

**ECO-INNOVATION IN THE REPUBLIC OF MOLDOVA –  
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**Abstract**

*The transition to a greener and more prosperous society is possible by promoting innovations that address current and future environmental problems, decreasing energy and resource consumption, while promoting sustained economic activities. Thus, a new type of innovation appears, namely, eco-innovation. This article summarizes the steps taken by the Republic of Moldova through the programs and strategies that encourage sustainable innovation and sustainable development, and brings to the attention of the Moldovan academic environment a new topic, which tends to become an area with a significant impact on the national economy. Thus, the paper carries out an analysis of the national context in Moldova for the development of eco-innovation, analyzes the existing conditions and identifies the main barriers. The author also identifies the main premises and directions that support the development of eco-innovation and elaborates the constitutive elements of the concept of eco-innovation in Moldova, from the perspective of consumers and the business environment. The methodology is based on methods of analysis and synthesis, interpretation and relevant comparisons. The results of the research highlight the fact that Moldova has potential for the development of eco-innovation, but it still does not have a clear policy and a legislative framework to support eco-innovation.*

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**Keywords:** *sustainable development, eco-innovation, Republic of Moldova, strategies, development directions*

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**1. Introduction**

Humanity is currently using more natural resources than the planet can sustain in the long term. In 2022, according to the calculations of scientists [24], the "Earth Overshoot Day" was on July 28, which means that mankind has used the natural resources of an entire year in only 7 months. According to the Millennium Ecosystem Assessment [11], 60% of the benefits provided by global ecosystems to sustain life on Earth (such as fresh water, clean air and a relatively stable climate) are degraded or used in an unsustainable way. Recent sustainability challenges (climate change, resource scarcity, environmental degradation, etc.) are driving change in the way Governments and the private sector alike operate.

From this perspective, it is widely recognized that innovation is a driver of economic and social progress in any country, as well as a driver of business success by providing competitive advantages at the organizational level. The transition to a greener and more prosperous society is possible by promoting innovations that address current and future environmental problems, decreasing energy and resource consumption, while promoting sustained economic activities. This type of innovation is further referred to as eco-innovation.

Two basic publications exploring the wider scope of green growth possibilities have been launched for almost 10 years by international organizations - OECD "Towards Green Growth" (2011) [23, p. 9] and UNIDO "Politics for supporting green industry" [38].

The launch of the EcoAP (Eco-innovation Action Plan) initiative [7] by the European Commission and the growing number of academic papers published on eco-innovation show the growing interest in this knowledge from politicians and academia. But the role of innovation in achieving green growth can hardly be overstated in any country.

Therefore, in many countries, innovations in environmental technologies are supported by various public measures because they are considered to be promising for improving environmental conditions without hindering economic growth. Eco-innovation is thus seen as a global concept that provides direction and vision for pursuing the overall societal changes needed to achieve sustainable development.

The predominant driver for the greening of business practices has been the tightening of environmental regulations. Recently, the trend has gained ground with increased competition during the economic slowdown and growing demand for green products (with increasing consumer awareness). Whether it's regulation, pushing competition or raising consumer awareness on the topic of sustainability, a company usually needs to eco-innovate to maintain its market position or even break into new markets. For politicians, the growing concern with climate change and the depletion of natural resources have been the main arguments when justifying new and increasingly strict environmental regulations.

From a macroeconomic perspective, it has also become apparent that technological eco-innovations alone are not capable of creating incremental change at an expected pace to achieve the EU 2030 climate change and energy targets [2], therefore there is a need for a more complex approach to eco-innovation at the state level in order to achieve systemic change. To date, the promotion of eco-innovation has mainly focused on environmental technologies, but there is a tendency to expand the scope of the concept. Eco-innovation is also seen as a global concept that provides direction and vision for pursuing general societal changes needed to achieve sustainable development [18].

This paper analyzes the national context of the Republic of Moldova for the development of eco-innovation. In order to gain a clearer understanding of the environment that supports eco-innovation, the author aims to: analyze the existing conditions, as well as identify the main barriers; to define the main premises and directions to support the development of eco-innovation in Moldova; to define the constitutive elements of the concept of eco-innovation in Moldova from the perspective of consumers and the business environment.

## 2. Literature review

In the European Union, eco-innovation supports the broader goals of the Lisbon Strategy for competitiveness and economic growth. The concept is promoted, first of all, by the Eco-innovation Action Plan of the European Commission [7], which defines eco-innovation as *"the production, assimilation or exploitation of a novelty in products, production processes, services or in management methods and business, which aims, throughout its life cycle, to*

*prevent or substantially reduce environmental risk, pollution and other negative effects of the use of resources (including energy)".*

The OECD definition of eco-innovation supports MEI's approach of evaluating eco-innovation through its output and adds wider dimensions to the concept by including "external parties" – *the implementation of a product (good or service) or a new or significantly improved process, of a new marketing method or a new organizational method in business practices, workplace organization or external relations* [22].

As defined by the European Commission [9], "eco-innovation is any innovation that have as a result a significant progress towards the goal of sustainable development, by reducing the impact of our production methods on the environment, increasing nature's resistance to environmental pressures, or by achieving an efficient and responsible use of natural resources", it seems that eco-innovation includes both technological and non-technological forms of innovation "that create business opportunities and environmental benefits by preventing or reducing their impact, or by optimizing the use of resources" [9].

Regarding the terminologies of "green innovation", "environmental innovation" or "sustainable innovation" [35], which are defined in this paper as "eco-innovation", they have been subjected to the analysis of different academic fields, such as, economics [33], management [31] and sociology [36], as well as in product design, governance, users or supply chain research [4]; [16]. Subsequently, the interest in eco-innovation among policy makers and the business environment arose due to the inherent market potential and global issues related to climate change and sustainability [14].

Thus, eco-innovation offers entrepreneurial opportunities in different fields, such as renewable energy technologies, pollution prevention schemes, waste management equipment, green financial products or ecological agriculture [3] and also supports firms that face fierce competition by offering competitive advantages [5].

Firstly mentioned by Fussler and James (1996), eco-innovation was defined as "new products and processes that provide customer and business value, but significantly reduce environmental impact", implying an initial focus on monetary and environmental failure mitigation [3]. Conversely, OECD (2010) indicates that eco-innovation also occurs in the form of "unintended side-effects" that reduce environmental impact. In fact, eco-innovation occurs wherever the reduction of environmental failure is the result of the introduction of new products, services, processes or management methods at the organizational level [22].

In addition, previous results have often ignored the positive environmental impact of "classical innovations" as well as the distinct "modes" of eco-innovation in terms of products, process organization methods [16]; [25]. Therefore, Kemp and Pearson (2007) described eco-innovation as "the production, application or use of a product, service, production process, organizational structure or management or business methods that is new to the firm (which developed or has adopted it) and which results, during its life cycle, in the reduction of environmental risk, pollution and other negative effects of resource use (including energy use) compared to relevant alternatives', which embodies a contribution basis for many subsequent research works [14]; [17]; [21]; [22]; [25].

In all the definitions presented, we can note that all the authors use the concept of eco-innovation 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 resources.

Critically presenting the prevailing research on eco-innovation from different points of view of various authors, a feasible definition of eco-innovation for the purpose of this paper is provided by the European Eco-innovation Observatory (2010), which this time provides a wider perspective of the concept: *"Eco-innovation is the introduction of any new or significantly improved product (good or service), process, organizational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and enables reducing the release of hazardous substances throughout the entire life cycle"* [19].

### **3. The degree of investigating the problem, the purpose of the research**

Eco-innovation is a relatively recent concept at international, European and especially national level. The first to use the concept of eco-innovation were Fussier Claude and Peter James in 1996. Almost 3 decades ago the authors started using the term "eco-innovation" and developed various researches around this concept. Some of the most notable researchers and specialists in the field are Rene Kemp and Pearson, who have done the final report of the MEI project on measuring eco-innovation in 2007 [16].

Later, in 2010, Kemp analyzes eco-innovation as a concept that replaces the older concept of environmental technology and provides a typology of eco-innovations, examines measurement indicators and offers measurement suggestions, in a scientific article *"Eco-innovation: definition, measurement and open research issues"* [15].

As we can notice that Eco-innovation is a relatively recent concept, there is no consensus definition of the term, being a rather complex one. The purpose of the research is to make a retrospective of the definition of this concept, to determine the role of eco-innovation in supporting sustainable development in the Republic of Moldova by defining the constituent elements of the concept from the perspective of consumers and business environment. Also, the purpose of the research is to identify the premises, barriers and directions for the development and promotion of eco-innovation at the national level.

For the EU states, interest in Eco-innovation is growing significantly, especially with the definition of the Eco-innovation Action Plan of the European Commission - EcoAP [7], which aims at a knowledge-based economy, capable of sustainable economic growth and with a better social cohesion. Thus, eco-innovation becomes a key concept that combines economic efficiency, saving resources and energy from the desire to create a new economic growth that takes into account the resources of the planet and is for the good of the citizens.

For the Republic of Moldova, the main challenge remains its low level of competitiveness, which significantly affects the research and innovation system. The high and medium technology sectors do not contribute enough to the trade balance, the demand for knowledge remains weak and the culture of innovation continues to be underdeveloped.

Moldova still occupies modest positions at the world level in terms of investments in research, innovation and sustainability. According to the Global Innovation Index 2021 [12], the Republic of Moldova ranks 64th among 132 economies, registering a decrease in position

in the last 3 years, or 37th among European states. However, reported to GDP, in 2019, the performance of the Republic of Moldova is above expectations for its level of development. In terms of ecological sustainability, Moldova ranks 105th, environmental performance - 76th and the implementation of ISO 14001 environmental certificates - 97th [12], registering better performances compared to 2019.

In the context of a sustainable development at the state level, it is important to apply the principles of sustainable development in the Republic of Moldova, both in all sectors of the national economy and in the social sphere. Based on these principles, public policies have been developed that aim to restore and maintain a long-term rational balance between economic development and the integrity of the natural environment. In general, the national policy agenda is partially aligned with the Sustainable Development Goals (SDGs), and a third of the SDG targets are not reflected in any way in national policy documents. Most aligned targets are part of the "environment" sector, and most non-aligned targets - from the "governance and human rights" sector [1].

According to the National Report based on the OECD set of green growth indicators [8], the socio-economic context in Moldova is improving, but at a suboptimal pace. The economy of the Republic of Moldova, in recent years, registered a modest growth rate, which did not allow a significant improvement in the standard of living among the citizens. Also, Moldova's economic growth has partially decoupled from the use of natural resources. Under the conditions in which the CO<sub>2</sub> evolution was constant and the GDP increased, the CO<sub>2</sub> productivity increased from 7.3 to 9.5 MDL/kg. At the same time, the ratio between GDP and greenhouse gas emissions increased from 10.7 to 14 MDL/kg CO<sub>2</sub> equivalent [8]. Due to these developments, there has been a partial decoupling of economic growth from CO<sub>2</sub> emissions, but despite all this, Moldova occupies one of the last positions among European states in terms of CO<sub>2</sub> productivity.

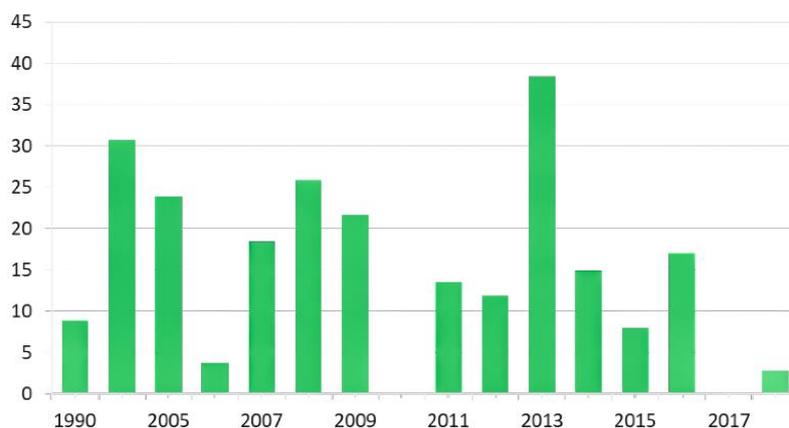
Both the Government and businesses in Moldova spend too little for environmental protection purposes, thus Moldova ranks last among European countries in terms of green investments. In recent years, Moldova allocated only 0.5% of GDP to environmental protection, while the EU average is 1.9%.

Innovations in the field of the environment and the green economy within the national Research and Development system, as well as within economic operators - remain quite small. Green investments require considerable financial resources for long-lasting results, resources that neither the state nor the vast majority of economic agents possess.

In the research carried out by the National Bureau of Statistics regarding the innovation activities of enterprises in 2019-2020 [34] it is mentioned that the number of innovative enterprises is 448 units and represents 12.6% of the total number of enterprises included in the research (in decrease by 26% compared to the years 2017-2018). The figures are quite modest compared to the international situation, because of the current situation of the entrepreneurs and the national infrastructure in the field of Research and Development.

Regarding environmental innovations, the situation can be evaluated based on the technologies developed in this field reported to the total number of technologies. Thus, according to Figure 1, on average, about 1/5 of the new technologies applied by domestic enterprises can be considered environmental. Most of these are related to environmental

management procedures and climate change mitigation in the energy or goods production sector.



**Figure 1. The share of environmental technologies in total developed technologies, %**

Source: EU4Environment (2021). Spre o transformare verde a Republicii Moldova: Analiza situației din 2022.

Monitorizarea progresului în baza indicatorilor creșterii verzi ai OCDE. Available on:

<https://www.eu4environment.org/app/uploads/2022/02/Report-Green-Growth-Indicators-Republic-Moldova-2021-ROM.pdf> [8]

Both public and private expenditures for environmental protection continue to be low. In recent years, the Government has paid little attention to the dimension of environmental protection, including in terms of financial resource allocations. For example, for the implementation of the "Environmental Protection" program, on average, 240 million MDL were allocated annually, or less than 0.1% of GDP. The weak correlation of public expenditures in the field with revenues from environmental taxes determines rather a bad situation compared to European states, no matter what the country's priorities are on this dimension.

Private expenditures on environmental protection are also very low. This fact determines a volume of total environmental expenses far below of the European countries, of only 0.2% of GDP compared to the EU average of around 1.9% in 2020 [8]. According to the same report, during the 2019-2020 period, private environmental expenditures remained approximately equal at around 250 million MDL. Most of the expenses are directed to the collection and treatment of wastewater (66%) and waste management (23%) and to a small extent to other areas. This volume of financial resources allocated to the private sector is far below that allocated in European countries. The EU average reports that private environmental expenditures exceed public ones by at least 2 times, reaching, in total, a level of 1.9% of GDP (2020) [10].

In the context of a sustainable development at the national level, Moldova applied more or less the principles of sustainable development, both in all sectors of the national economy and in the social sphere. Based on these principles, public policies have been developed that aim to restore and maintain a long-term rational balance between economic development and the integrity of the natural environment.

The normative and policy framework that regulates and administers the processes of sustainable development and greening of the economy, including environmental tax reform, is

reflected in several categories of documents, such as: international agreements, conventions and treaties, strategies and codes, laws and government decisions, national programs and other relevant normative documents.

In order to ensure sustainable economic development without compromising environmental objectives, the Republic of Moldova has two strategic international commitments: the Association Agreement with the European Union and the 2030 Agenda for Sustainable Development. By signing the Agreement, the Republic of Moldova undertakes to harmonize national legislation with European legislation and to ensure the integration of environmental protection provisions, rational use of resources and energy efficiency, in all sectors of the national economy and social life [32].

Among the most notable policy documents from Moldova, which are the basis for the *development of eco-innovation*, the author identified the following:

- The Government's activity program, which dedicates a chapter to the promotion of the green and circular economy.
- National Development Strategy "Moldova 2030" (under review, with expected adoption in 2022).
- The environmental strategy for 2014-23, which stipulates as a priority the integration of the principles of sustainable and ecological economy in all economic sectors.
- Energy strategy -2030.
- The strategy of the development of SME sector for 2012-2020.
- Adapting the 2030 Sustainable Development Agenda to the context of the Republic of Moldova.
- Environmental tax reform.

Among the most important national programs in Moldova, which support and promote the *development of eco-innovation*, the author identified the following programs:

- The National Program in the fields of research and innovation for 2020-2023.
- The program for the promotion of the green economy in the Republic of Moldova and the Action Plan for 2018-2020 (HG/GD no. 160/2018).
- Greening program for small and medium enterprises [26], approved by HG/GD no. 592/2019 (the program provides financial support to SMEs for the implementation of greening actions regarding resource efficiency, the application of sustainable production and consumption models, the introduction of eco-innovations in technological processes, waste reduction and management, pollution prevention and water resources management).
- EU4Business Program (encouraging ecological enterprises/businesses or ecological technologies by offering various facilities, including financing) [27].
- "Clean technology innovation program for SMEs and Start-ups from the Republic of Moldova".
- National program for energy efficiency 2011-2020.

The SMEs Greening Program is one of the most important programs currently carried out at national level, which aims to promote, support and develop the entrepreneurial capacities of SMEs to adapt their production processes and services towards sustainability social and environmental. Supporting eco-innovations in the business environment is one of the three key areas of the SMEs Greening Program, managed by the Organization for the Development

of the Small and Medium Enterprise Sector (ODIMM). The successful implementation of eco-innovations can be achieved by providing training and education programs, thus workshops are organized within the project, which aim to present the UNEP and EU methodology for promoting eco-innovation within SMEs [30].

The development of innovation is supported by financial sources from the national budget, international grants and private sector contributions. According to the National Program in the fields of research and innovation for 2020-2023 [28] and the "State Program" contest, there are financed projects for the following strategic priorities: Health; Sustainable agriculture, food security and food safety; Environment and climate change; Social challenges and economic competitiveness and innovative technologies.

An important support for research and innovation are international grants. The most visible in the implementation of innovations is the energy sector. The study of the objectives regarding some ways to improve the energy sector 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 sources renewables constitute 10%, and the reduction of greenhouse gas emissions is reduced by at least 25%, and by 2030 by 64% [29].

Also, the Energy Efficiency Agency together with the United Nations Organization for Industrial Development launched the "Clean Technology Innovation Program for SMEs and Start-ups from the Republic of Moldova" project. The main objective of the project was to identify and promote entrepreneurial initiatives in the field of energy efficiency and renewable energy sources in the most important sectors of the national economy.

Over time, the field of eco-innovation has shown increasing interest among the academic environment in Moldova, as are the higher education institutions that carry out research and education activities in the field of innovation, such as the Academy of Economic Studies from Moldova, Technical University of Moldova, Moldova State University, Trade Co-operative University of Moldova etc. One of the most important research institutes in the Republic of Moldova is the National Institute of Economic Research that carries out different studies and research in the field of green economy, circular economy and eco-innovation etc. The National Institute of Economic Research carried out various relevant projects and studies in the field, and among the most important we mention: "Study on the prerequisites for the transition to the circular economy of the Republic of Moldova", elaborated within the project "Development of the circular economy formation mechanism in the Republic of Moldova (2020- 2023)"; "The introduction of a new priority "Green economy for SMEs" in the Action Plan for 2015-2017 for the implementation of the Strategy for the development of the small and medium-sized enterprises sector for 2012-2020"; Survey of SMEs within the project "Promoting the improvement of the environmental performance of small and medium-sized enterprises (2014) [13].

#### **4. Methods and materials applied**

For preparing this paper, the author resorted to the investigation of theoretical and practical sources, using various research methods, such as: the method of analysis and synthesis of the

literature in the researched field, the comparative method, induction and logical deduction, etc., followed by a dissemination of the results in order to express a personal opinion. As informational support, there were used bibliographical resources, studies and researches, normative acts, official reports and documents (e.g., strategies, national programs, etc.), websites of governmental organizations, national statistical data, publications from Republic of Moldova and other countries in the field of sustainable development, green economy, sustainability and eco-innovation. Analysis and synthesis are based on processed and summarized data.

There were also used the study of the literature and the presentation of the synthesis of its results, the analysis of research and studies in the field regarding the definition of eco-innovation concepts in the contemporary economy, the analysis of the European and national context regarding eco-innovation policies, as well as the analysis the existing conditions for the development and implementation of eco-innovation in the Republic of Moldova in order to formulate theoretical arguments, as well as the application of the comparison method in the process of realizing one's own visions. In the theoretical approach, based on the current literature discussion, the author prioritized a juxtaposition of sources from different fields, such as eco-innovation and sustainable development.

## **5. Results obtained and discussions**

The introduction of systemic eco-innovation at the country level requires the creation of favorable conditions, structured on two levels of intervention: market-based instruments and a policy dedicated to science, technology and innovation. At the national level, a strong vision and awareness is a prerequisite, with a clear strategy and objectives to address societal challenges, as well as a strong promotion of sustainable consumption and production practices. In addition, general framework conditions (degree of gaps, ease of doing business, ease of innovation) are essential factors to facilitate innovation as well as eco-innovation.

According to OECD 2009, innovation policy in most countries was under the responsibility of the ministries for economy and trade, industry, science and technology, while environmental policy was under the responsibility of the minister for environmental protection, with little effort to integrate these two policy areas. While environmental policies have traditionally focused on "end-of-pipe solutions" rather than pollution prevention solutions or an extensive focus on the supply chain, innovation policy is usually too broad to appropriately address specific environmental concerns. To realize its full potential, eco-innovation will require actions to ensure that the entire innovation cycle is effective, with policies ranging from adequate investment in research to support for the commercialization of existing and innovative technologies [21].

Both environmental and innovation policy areas would benefit from better integration and interconnection. At the market level, a combination of market-based instruments can be designed for eco-innovation, with demand-side measures (regulations and standards, public procurement and demand support, technology transfer) and supply-side measures (equity support, research and development (R&D), education and training, networks and partnerships, infrastructure provision).

From the author's point of view, the conditions for eco-innovation at the national level are based on a number of elements, such as the attitude of companies towards eco-innovation; the public policy framework and legislative environment that supports eco-innovation; support services for eco-innovation and access to financing and available financial resources.

There are few studies at European or national level regarding eco-innovation activities. The most representative European study is the Eurobarometer Flash 315 "Attitudes of European entrepreneurs towards eco-innovation" [37] carried out in 2011, which identifies the main concerns, obstacles and driving elements perceived by EU entrepreneurs in relation to eco-innovation. Among the main findings of the report on eco-innovative activities, it is mentioned that:

- over a fifth of the surveyed companies estimated that 30% of their innovation investments were related to eco-innovation: Sweden (21%), Greece (22%), Austria (23%), CDPIu and Luxembourg (both 24%) and Poland (30%);
- around 3 out of 10 EU companies have introduced a new or significantly improved eco-innovative product or method in the last two years, while around a quarter have introduced a new or significantly improved eco-innovative organizational method. A similar proportion (25%) introduced a new or significantly improved eco-innovative product or service to the market;
- among companies that introduced at least one type of eco-innovation in the last two years, the largest number (42%) said that such eco-innovation led to a reduction in material use between 5% and 19% at a unit of output, while about a third estimated that the reduction in material use was less than 5% at a unit of output;
- the main barriers encountered by entrepreneurs in the development of eco-innovation are: the uncertain demand from the market; uncertain return on investment or too long payback period; lack of funds for eco-innovation; insufficient access to existing subsidies and tax incentives; existing regulations and structures do not provide incentives for eco-innovation;
- the main drivers for the accelerated adoption of eco-innovation identified in the study are: expected increases in energy prices; current high energy prices; current high material prices; good business partners; ensuring or increasing the existing market share; access to existing subsidies and tax incentives.

As an overview of the situation of eco-innovation in Moldova, we can observe that, although the first steps have been taken in promoting a green economy, concrete actions in the development of eco-innovation are missing. The main reasons for this situation are: the regulatory framework does not encourage eco-innovative practices, products and services, research and development activities do not meet current economic, environmental and social needs, and the business sector is characterized by a short-term perspective regarding obtaining profit.

The analysis carried out for this paper identified several barriers to the development of eco-innovations in Moldova, but also catalysts and positive premises that can contribute to a large-scale application of eco-innovative solutions.

So, the author find that *the main barriers to eco-innovation* are: the absence 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 the company level, regarding the efficient use of resources and the minimization of waste and emissions; reduced availability for financing platform initiatives or sustainable production and consumption projects; lack of cooperation between stakeholders in supporting the introduction of eco-innovation; sacrificing environmental priorities in favor of other current priorities, with the Government reducing environmental expenditures during the budget year.

The research carried out reflects the existing **opportunities** in Moldova and demonstrates that the eco-innovation potential is important and must be taken into account. Following the investigation, we identified the existing **premises** and the **potential** for eco-innovation, which, with the right approach, can be transformed and used as agents of change. The author formulates several important *premises for the development of eco-innovation in Moldova*:

- well-educated and innovative human capital;
- increased access to information;
- consumers with a positive attitude towards green products;
- increased demand for green products in global supply chains;
- high access to financial resources through financing programs;
- improved and harmonized legislation.

Regarding the *catalysts of eco-innovation*, the author identifies the most important ones in his opinion, namely: the continuous increase in prices for energy and raw materials, increased competition in the European free market, increased legislative pressures for the elimination of hazardous and polluting substances, the reputation and trust become essential for a successful business, better access to capital, more and higher environmental taxes and, last but not least, new markets for green and eco-responsible products and services.

In recent years, Moldova has developed its programmatic framework, mainly due to the pressures from the EU and the commitments assumed as a precondition to access funds. The implemented plans and strategies address more or less the ecological and innovation aspects in a wider social and economic context.

*The possible strategic directions* for increasing eco-innovation in Moldova are:

- Alignment with the priorities and objectives of the 2030 Sustainable Development Agenda and the European Green Deal, as well as with the commitments of the EU-Republic of Moldova Association Agreement.
- Strengthening the capacities of public authorities, as well as the business environment regarding the promotion and implementation of eco-innovation.
- The higher level of use of green public procurement and other demand-side policies could encourage more sustainable business practices; research and development activities should be made more efficient in order to face the current challenges in Moldova, thus improving its economic and social attractiveness.
- Adjusting the normative regulatory framework to the needs of SMEs development; improving their access to finance to improve their conditions and capacity to eco-innovate; human capital development by promoting skills in eco-innovation.

- Defining national sectors with potential for smart specialization to give them more focused and specific support that will also improve the potential for eco-innovation.
- Harmonization and updating of the legislative framework on energy efficiency and waste (restrictions on the use of certain hazardous substances in electrical and electronic equipment, waste electrical and electronic equipment (WEEE)).
- Creation of a framework for establishing requirements in terms of eco-design of products.
- Updating the legislative framework regarding product labeling and indicating, through labeling and standard information about the product, the energy consumption and other resources of energy impact products.
- Ensuring a good coordination of the sectoral efforts of the ministries (Ministry of Economy, Ministry of Environment, Ministry of Education and Research, Ministry of Agriculture and Food Industry, etc.).
- Collaboration in the field of eco-innovation especially between the public and private sector.
- Establishing partnerships at national, European and international level in order to transfer know-how in the field of eco-innovation.

At the national level, information on the investments intended for environmental protection made in the private sector is limited. Also, there are no national studies that provide an insight into the current situation regarding consumer perceptions toward sustainability or that provide an insight into eco-innovation within businesses.

Starting from these premises, as well as from the catalysts of eco-innovation, for a better understanding of the concept of eco-innovation and its development in Moldova, it is necessary to have an overview of the interests and needs of the existing demand on the market, i.e. consumers as well as supply alike. Consequently, the author **initiated 2 important studies** in Moldova:

1. Study on consumer perceptions regarding sustainability and green products (305 respondents).
2. Study on eco-innovation in enterprises from Moldova (200 enterprises from the Industry, Services and Agriculture activity sectors).

Both studies were initiated between August and September 2022, in the Chisinau municipality and the Central Region.

The consumer study aims to analyze the attitudes and behaviors of Moldovan consumers regarding sustainability and whether they are making more conscious decisions considering the existing environmental problems. It also aims to explore how consumers adopt a more sustainable lifestyle, how much they value ethical and sustainable practices within companies and how this influences their purchasing behavior.

The purpose of the enterprise study is to analyze existing eco-innovation activities, as well as material costs, in the context of rising resource prices and resource scarcity. Also, the study aims to identify the main barriers and drivers for the accelerated adoption of eco-innovations, as well as to identify the main interests, needs and expectations of Moldovan entrepreneurs in order to develop eco-innovative businesses.

**Table 1. Constituent elements of the concept of eco-innovation in the Republic of Moldova from the perspective of consumers and the business environment**

Demand Study Study among consumers	Supply Study Study among enterprises
<b>The studies analyze:</b>	
1) The interest of Moldovan consumers regarding climate change, as well as the degree of knowledge of the concepts of green products and what they consider a sustainable product/ service. 2) Consumer attitudes and behaviors regarding green products and sustainability. 3) The main barriers and needs in adopting a more sustainable lifestyle.	1) Strategies, the business environment in the context of climate change. 2) The costs of materials within the company. 3) Eco-innovation activities within the company. 4) Barriers and drivers for accelerated adoption of eco-innovations. 5) Interests, expectations and needs of entrepreneurs regarding the development of eco-innovative businesses.

Source: elaborated by the author

Implementing eco-innovation is a challenging process and will not be suitable for all enterprises. Thus, these studies will provide, on the one hand, an understanding of consumer behavior regarding green products and, on the other hand, will identify barriers and opportunities at the level of the business environment, as well as the main gaps in policies and education, which could help to building a better understanding of the context and optimal conditions for the development of eco-innovation in Moldova.

## 6. Conclusions

In recent years, the Republic of Moldova has made progress in promoting the green economy, but it has also identified priority areas for further actions, such as: promoting eco-innovation, greening small and medium-sized enterprises and creating more green jobs; increasing energy efficiency and diversifying energy sources by increasing the share of renewable energy; reducing greenhouse gas emissions in accordance with nationally determined contributions or promoting green investments [8].

Following the analysis carried out, the author considers that, at the national level, there is potential for eco-innovation, but Moldova has not yet established a clear policy and legislative framework to support eco-innovation. It is not enough to implement general strategies aimed at green growth, if they are not followed by concrete support mechanisms, such as incentives, education policies, policies regarding sustainable production and consumption, access to financing and institutional development.

Not all innovations require government support. In general, step-by-step innovation does not require special support. On the contrary, transformational innovations encounter a number of obstacles, related to costs, uncertainty, difficult access to capital and the need for institutional changes. To be effective, innovation and eco-innovation policies must be designed based on particular types of obstacles rather than abstract notions such as market or system failure.

There are many opportunities for eco-innovation, which can target low-carbon solutions for various business sectors, green products, waste regeneration systems and green business

models, to zero-waste cities with smart infrastructures or a better management of ecosystems and citizens' lifestyles [6].

The Republic of Moldova also started moving in this direction by implementing the principles of green growth. Moldova initiated the promotion of eco-innovation by adapting public policies to the EU sustainable development objectives through various national programs and establishing partnerships at the national and international level, but which are not sufficient for the introduction and development of eco-innovation at the national level.

Following the analysis carried out, the author believes that in Moldova there is potential for eco-innovation, which must be capitalized both in the public and private systems, while the business and public environment is faced with a low level of knowledge and understanding of the concept in general.

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**Rezumat**

*Trecerea către o societate mai ecologică și mai prosperă este posibilă prin promovarea inovațiilor care abordează problemele de mediu actuale și viitoare, scăderea consumului de energie și resurse, promovând în același timp activități economice susținute. Astfel, apare un nou tip de inovare, și anume, eco-inovarea. Prezentul articol sintetizează demersurile pe care Republica Moldova le-a făcut prin programele și strategiile care încurajează inovarea sustenabilă și dezvoltarea durabilă, și aduce în atenția mediului academic din Moldova un subiect nou, care tinde să devină un domeniu cu impact semnificativ asupra economiei naționale. Astfel, lucrarea realizează o analiză a contextului național din Moldova pentru dezvoltarea eco-inovării, analizează condițiile existente și identifică principalele bariere. De asemenea, autorul identifică principalele premise și direcții care susțin dezvoltarea eco-inovării și elaborează elementele constitutive ale conceptului de eco-inovare în Moldova, prin prisma consumatorilor și mediului de afaceri. Metodologia se bazează pe metode de analiză și sinteză, de interpretare și comparații relevante. Rezultatele cercetării evidențiază faptul că Moldova are potențial pentru dezvoltarea eco-inovării, doar că încă nu are stabilită o politică clară și un cadru legislativ care să susțină eco-inovarea.*

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**Cuvinte-cheie:** dezvoltare durabilă, eco-inovare, Republica Moldova, strategii, direcții de dezvoltare

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**Аннотация**

*Переход к более экологичному и процветающему обществу возможен путем продвижения инноваций, которые решают текущие и будущие экологические проблемы, снижают потребление энергии и ресурсов, способствуя при этом устойчивой экономической деятельности. Таким образом, появляется новый тип инноваций - эко-инновации. Данная статья обобщает шаги, предпринятые Республикой Молдова посредством программ и стратегий, стимулирующих устойчивые инновации и развитие, и предлагает молдавской академической среде новую тему, которая имеет тенденцию стать областью, оказывающей значительное влияние на национальную экономику. Таким образом, в статье проводится анализ национального контекста в Молдове для развития эко-инноваций, анализируются существующие условия и определяются основные барьеры. Автор также определяет основные предпосылки и направления, способствующие развитию эко-инноваций, и разрабатывает составные элементы концепции эко-инноваций в Молдове, с точки зрения потребителей и бизнес-среды. Методология основана на методах анализа и синтеза, интерпретации и сравнений. Результаты исследования подчеркивают тот факт, что Молдова обладает потенциалом для развития эко-инноваций, но в стране до сих пор нет четкой политики и законодательной базы для поддержки эко-инноваций.*

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**Ключевые слова:** устойчивое развитие, эко-инновации, Республика Молдова, стратегии, направления для развития

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