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## Eco-innovations for sustainable development of Ukrainian enterprises

**Abstract.** The successful development of enterprises is based on many factors, and today, global environmental problems, the depletion of natural resources, global warming, and overpopulation are highlighting the importance of eco-innovation for sustainable development. The purpose of the study was to investigate the essence and significance of eco-innovations for the sustainable development of Ukrainian enterprises, in particular, considering the consequences of the 2022 military aggression against Ukraine. Research is generally based on methods of analysis, synthesis, abstraction, generalisation, and explanation. Prerequisites for the introduction of eco-innovations are established by the following groups of factors that put pressure on business: economic, regulatory, market, and socio-environmental. Three key groups of effects of eco-innovations (environmental, economic, and social) are identified and the advantages and disadvantages of their implementation for business are analysed in detail. As the analysis and successful global examples have shown, eco-innovations provide an increase in customer and employee loyalty, increase sales and improve the brand image, and so on. At the same time, the following disadvantages are mentioned: significant costs; technical, technological, and regulatory difficulties; rising prices for goods, and in addition, there are additional specific obstacles in Ukraine. Although many Ukrainian companies successfully introduce innovations, in general, it is shown that they lag behind firms in developed countries in terms of technological efficiency and sales of high-tech products. Ukraine has already achieved quite significant positions in the Environment Performance Index 2022 on the way to implementing the European Green Deal. However, the Russian invasion of Ukraine in 2022 negatively affected the state of its economy, environment, science and innovation. The practical value of the study is to provide recommendations for the sustainable development of Ukraine based on the European Green Deal and innovative global eco-approaches

**Keywords:** ecology; ESG principles; business model; eco-marketing; European Green Deal

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## INTRODUCTION

The planet's resources are rapidly being depleted. According to forecasts, by 2050, humanity (about 9.6 billion people) will need three planets like Earth to maintain a modern way of life. In total, half a trillion tonnes of primary resources were used to meet public needs in 2018-2023, which is 70% more than land can safely replenish (Horbal & Lomaga, 2022). Accordingly, today sustainable development (which "meets the needs of the current generation without compromising the ability of future generations to meet their own needs") is a global trend. Especially profound changes in values and behaviours based on the ideas of sustainability, organicity, and environmental friendliness can be observed in young people. On the one hand, consumers of eco-products want to contribute to the protection of the environment, on the other – to improve their own health (Musina & Kvasha, 2018).

Environmental innovations for sustainable development should concern not only goods or companies, but also industries, regions, countries, and, accordingly, combine their economic success with environmental and social added value for consumers, workers, and society. At the same time, the United Nations (UN) Climate Change Conference COP27 in Egypt and the biodiversity conference COP15 in Montreal highlighted the critical role of business in reducing the impact of humanity on nature and climate. The COVID-19 pandemic, Russia's attack on Ukraine and, as a result, another wave of refugees, rising inflation and a lack of energy resources have further increased doubts about the ability of governments to ensure sustainable and inclusive development of countries. In addition, investors and rating agencies monitor the ESG (*environmental, social, governance*) performance of firms and hold them accountable (Horbal & Lomaga, 2022; EPI Results, 2022; European Commission, 2022). Accordingly, business will play an increasingly important role in ensuring sustainable development globally.

The topic under study is extremely popular among researchers today. L.A. Musina & T.K. Kvasha (2018), studying the prospects for enterprise development in the current realities of biodiversity destruction and global warming, came to the conclusion that only companies that will implement eco-innovations have a future. E. Smith (2021) presents a rating of the 100 most creative eco-innovations on the international market and a description of the products to which these eco-innovations have become alternatives. M. Siswoyo *et al.* (2020) and S. Balamurugan (2022) investigated eco-innovation as a prospectively significant factor in strengthening the competitiveness of an enterprise, and A.S. Immawati & A. Nugroho (2020) – prospects and disadvantages of implementing eco-innovations in firms.

The features and significance of eco-innovations for the sustainable development of enterprises, in particular in developing countries, at the present stage, require further dynamic research, in particular, studying the specifics and results of their implementation. The purpose of the study, respectively, was to investigate the essence, significance,

features and possibilities of implementing eco-innovations for the sustainable development of Ukrainian enterprises, in particular, considering the consequences of military aggression in 2022 against Ukraine.

## MATERIALS AND METHODS

The research methodology includes studying the content of the concept of "eco-innovations" in the context of sustainable development of enterprises, considering the main features, advantages and disadvantages, the results of implementing such innovations on the examples of specific enterprises of countries with developed market economies, assessing the state and prospects for the development of innovation activities at Ukrainian enterprises, in particular, considering the consequences of military aggression against Ukraine since 2022.

The study is based on theoretical research methods (analysis, synthesis, abstraction, generalisation, explanation), as well as system and functional approaches. In other words, abstract ideas, provisions, and concepts related to the process of practical knowledge of the effectiveness of eco-innovations for enterprises are used. There are not enough reliable data on the activities of Ukrainian enterprises available today to apply empirical research methods. Accordingly, the conducted research is more fundamental (i.e., aimed at the development of new knowledge) than applied.

The authors used data from the Global Sustainability Study (Businesswire, 2021), McKinsey (The Restless CMO, 2022), and UN (United Nations) environment programme (UNEP, n.d.), the EU4Environment programme (n.d.), FINTECC (n.d.) and the Ministry of Economy of Ukraine; results of implementation of eco-innovations and eco-marketing by the world's leading enterprises (the Tiny Housing Co "Natura", ShoeX, Coolpaste, PriestmanGoode, Edeka, Innocent Smoothie); data on innovation activity of Ukrainian enterprises from Mind (n.d.); data from the Global Environment Performance Index (EPI Results, 2022) and other publicly available sources of information.

## RESULTS AND DISCUSSION

To ensure sustainable development and adequate livelihoods today and in the future, humanity must fundamentally change its approach to consumption and production. Ultimately, consumers, through their purchasing behaviour, essentially determine value chains and supply chains, and thus economic, social and environmental conditions around the world. On the other hand, producers and marketers have the ability to influence the conditions of production and sale of goods/services (Balamurugan, 2022).

Consumer behaviour is positively influenced by eco-education, better information and eco-marketing. Thus, environmental and social labelling of goods reflects sustainable development-oriented aspects during their production and helps to consume responsibly. At the same time, it encourages companies to consciously design production and supply chains with a focus on sustainability (Green marketing

trends era, 2023). In Germany, for example, the “Blue Angel” as a state environmental sign has been setting high standards for 40 years. More than 12,000 products and services meet strict environmental criteria (Blue Angel, n.d.).

Companies focused on sustainable development should maintain a dialogue with the public and report transparently on their goals and measures to reduce their environmental impact. Business compliance with ESG principles and disclosure of information about ESG indicators (which assess the company’s corporate governance in terms of its impact on *ecology and society*) becomes a key factor in the investment attractiveness of a business. For example, the European EMAS (Eco-Management and Audit Scheme) logo means a complex internal eco-management system that is reviewed by state-approved environmental auditors. Nowadays, it is allowed to be used by more than 2,200 branches of German companies (European Commission, n.d.).

More and more companies are integrating methods aimed at sustainable development, in particular, eco-innovation, into their activities. First of all, they relate to the origin and use of raw materials in production. By minimising both their own costs and their environmental impact, such companies are becoming increasingly successful (Balamurugan, 2022). Accordingly, almost every company and brand is trying to promote sustainable production (Horbal & Lomaha, 2022): even energy and automotive companies, fast food giants, and chemical companies that produce significant amounts of CO<sub>2</sub> emissions. At the same time, a green layer of paint, a set of quality marks and certificates on the packaging are no longer enough. Environmental innovations can and should relate to various aspects of a product, from manufacturing and packaging to advertising and distribution. In particular, these include: sustainable production; use of recycled materials; carbon neutral footprint; water-saving production; renewable raw materials/materials; recycling of goods after use; zero waste or zero plastic production; local or regional production; fair production, etc.

In general, eco-innovation is an innovation that can make a significant contribution to sustainable development. It may relate to reducing the impact on the environment, more efficient use of natural resources, environmental orientation, etc. This concept first appeared in 1996 in the book “Driving Eco-Innovation: A Breakthrough Discipline for Innovation and Sustainability” (Fussler & James, 1996). V. De Marchi & R. Grandinetti (2013) suggests that eco-innovation should meet at least one of the following conditions: minimising the negative impact on the environment; efficient use of natural resources; energy efficiency; waste recycling/use of waste-free technologies; use of eco-standards; use of renewable energy.

But today, approaches to sustainable development have changed somewhat compared to the original ideas – the focus has shifted from final product solutions to the product lifecycle, business models, and environmental strategies (Musina & Kvasha, 2018). Eco-innovations today include

improving the business process system to improve efficiency and significantly reduce costs and waste.

It is difficult for large and medium-sized companies that have been operating on the market for more than 15-20 years to adapt their business processes and products to the new realities of environmental friendliness. However, despite the difficulties and high costs of their implementation, eco-innovations are becoming increasingly popular in the world. Thus, according to the results of the Global Sustainability Study (Businesswire, 2021) conducted in 2021 by Simon-Kucher & Partners in 17 countries, 85% of respondents indicated that in recent years they have changed their behaviour towards a healthy lifestyle and the purchase of eco-products. About 35% of consumers are willing to pay more for eco-friendly products and for products that are made on the principle of zero waste, but there are age differences. Thus, 39% of the surveyed representatives of the younger generation (also called Generation Z) and 42% of millennials (people born in 1981-96) are willing to pay more for eco-products. But for Generation X (born in 1961-81), this is only 31%, and for the baby boomer generation (born in 1945-63) – 26%.

60% of respondents indicated that environmental friendliness is the most significant criterion for choosing a product, and it is worth noting the differences by industry. Thus, 74% said that environmental friendliness is the main criterion in the energy and utilities sector, 44% indicated financial services, 66% – construction, 63% – consumer goods, 62% – travel and tourism, and 61% – when choosing a car (Businesswire, 2021).

The UN environment programme (UNEP) helps small and medium-sized enterprises (SMEs) in different countries apply eco-friendly business models throughout the life cycle and throughout the value chain and implement eco-innovations. At the same time, they use innovative market approaches, organisational structures, new solutions and changes within the company that help increase productivity, technological efficiency and profitability, open access to new markets, attract investment, etc. Thus, with the help of UNEP in Malaysia, Accel Graphic System introduced eco-processes in the printing ink market, where there is strong competition, and Wilron Products developed an eco-innovation strategy in the glue market. In Peru, in the coffee and cocoa market, which is of key importance for the agri-food industry, environmental innovations helped IMSA reduce production waste and take a leading position; in the mining and cement industry, Funvesa previously used iron scrap in production, but with great ambitions and opportunities to enter new markets, it successfully introduced environmental innovations. In Vietnam, guava farms make extensive use of pesticides to protect trees, which is not eco-friendly, so Viet Lien applied an innovative solution for the market position; in the tea market, Hiep Thanh, which previously could not sell the tea produced abroad due to regulatory, technical, and environmental problems, reached a new innovative level only

through a complete transformation of the company. In Sri Lanka, Rasoda Dairies' milk processing company eco-innovations helped improve quality, sustainability and productivity; and Asian Agro Products entered the international market through eco-innovations that helped increase the added value of the product (UNEP, n.d.).

The European Union's EU4Environment programme also supports eco-innovations for SMEs in partner countries. It helps assess the potential of environmental innovation at all stages of the value chain, and develop innovative strategies to strengthen environmental performance, market position, customer base, and competitiveness. In Ukraine, EU4Environment assists in the development of green economy policies, the introduction of resource Efficient and Cleaner Production (RECP) in SME activities, promotes the production of green products, green public procurement and environmental labelling, strengthens regulatory compliance, performs assessments and strengthens administrative capacity, and develops green growth indicators (GGI) (EU4Environment..., n.d.).

The programme of climate innovation vouchers created by the FINTECC Initiative (Centre for technology transfer and finance in the field of climate change), funded by the European Union and the European Bank for Reconstruction and Development (FINTECC, n.d.).

According to UNEP experts, environmental degradation and resource depletion, which increases pressure on businesses, increases requirements for suppliers and the likelihood of fines and sanctions for violations, creates conditions for the introduction of eco-innovations. Thus, based on (Balamurugan, 2022; UNEP, n.d.) the authors of the study systematised the factors of pressure on business that form potential opportunities for eco-innovation: 1) economic factors (resource scarcity, commodities price volatility), 2) regulatory factors (strengthening regulation, mandatory transparency of corporate sustainability performance), 3) market factors (growing demand and pressure for sustainable products, developing markets of eco-innovations, partnerships for sustainability), 4) social-ecological factors (environmental degradation, natural disasters, negative impact on society). To find opportunities for them, it is recommended to analyse the value chain of companies (UNEP, n.d.).

To illustrate the results of implementing eco-innovations, it is advisable to give the most interesting world examples. The Tiny Housing Co "Natura" is a small house created by the company Natura, which is completely eco-friendly, because they are created based on wooden panels and cardboard.

As the use of disposable protective masks during the COVID-19 pandemic has increased significantly, creating tonnes of medical waste, ShoeX has developed a reusable AirX protective mask made from coffee waste. The mask has a biodegradable and antimicrobial design, an air filter, AATCC 100 certificate (quantitative test method used to determine the effectiveness of antibacterial finishes applied to textile materials), and it can be worn for about one month.

Instead of plastic tubes of toothpaste and their paper packaging, Coolpaste has created a biodegradable tube with hanging packaging for proper storage. The company Everloop has produced a toothbrush that can change the bristles. Its handle is designed on the basis of recycled plastic, and the bristles are made of bamboo, which decomposes after use.

PriestmanGoode has created zero packaging for fast food and cooperates with companies that sell fast food. Consumers first pay a little too much for bento-style cocoa bean shell packaging, and then get a refund when they bring the lids and mould for their next use to this facility (Smith, 2021).

The following are examples of companies switching to eco-marketing. Edeka, the largest German food retailer, has been partnering with the World Wildlife Fund (WWF) since 2009. Cooperation began with sustainable fisheries, which aims to combat overfishing in the world's oceans. Since then, most Edeka fish products have the "MSC" (Marine Stewardship Council) label, which is used worldwide. In the following years, the cooperation was extended to other segments. Edeka's long-term goal is to "further strengthen sustainable action at all levels of the company." Edeka's own brands, which meet strict environmental requirements, now have the WWF panda logo. All brands made from wood or paper are FSC (Forest Stewardship Council) certified or made from recycled material. In addition, Edeka relies on certified feeds that are produced without the help of genetic engineering. The share of eco-friendly products in Edeka's product range has grown steadily over the years, along with the intensive use of sustainable marketing. In other words, targeted advertising events are mainly combined with messages about environmental awareness. Accordingly, it is not the product itself that is advertised, but the philosophy of its production.

Another example is the global company Innocent Smoothie, which produces smoothies and fruit juices. The concept of its sustainable development covers all areas of activity: from environmentally friendly production and waste prevention to information campaigns and training employees and customers in the basics of sustainable development. This is partly implemented in collaboration with WWF and the Rainforest Alliance (an international non-profit organisation working at the intersection of business, agriculture, and forests to make business responsible). Innocent Smoothie attempts to "find a balance between good taste and eco-friendly production", so advertising events focus not on products, but on successful environmental development campaigns. Nowadays, Innocent Smoothie processes more than 80% of dry waste from juice production, and liquid waste is used as livestock feed and for the production of biogas. To reduce the amount of packaging material, bottles contain as much recycled PET (polyethylene terephthalate) as is technically possible. Every four years, the company determines CO<sub>2</sub> emissions for each product. Emissions from each individual stage of production and the entire supply chain are determined using the PAS 2050 (specification for the assessment of the life cycle greenhouse gas emissions of goods/services) method to detect and reduce

greenhouse gases. Because of this, Innocent Smoothie does not use aeroplanes and, as far as possible, road transport to deliver fruit and transport juices. Instead, for the most part, everything is transported by ships or trains (Die Bundesregierung, 2022).

In general, the impact and significance of eco-innovation should be evaluated in three dimensions: 1) goals (e.g., products, processes, marketing methods, etc.); 2) mechanisms (e.g., modification, redesign, alternative and creation); 3) impact (effects) (OECD, 1997), as well as in three

main objects: the environment; the country's economy and society as a whole. Accordingly, their effects can be: 1) environmental (reducing the use of Natural Resources and waste volumes); 2) economic (increasing incomes, achieving new competitive advantages, realising new market opportunities); 3) social (creating new jobs, changing people's behaviour and lifestyle to healthier, better quality). And if eco-innovations create significant positive effects for the environment and society, they can have both advantages and disadvantages for businesses, as shown in Table 1.

**Table 1.** Key advantages and disadvantages of eco-innovation for business

Advantages	Disadvantages
Improvement of the company's image and customer/employee loyalty, Cost reduction due to: reduced waste volumes and increased recycling volumes; energy conservation and sustainable production; tax incentives, Creation of new strategic business opportunities, etc.	Significant spending of money and time on R&D and innovation, Technical and technological difficulties, Lack of qualified personnel, information/knowledge, and partners in this area, Need for a well-thought-out regulatory system at different levels, Rising product prices, Need to constantly analyse the requirements/needs of society, Relative immaturity of eco-innovation markets, complexity of forecasting demand for them, Probability of bankruptcy of weaker companies, loss of jobs, Not everything called "eco" is such in essence

**Source:** systematised by the authors based on S. Balamurugan (2022), A.S. Immawati & A. Nugroho (2020), O. Larbi-Siaw *et al.* (2022)

Table 1 shows that eco-innovations, in addition to the need to preserve the planet for themselves and future generations, have significant economic effects for businesses, in particular through:

1. Increased customer loyalty to the brand. According to a 2020 McKinsey survey (the Restless CMO, 2022), one in three people in the world consciously chooses new eco-products to reduce the environmental footprint and make a social contribution. Even in times of crisis, sustainability and eco-friendliness are essential for customers. Through eco-innovation, companies respond to the wishes of their customers, which increases their trust, loyalty, and brand image.

2. Increased employee loyalty. An employee who works for a company that adheres to values similar to their own is more satisfied. The pride and team spirit of working in an environmentally conscious company increases the loyalty and dedication of employees, which, in turn, makes the company more attractive.

3. Long-term benefits. The company's transition to environmentally sustainable production initially negatively affects its budget. However, in the long run, this can increase profitability, as optimised production methods and processes reduce costs. In addition, the increase in prices for goods can be justified and shifted to customers, because environmentally conscious consumers are willing to spend more.

4. Investment in the future. The topic of sustainable development is only gaining relevance today. Companies

are simply forced to switch to its principles and implement eco-innovations.

In addition to these shortcomings directly in the business sphere, there is a number of social factors that hinder the introduction of eco-innovations: a certain passivity of human thinking and behaviour; resistance to change; lack of knowledge about the global ecosystem; self-centredness and limited interests of stakeholders, etc. Ukrainian companies lag behind the EU in terms of technology efficiency by a third, and export four to eight times less high-tech products (Zhmereneckiy, 2017). At the same time, many companies in Ukraine successfully introduce innovations (Table 2).

Table 2 shows that PrivatBank has been a leader in recent years. Many companies from the 2017 ranking of innovative companies ceased to exist as of 2022 due to COVID-19 and military operations on the territory of Ukraine, but other companies were not only able to exist in difficult conditions, but also to develop innovations.

In Ukraine, the signing in 2014 of the Association Agreement with the EU (Government portal of Ukraine, 2017) and the adoption of an action plan for its implementation (in particular, the section on Economic and Sectoral Cooperation), as well as the approval of plans for the implementation of EU directives and regulations on energy, environment and technology, are aimed at Ukraine's transition to the European model of "green" development. This should contribute to the modernisation and more dynamic development of the Ukrainian economy through: the

development of less resource-intensive and more high-tech sectors of the economy, the creation of new jobs; the introduction of modern resource- and energy-efficient technologies, increasing innovation activity, reducing waste, and, accordingly, increasing the competitiveness of Ukrainian enterprises. However, the obstacles to the introduction of eco-innovations by enterprises in Ukraine include:

insufficient financial support for R&D, and lack of state orders for eco-innovations; inefficient regulatory support in this area, which complicates the development/implementation of eco-innovations, in particular for SMEs, and reduces the motivation of enterprises; undeveloped infrastructure for supporting eco-innovations; low public demand for eco-innovations; inefficiency of environmental audit, etc.

**Table 2.** Ratings of Ukrainian innovative companies in 2017 and 2022

No.	Rating 2017			Rating 2022		
	Companies	Sector	Index I	Companies	Sector	Index I
1	PrivatBank	Banking	79.2	PrivatBank	Banking	83
2	PA Pivdenmash	Mechanical engineering	64.6	Silpo Food	Retail	80
3	Nova Poshta	Transport and logistics	60.4	Agroprosperis	Agriculture	78
4	Farmak	Pharmaceuticals	60.4	Nova Poshta	Transport and logistics	76
5	Turboatom	Mechanical engineering	58.3	Kyivstar	Telecommunications	75
6	Naftogaz-vydobuvannya	TEC	56.3	Vodafone Ukraine	Telecommunications	75
7	Grammarly	Technologies	54.2	DTEK	Energy	73
8	MHP	Agriculture	54.2	Roshen	Consumer market	70
9	Ukroboronprom	Defence manufacturing	52.1	MHP	Agriculture	70
10	Rozetka	E-commerce	52.1	Alfa-Bank Ukraine	Banking	68
11	Silpo Food	Retail	52.1	Arterium Corporation	Pharmaceuticals	67
12	Wind Power	Renewable energy	50	Datagroup	Telecommunications	67
13	Darnitsa	Pharmaceuticals	47.9	Metinvest	Metallurgy	66
14	Petcube	Technologies	45.8	Astarta	Agriculture	66
15	Nibulon	Agriculture	43.8	Interpipe	Metallurgy	65
16	Drone.ua	Technologies	41.7	Epicenter K	Retail	63
17	Eco-Optima	Alternative energy	41.7	Darnitsa	Pharmaceuticals	62
18	Svarog West Group	Agriculture	41.7	Kernel	Agriculture	62
19	AgriLab	Agriculture	40.4	Yuria Pharm	Pharmaceuticals	62
20	Kernel	Agriculture	33.3	Farmak	Pharmaceuticals	61

**Source:** systematised by the authors based on O.V. Zhmerenecki (2017), Mind (n.d.)

According to the Environmental Performance Index (EPI) in 2022, Ukraine was ranked 52<sup>nd</sup> out of 180 countries assessed. EPI is an international ranking that evaluates the state of the environment and sustainability of countries based on 40 indicators of climate change effectiveness, environmental health, and ecosystem viability. The leaders in 2022 were Denmark, the United Kingdom, Finland, Malta, and Sweden (EPI Results, 2022).

The Russian invasion of Ukraine has had a very negative impact on the state of the environment in the country due to industrial and chemical pollution, mining of territories, reduction and deterioration of natural ecosystems, destruction of landscapes, damage to biodiversity, and the destruction of industry and agriculture. At the same time,

attacks on Ukraine's critical infrastructure and global energy markets are now somewhat shifting the focus from the environmental component of ESG to energy security, at least in the short term. However, there is also a positive impact: it encourages innovation in the areas of energy conservation and renewable energy sources.

The country's economy was also significantly affected by the war: according to the Ministry of Economy, gross domestic product in 2022 decreased by 30.4%, which is the largest drop in the recent history of Ukraine. The volume of economic losses of Ukraine at the end of 2022 amounted to more than USD 700 billion. The field of science and innovation also suffered significant losses: about 15% of the research infrastructure of higher education institutions

and scientific institutions was damaged, including unique scientific equipment, research laboratories, and centres for collective use of scientific equipment (Ministry of Education and Science of Ukraine, 2022).

Therefore, Ukraine faces the difficult task of restoring the economy, the environment, science and innovation, in particular, based on the European Green Deal and advanced eco-approaches. Certain measures are being implemented today. For example, on 4-5 July 2022, the Ukraine Recovery Conference (2023) in Lugano, Switzerland, adopted the programme “Restoring a Clean and Protected Environment”, which provides for the implementation of 76 environmental projects worth EUR 25.5 billion in Ukraine. In June 2022, the Verkhovna Rada adopted the law on waste management (Law of Ukraine No. 2320-IX, 2022), and in September – on the national register of pollutant emissions and transfer (Law of Ukraine No. 2614-IX, 2022). The “New EU Forest Strategy for 2030” (European Commission, 2019) should become the key one in forestry. And for the greening of society, it is planned to create and implement the interdepartmental programme “Environmental education and information for sustainable development of Ukraine for 2022-2032” (Proschuk, 2022).

In general, other researchers have paid a lot of attention to the analysis of various aspects and areas of implementation of eco-innovations. For example, L.G. Lypych *et al.* (2022) analysed the essence and role of eco-innovation from the standpoint of closed-loop economics, and M.V. Odrekhivskiy & U.I. Kohut (2022) proposed a systematic concept of eco-innovation policy. O.F. Hryshenko & S.O. Kostornova (2017) described the prospects of eco-innovations in the field of tourism, and A.G. Abramova & Yu.A. Myroshnyk (2020) focused on the hotel and restaurant business.

Yu.I. Golovnya *et al.* (2019) examined the company's eco-strategies and described how environmental branding develops in a sustainable development environment. Exploring green marketing as a component of eco-innovation, T.V. Pavlenko (2018), I.O. Korostova (2020) and L.O. Plakhotnikova & T.M. Bulakh (2019) concluded that it helps businesses increase customer loyalty and improve employee satisfaction with working for the company. Instead, S.V. De Freitas Netto *et al.* (2020). and T. Pimonenko *et al.* (2018) focused on the negative consequences of pseudo-ecological marketing – greenwashing. Companies have started to “green” their products and activities with green labels and colours, and, in fact, their activities continue to harm the environment. O. Larbi-Siaw *et al.* (2022) proved that there is a small and even negative relationship between the introduction of eco-innovations and sustainability.

Despite the widespread coverage of the topic in scientific research, especially in relation to developed countries, their results are not unambiguous. While most of them highlight and confirm the positive aspects of eco-Innovation, some researchers emphasise the opposite results in their studies.

## CONCLUSIONS

As the planet's resources are rapidly depleted, humanity must radically change its approaches to consumption (the sphere of responsibility of consumers and society) and production (the sphere of responsibility of producers and sellers). Due to the increased attention to sustainable development and environmental protection, the demand for eco-innovations (innovations to reduce the impact on the environment, more efficient use of natural resources, environmental orientation, etc.) is increasing today, and they are becoming the norm in the activities of enterprises.

It can be difficult for large companies to adapt their business processes and products to the new realities of environmental friendliness. Pressure on business (economic, regulatory, market and socio-environmental factors) creates prerequisites for the introduction of eco-innovations. To find opportunities for them, it is recommended to analyse the value chain of companies. Three key groups of effects of eco-innovations (environmental, economic, and social) are identified and the advantages and disadvantages of their implementation for business are analysed in detail. In fact, as the analysis and successful global examples show, eco-innovations are a profitable investment, because they, in particular, provide an increase in customer and employee loyalty, increase sales and improve brand image, and so on. At the same time, the following disadvantages are given: significant costs; technical, technological, regulatory difficulties; rising prices for goods, etc., and in addition, there are additional specific obstacles in Ukraine. Assistance in implementing eco-innovations for small and medium-sized enterprises is provided, in particular, by the United Nations Environment Programme (UNEP), EU and EBRD programmes.

As the analysis showed, although many Ukrainian companies successfully introduce innovations, in general, they lag behind enterprises in developed countries in terms of technological efficiency and sales of high-tech products. At the same time, Ukraine has already achieved quite significant positions on the way to implementing the European Green Deal. However, in 2022, the Russian invasion of Ukraine had a very negative impact on the state of its economy, environment, science, and innovation, in particular, due to industrial and chemical pollution, mining of territories, reduction and deterioration of natural ecosystems, and damage to biodiversity. Prospects for further study can be an analysis to prevent external factors that negatively affect the introduction of eco-innovations, and providing clear recommendations and standards for the introduction of eco-innovations in small businesses and developing ones, which will be based on the current sales market and the global situation in general.

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## CONFLICT OF INTEREST

None.

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## **Еко-інновації для сталого розвитку українських підприємств**

**Анотація.** Успішний розвиток підприємств ґрунтується на багатьох чинниках, та на сьогодні світові проблеми з навколишнім середовищем, вичерпанням природних ресурсів, глобальним потеплінням та перенаселенням планети актуалізують значимість еко-інновацій для сталого розвитку. Метою статті було дослідити сутність та значення еко-інновацій для сталого розвитку українських підприємств, зокрема з врахуванням наслідків військової агресії 2022 р. проти України. Дослідження загалом ґрунтується на методах аналізу, синтезу, абстрагування, узагальнення та пояснення. Передумови для впровадження еко-інновацій формуються такими групами факторів, що чинять тиск на бізнес: економічні, регуляторні, ринкові та соціо-екологічні. Виділено три ключові групи ефектів еко-інновацій (екологічні, економічні та соціальні) й детально проаналізовано переваги й недоліки їх впровадження для бізнесу. Як засвідчив проведений аналіз та наведені успішні світові приклади, еко-інновації забезпечують підвищення лояльності клієнтів і працівників, збільшення продажу та покращення іміджу бренду тощо. Разом із тим наведено такі їх недоліки: значні витрати; технічні, технологічні, регулятивні складнощі; ріст цін на товари, а крім того в Україні існують і додаткові специфічні перешкоди. Хоча багато українських компаній успішно впроваджують інновації, загалом показано, що вони за рівнем технологічності та збуту хай-тек продукції відстають від фірм розвинутих країн. Україна на шляху до впровадження Європейського зеленого курсу вже досягла досить значних позицій за Environment Performance Index 2022. Проте російське вторгнення в Україну у 2022 році негативно вплинуло на стан її економіки, довкілля, науки та інновацій. Практична цінність дослідження полягає у наданні рекомендацій для сталого розвитку України на засадах Європейського зеленого курсу та інноваційних глобальних еко-підходів

**Ключові слова:** екологія; ESG-принципи; бізнес-модель; еко-маркетинг; Європейський зелений курс