prevent and reduce marine pollution, the sustainable management of marine ecosystems and to ensure sustainable and legal fishing.
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	The strategy calls for the sustainable use of terrestrial ecosystems and sustainable forest management because human society has created a huge impact on Earth, and with this action of mankind the responsibilities related to environmental protection have been born. EU promotes sustainable forest management, combating deforestation, forest degradation and illegal logging.
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	The strategy aims to develop quality, reliable, safe and sustainable infrastructure, to ensure the well-being for all, modernize the infrastructure and sustainable rehabilitation of the industries for the efficient use of resources, encourage innovation, eradicate forced labor and increase the number of employees in research and development.

Source: own elaboration with information from [16]

In terms of eco-innovation, the tasks it has to achieve are found at the intersection of ecological aspects and those with an emphasis on industry, innovation and resilient infrastructure. Industrial development has double impact, with opposite effects on the environment: negative and positive. To reduce the negative impact, which is manifested by environmental pollution and depletion of non-renewable resources, there were theories such as "zero growth" or "economic downturn". From another point of view, economic

growth is necessary to ensure a high level of quality of life for all, but also to support the development of eco-innovations. For these reasons, innovative industrial development leads to efficient resource consumption solutions and minimizing the negative impact on the environment.

Eco-innovation – concept and dimensions

As it was mentioned in the introduction, the concept of eco-innovation highlights the idea that the eco-innovations reduce the impact on the environment, caused by the consumption and production activities. Fussler Claude and Peter James [9] are the first authors to use this concept in 1996 in the book "Driving Eco-Innovation: A Breakthrough Discipline for Innovation and Sustainability". One year later, Peter James defines eco-innovation as "new products and processes that provide value to customers and businesses, but significantly diminish the impact on the environment" [13].

All mentioned authors use this concept as a means of minimizing pollution and the impact of human activity on the environment, on the one hand and on the other hand as a means of obtaining a more efficient use of the resources. From the specialized literature we can note three essential dimensions:

1. The object of innovation is always a process, product or service, which is why eco-innovation is mostly related to the theory of innovation.
2. Most authors believe that eco-innovation must be market-oriented, this assertion being supported by the fact that it is a beneficial process by improving the competitiveness of companies and keeping the environment at a "green quota".
3. Even if the concept of environmental impact is defined rather loosely, all definitions include the same idea, to reduce pollution.

The assessment of eco-innovation

With increasing interest in innovation with beneficial effects on the environment, the problem of measuring it in a more precise way has been raised. The importance of measuring progress towards eco-innovation was highlighted by the OECD in 2009, which underlined that this measurement process can help the lagging countries to identify their opportunities for performance improvement. They can obtain information on the economic effects, the barriers that appear, as well as if there is a decoupling of the economic growth from environmental degradation. The European Union has developed its own instrument for assessment of eco-innovation – Eco-innovation Scoreboard (EIS) - a complex index formed by 16 indicators, divided in five areas: eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency and socio-economic results [2]. According to the results obtained in the process of eco-innovation implementation, the European countries fall into three categories:

- eco-innovation leaders, with results better than European Union's average: Sweden, Finland, Germany, Luxembourg, Denmark and Slovenia;
- average eco-innovation performers with results around EU average: Austria, Italy, Spain, Portugal, United Kingdom, France, Ireland, Netherlands and Malta;
- countries catching up in eco-innovation with performances below the EU average – the rest of EU countries.

The Eco-innovation Scoreboard is a useful tool for the assessment of the overall performance in eco-innovation for a country or a region, but it doesn't give detailed information about the inside processes involved in eco-innovation. Only the analysis of the

dimensions of the index can give more information about strength points and weak points of a country in the field of eco-innovation.

Romania' approach regarding eco-innovation

Generally speaking, Romania has a low performance in the field of innovation. In 2007, when Romania joins the EU, the overall performance in innovation was well below the EU average, exactly lower than half the EU average. During all this period Romania was not able to improve its results and, in this moment, it is still considered a modest innovator [3]. The overall performance in eco-innovation in Romania, for the period 2010 – 2018 is represented below, in the figure 1.

The graph shows a negative evolution since 2016, with very low values of the Eco-innovation index for the whole period and, unfortunately, the trend is also, decreasing. About 33% of enterprises have implemented energy saving measures and 31% of enterprises have implemented measures to reduce waste. According to statistics, approximately 59% of Romanian companies invest less than 1% of their turnover in order to become more efficient in using the resources.

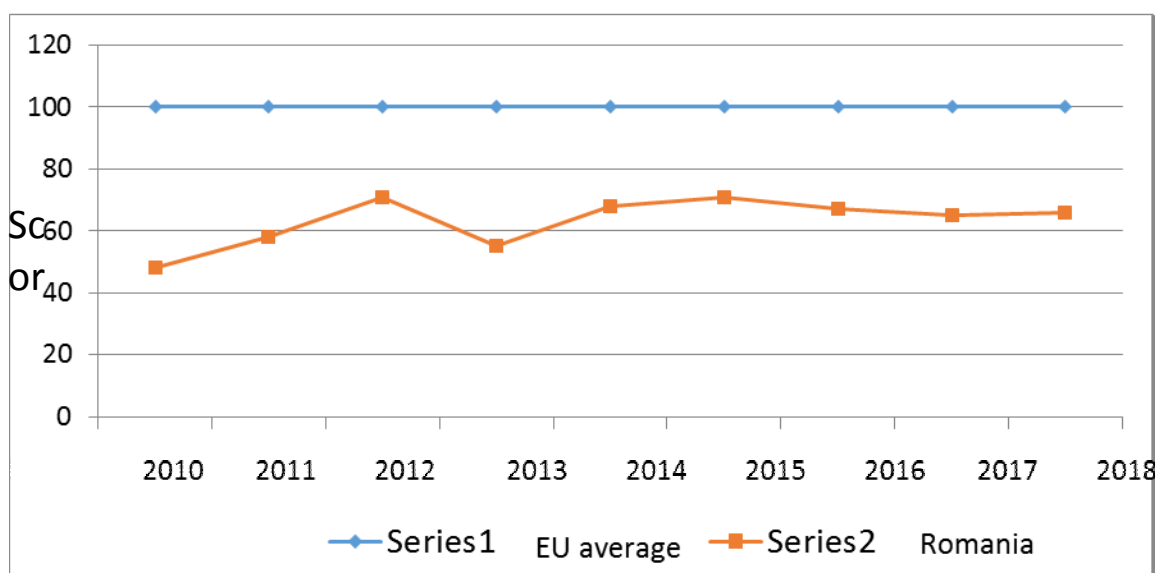


Figure 1. The evolution of Eco-innovation Scoreboard in Romania, between 2010 – 2018.

Source: own elaboration with information from [6].

In particular, the eco-innovation is in the same situation, with unsatisfactory results at 4 from the 5 dimensions, according to the Eco-innovation Scoreboard method [6]. The dimensions Resources involved in eco-innovation and Eco-innovative activities are half or even less than half of EU average and only the Socio-economic results approach the average value of the Union.

An in depth analysis of the scores of each dimension of Eco-innovation index shows the lag between Romania and the other members of EU: the dimension Resources involved in eco-innovation is 53, a half of average European value; there is no change in government investments in environment and energy and in research and development compared to previous years, as Romania invests below the EU average in these areas (0.03% of GDP) [6].

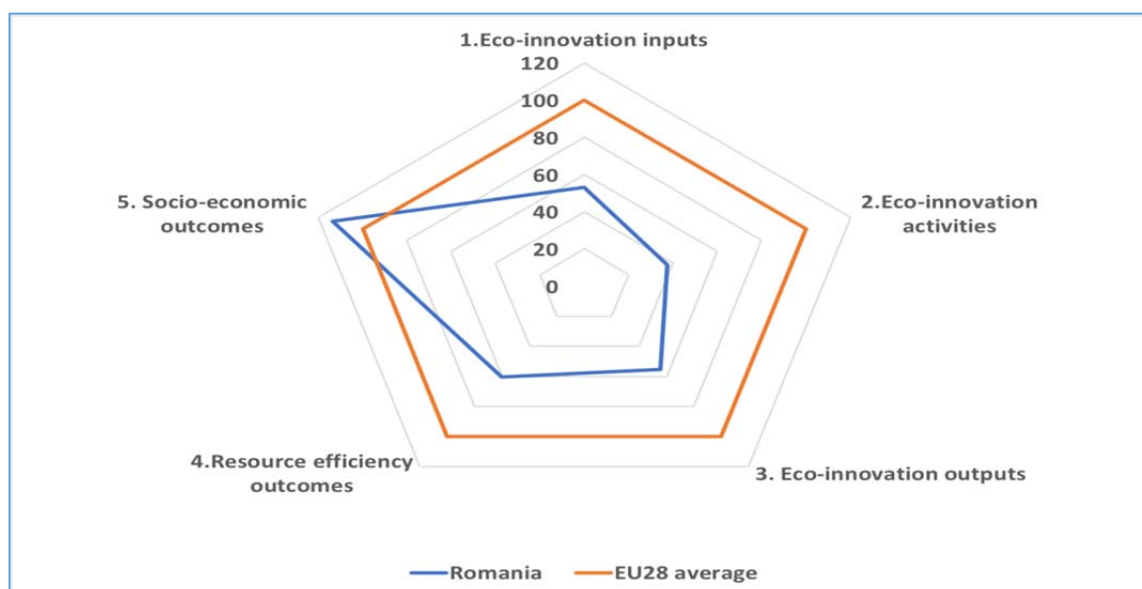


Figure 2. The components of the eco-innovation index for Romania, 2017.

Source: *Eco-innovation Observatory - Eco-innovation in Romania* [6].

The eco-innovation in the Republic of Moldova

Republic of Moldova has been recognized at the highest level that it is important to apply the principles of sustainable development both in all sectors of the national economy and in the social sphere [1]. On these principles, public policies have been elaborated that aim to restore and maintain a long-term rational balance between economic development and the integrity of the natural environment.

Innovation development is supported by state budget sources, international grants and private sector contributions. According to the National Program in the fields of research and innovation for the years 2020-2023 [11] and the "State Program" competition, projects for the following strategic priorities will be funded: Health; Sustainable agriculture, food security and food safety; Environment and climate change; Social challenges and Economic competitiveness and innovative technologies.

Some estimates claim that in the Republic of Moldova the share of research and innovation funding from the state budget for the next 4 years constitutes from 0.197% to 0.189% of GDP [5] while in the world, in 2018, 2,228% was spent from GDP for research and development and in the European Union, the proposed objective is 3% of GDP [7].

An important support for research and innovation are international grants. The most visible in implementing innovations is the energy sector. The study of the objectives regarding some ways of improving the energy sector, established by various strategic documents, indicates that by 2020 the final energy consumption in all sectors of the national economy will be reduced by 20%, the losses in the electricity networks will be reduced by 11%, the share of electricity from renewable sources constitutes 10%, and the reduction of greenhouse gas emissions is reduced by at least 25%, and by 64% by 2030 [12].

Recently the Agency for Energy Efficiency together with the United Nations Industrial Development Organization launched the project "Clean Technology Innovation Programs for SMEs and Start-ups in the Republic of Moldova". The objective of the project is to promote and support renewable energy technologies in the Republic of Moldova by

piloting an Entrepreneurial Accelerator, which will lead to the development of the entrepreneurial spirit, the creation of jobs and the positive impact on the environment. The support of innovations will be achieved by organizing the Moldova EcoEnergetic Competition by awarding prizes for the best entrepreneurial initiatives aimed at implementing energy efficiency measures and renewable energy sources in the agricultural, IT, transport and industry sectors and launched by women in the energy field. The degree of innovation will be evaluated according to the project's realization based on a scientific research or a recent rationalization proposal, in particular belonging to the local researchers and if there are patent applications or the project has been realized on the basis of a patent or a proposal to use a totally new practices for the Republic of Moldova [13].

In recent years, the Moldovan efforts to promote and implement eco-innovations are becoming more visible, but the country still occupies modest positions worldwide. According to the Global Innovation Index 2019, the Republic of Moldova has dropped 10 positions compared to 2018 and ranks 58th out of 129 monitored states, below the world average. In terms of ecological sustainability, the position is 116th, the environmental performance – 91th and the implementation of the environmental certificates ISO 14001 – 111th. Romania is 50th in the ranking, Ukraine - 47th, Russia - 46th [15].

Conclusions

Nowadays, innovation has become one of the most important features of the economy; countries that give importance to innovation by creating new technologies, innovative products and services, have the opportunity to register economic growth much faster than those that do not consider innovation as the engine of economic growth and which do not attach importance to technology and innovation. A sustainable future can be built only by reducing the amount of waste from natural resources and by reducing energy consumption, producing and consuming moderately and responsibly. Under these conditions, eco-innovation is not only a modern concept, but also a reality and a necessity nowadays, a way to achieve a sustainable future for us and for future generations.

Eco-innovation has been placed at the heart of Europe 2020's strategy for smart, sustainable and inclusive growth, due to its potential to address some of the EU's current societal challenges related to the environment and to improve the EU's competitiveness, productivity and economic growth. For the second component of the eco-innovation index, the Eco-innovation activities, Romania has a score of 37 points, which represents about one third of the EU average. The results of the Eco-innovation activities are determined by the low interest of the companies to obtain certifications for their environmental management. Romania's performance in relation to the Results of eco-innovation dimension, which means the environmentally friendly products remains below the EU average, registering a value of 55 points. This result is the explanation of the small number of eco-innovation patents and publications per million inhabitants. The Resource efficiency is the fourth indicator that also stagnates, remained at 40% of the union average during 2011-2017. The last component of the index, the Socio-economic results, recorded a total score with 13 points above the average performance at EU level, slightly lower than the maximum value obtained in 2010. Positive performance is influenced by employment.

There were identified three possible reasons for the modest performance of Romania in the field of eco-innovation:

- Non-performing long-term strategies for making a profit;

- Research and development activities do not respond to current economic, environmental and social needs;
- The regulatory framework does not provide incentives for eco-innovative practices, products and services.

In Romania there are some initiatives in the private sector for the production of environmentally friendly industrial products, but they are isolated. Introducing national tax regulations that bring economic benefits to organizations that design technologies and products in an environmentally friendly manner would be a solution for improving performance in eco-innovation field. In the Republic of Moldova, the implementation of eco-innovation in different sectors of the national economy is encouraged through different modalities. Last but not least, an important role is to educate the lifestyle and social responsibility regarding rational and ecological production and consumption. A well-informed consumer has enormous power in opting for eco-innovative products and processes, the choice of which will ultimately focus on green technologies.

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