
Eco-Innovation Versus Eco-Investment in the Context of Sustainable Development: The Perspective of Local and Regional Economies

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Abstract:

Purpose: The aim of the article is to identify and systematise eco-innovation and eco-investment as components of sustainable socio-economic development. In addition, a comparative analysis of investments and eco-innovations was carried out. This means that the subject of the study covers undertakings oriented towards the preservation and protection of nature, while the subjects of the study are selected spatial units in Poland, i.e. a specific regional system - Western Pomerania - and a local system - Szczecin. A hypothesis was formulated that eco-innovations and eco-investments are important elements of the development potential of regional and local economies, and their activation and intensification ensure sustainable development at the environmental, social and economic levels. Adequately to the objective and hypothesis, the following research questions were formulated: what constitutes eco-innovation and eco-investment, what are the similarities and differences between these concepts, and why are these projects such an important element of sustainable development?

Design/Methodology/Approach: The research methodology in the theoretical part was based on a critical analysis of the literature on the subject (especially journals and monographs). This part also employs a comparative analysis method in identifying differentiating features and analogies between eco-innovation and eco-investment. The empirical and pragmatic part is descriptive and explanatory, especially with regard to the identification of ecological undertakings as drivers of sustainable development of economies in selected spatial units - regional and local systems. The synthesis method was used in the formulation of conclusions.

Findings: The research methodology applied and the cognitive and empirical studies carried out made it possible to systematise eco-innovation and eco-investment and to identify similarities and differences between these terms. In addition, their significance from the perspective of regional and local economies was verified. The research was carried out on the example of selected spatial systems as a basis for sustainable socio-economic development across the country.

Practical Implications: Analysis of exemplary development projects of an ecological nature has shown that eco-investments and eco-innovations are one of the pillars of sustainable economic development on a regional and/or local scale. Stimulators in this respect are the

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active activities of enterprises, business environment institutions, various organisations and associations, local government units, as well as the pro-development policy of the state, especially the investment and innovation policy. What is important here is the integration and coordination of ecological activities at the microeconomic level (represented by business), at the mesoeconomic level (local government units in terms of regional and local socio-economic development policy) and at the macroeconomic level (in terms of state policy). Eco-innovation and eco-investment should be integral elements of sustainable socio-economic development, not only at the regional and local scale, but also at the national level as a whole. This is due to the fact that the national economy is the sum of regional and local economies.

Originality/value: *The article addresses the topical and important issue of sustainable development at regional and local levels through the lens of environmentally oriented development projects. The rationale behind the choice of topic is both the topicality and importance of these issues and the identification of a theoretical and pragmatic gap, especially in terms of comparative analysis regarding eco-innovation and eco-investment. The article combines theoretical and empirical research into a coherent whole, filling the diagnosed gap of a cognitive and applied nature.*

Keywords: *Regional analysis, regional development, regional and local economies, sustainable economic development, eco-innovation and eco-investment.*

JEL classification: *D25, O11, O12, O18, O35, Q20, Q56.*

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1. Introduction

The title of the article determines the systematisation of basic terminology in the area under study. It is therefore necessary to introduce eco-investment and eco-innovation, together with an indication of the analogies and differences between them. In addition, the concept of sustainable development needs to be clarified.

Given that sustainability is the broadest concept, it is first necessary to understand what the term means.

Sustainability is a frequently addressed topic by both researchers and practitioners, including business, politics, non-profit organisations, while the issue of eco-investment and eco-innovation, including through the prism of sustainability, needs to be sorted out on a scientific basis. It is also necessary to take into account the implications of this on practical grounds, including application, and to indicate

specific manifestations of investments and eco-innovations in the regional and local system.

2. Literature Review

The literature emphasises that sustainable development is a question of intergenerational equity. In other words, it is a concept oriented towards the needs of people today (especially the poorest people) and the needs of future generations in the face of environmental threats and extreme poverty (Tietenberg and Lewis, 2023).

An important element of the concept studied is sustainable consumption, which is related to society's use of goods and services that meet basic needs and ensure an improved quality of life (Isenhour, 2015). This means that, at the economic level, sustainability manifests itself in parallel in all economic phenomena and processes, i.e. in the sustainable production, consumption of goods and services, and the exchange and organisation of material, financial and intangible (including information) flows.

Some researchers emphasise the importance of innovation in the process of creating sustainable development, including sustainable business models based on the initiation and implementation of innovative business processes aimed at sustainable development goals (Podgórska and Zdonek, 2022; Pham *et al.*, 2022).

Typical eco-innovations, the development and implementation of closed-loop economies strategies and the integrated management of scarce resources, including water resources at all levels, including cross-border cooperation, play an important role in this regard (Benson, Gain, and Giupponi, 2020; Kuo and Smith, 2018; Bartram, Brocklehurst, Bradley, Muller, and Evans, 2018; Machado, Winroth, and Ribeiro da Silva, 2020). Eco-innovations are also referred to as sustainable innovations or eco-innovations. Importantly, they are one element of innovation activity and their importance is steadily increasing given the popularisation of sustainability.

Contemporary innovation theory assumes that innovation is a specific characteristic of entrepreneurship that can apply to different spheres of activity - from products and technology through marketing, organisation and management to logistics and ecology. It has a broader conceptual scope than invention, rationalisation or improvement. It is not the same as creativity.

Innovation is a particular form of change that should generate positive outcomes for different stakeholders. It follows that change has a broader conceptual scope. Change can be positive (as is or should be the case with innovation), negative or neutral. Innovation is a kind of novelty on an absolute or relative scale, the result of human ingenuity, originality, divergent thinking and willingness to take risks, with

varying degrees of social and economic impact, determining the diffusion of innovation processes in the economy.

Eco-innovation is a specific type of innovation, which is the transfiguration of an idea into a specific product or service, process or solution that contributes to improving the state of the environment, eliminating or reducing threats to this environment and preserving nature, including natural values. In addition, it is important to generate and deliver values relevant to the natural environment. The specificity of eco-innovation determines the dissimilarity of innovation processes in ecology compared to basic economic activities, such as industrial production (Brojak-Trzaskowska, 2018).

The diffusion of the concept of sustainability is a major force behind the rise of eco-innovation. In view of this, issues such as potential ways to implement sustainable innovation, defining the attributes of sustainability and identifying the factors influencing different attitudes and innovation behaviour in business are important (Varadarajan, 2017).

It seems that it should be important not only to delineate potential sources and methods of eco-innovation, but, above all, viable (real-world) models of innovation processes and the conditions that determine their uptake. What is at stake here are specific models applicable to sustainable innovation, namely the open innovation model, the network model and the integrated model. These are the so-called modern, alternative or otherwise 5th and 6th generation models, in which great emphasis is placed on intensifying and coordinating innovation cooperation between the various actors involved in innovation processes.

In other words, eco-innovation refers to the process of designing, developing and implementing new products and services, reducing environmental impacts, which are a source of value for customers (society) and businesses themselves (Fussler and James, 1996). The definition provided needs to be supplemented. Firstly, innovations are not always new in an absolute, radical sense. Sometimes they are a significant upgrade of something pre-existing (e.g., technology, product, process). Secondly, when talking about reducing environmental impact, the quoted authors should note that it is specifically about reducing negative impacts on nature.

The literature emphasises that eco-innovation addresses the most challenging, critical business innovation endeavours. At the same time, they form the basis for sustainable business development (Kyung Jang, Sun Park, Woo Roh, and Joo Han, 2015), contributing to the achievement of sustainable economic development goals.

As mentioned earlier - the national (regional or local) economy is, in some simplification, the totality of activities of economic actors across the country (region or local unit, e.g. municipality).

In this context, eco-investments and eco-innovations in enterprises will be a source of sustainable development for specific spatial systems (national, regional or sectoral and local) (Cristea *et al.*, 2022).

Initially, eco-innovation focused on the material sphere (technology, technology, products, processes, fixed assets), while nowadays it concerns not only the material sphere, but also - the organisational, marketing, management and even social sphere, contributing to the creation of new organisations and markets (Little, 2005; Kemp and Arundel, 1998; Charter and Clark, 2007). When talking about the social sphere of eco-innovation, it is important to emphasise the increase in environmental awareness and the involvement of society in innovation processes aimed at the development and diffusion of sustainable innovations (Lipnik and Lipnik, 2020).

When analysing the effects of eco-innovation, especially in the form of the creation of new markets or new actors, it should be noted that this is in line with the assumptions of the already classic theory of innovation created by J.A. Schumpeter (founder of the theory of economic development and so-called creative destruction). Furthermore, it should be noted that eco-innovation (like other types of innovation) includes both 'soft' and 'hard' innovations.

Eco-innovation is expressed in adherence to sustainable production and consumption patterns, including the dissemination of environmentally friendly lifestyles. Among specific eco-innovations, it is worth mentioning processes for the recovery of valuable raw materials (e.g., from wastewater), the greening of packaging, eco-products including the production of building materials from recycled waste, activities geared towards overall sustainable productivity and new management methods (Ganapathy, Natarajan, Gunasekaran, and Subramanian, 2014; Sarkar, 2013).

Other specific examples of eco-innovation include:

- reducing the energy and material intensity of production processes and minimising the consumption of raw materials, eliminating the use of non-renewable raw materials;
- modern solutions (mainly technical and technological) affecting the reduction of noise emissions and various pollutants, including CO₂ emissions;
- technologies, attitudes, behavioural patterns oriented towards zero-waste or minimisation of waste during production, consumption and exchange processes, including zero-waste production methods, recycling at various stages of economic processes and in the case of waste generated by households;
- solutions related to the concept of a circular or closed loop economy instead of the current traditional linear economy;

- automation and robotisation instead of mechanised production processes, especially outdated technologies with a high degree of environmental damage and high capital and energy intensity;
- intangible eco-innovations in enterprises, especially in the organisational, managerial, process and service spheres, ensuring an increase in corporate social responsibility, particularly with regard to the use of natural resources;
- construction and implementation of modern business models oriented towards optimisation, increase of effectiveness, efficiency and flexibility of business processes (main and auxiliary), including digitalisation.

Eco-investments are deliberate disbursements of an investor's financial resources, which may include equity (surplus profit from the previous financial year, proceeds from the sale of shares), external capital (bank loans, borrowings) or alternative external financing (factoring, line of credit, *venture capital* funds). They are initiated by an investment decision. These days they are often referred to as green investments.

3. Research Methodology

The article consists of theoretical, explanatory and descriptive considerations and a practical, largely analytical part.

The research approach used in the theoretical part is based on a critical analysis of the literature on the subject, covering domestic and foreign literature (compact items, monographs and journal articles). Those bibliographic items directly related to innovation and investment activities were included, as well as basic literature on sustainable socio-economic development.

This section also uses a comparative analysis method to identify similarities and differences between eco-innovation and eco-investment. The empirical and pragmatic part - like the theoretical part - is descriptive and explanatory. This is especially true for the identification of ecological undertakings as drivers of sustainable development of economies in selected spatial units (regional and local systems).

Another important method used in the research approach is the factual observation method. The synthesis method and inductive reasoning with elements of deduction and logical thinking were mainly used in formulating conclusions.

4. Results

Based on conducted research, including literature studies, personal reflections, and observations of economic practice, a comprehensive comparative analysis of eco-innovations and eco-investments was carried out, as presented in Table 1.

Table 1. Comparative analysis of eco-innovation and eco-investment in the context of sustainable socio-economic development

Similarities	Differences	
	Eco-innovation	Eco-innovation
They are part of a larger whole. Eco-investments are a component of innovation activities and eco-innovations are a component of innovation activities.	Eco-innovation has a relatively smaller conceptual scope than eco-investment.	Most often it has a broader conceptual scope than innovation. Eco-investments may or may not have an innovative character.
They are one of the pillars of sustainable development.	They are <i>strictly</i> innovative in nature, which is due to the nature and attributes of innovation itself.	They may have an original, innovative character, but this is not obligatory.
The objectives of these activities converge. These are: minimising negative impacts on nature, protecting the environment, preserving nature for future generations.	It is a change for the better, in other words it must generate positive aspects (benefits).	It should have the character of a positive change, nevertheless in practice it is not obligatory as in the case of innovation.
They contribute to growth and economic development.	Often the effects of eco-innovation are not measurable.	In the case of investments, measurable, often economic-financial effects of a quantitative nature predominate.
They are a source of development activity in enterprises.	High level of public participation. Emphasis on networked, integrated innovation models or open innovation models.	Low level or no public involvement at all, especially for eco-innovations considered at the microeconomic scale.
Their implementation should be based on a comprehensive cost-effectiveness calculation of the project.	For the criteria of the profitability calculation of this type of innovation, social and environmental aspects are important.	In the case of the criteria for calculating the profitability of this type of investment, economic aspects play a major role, and social and environmental aspects to a lesser extent.

Source: Own study.

It is worth adding that eco-innovations and eco-investments are undertakings aimed at development at the micro-economic (enterprise), meso-economic (in regional and local spatial systems) and macro-economic (economy-wide) scales. Furthermore, they are important components of sustainable development that are linked to systematic learning, the dissemination of green attitudes and lifestyles in society and eco-solutions in the economy.

5. Discussion

Eco-innovations should be perceived as innovative solutions in the field of technology, products and services, organisation, management, marketing and other areas of activity oriented towards environmental protection, minimising the negative impact of the economy and society on this environment, preserving its elements, having a positive impact on the life, health and safety of people.

While in the case of product, marketing, process or organisational-management innovations, economic and financial benefits from their generation and dissemination in practice are emphasised, in the case of eco-innovations, we are often dealing with non-quantifiable or hard-to-measure benefits (environmental, social, cultural).

The main feature of eco-innovation is that it contributes to reducing the environmental burden. This can be done by assessing its environmental impact directly (reduction of energy and raw material consumption, reduction of emissions and waste, or preservation of biodiversity) and by assessing its environmental impact indirectly (ecological activities as part of a sustainable development strategy) (Lulewicz-Sas, 2011).

Eco-innovation is also a pro-innovation policy of the state and TSU, which on the one hand is aimed at optimising the economic potential and rationalising the use of limited resources (mainly - but not exclusively - natural resources), while on the other hand it takes into account the threats related to climate change, progressive degradation of the natural environment and the disappearance of biodiversity.

In the process of regional (and local) development, regional integration processes, an increase in investment attractiveness, the scale and intensity of innovation processes, an increase in social welfare, diversification of the economic structure of a given region, eco-development and care for the natural environment, the development of intellectual capital, as well as the development of social services and rational spatial development, especially with regard to infrastructure, are important (Brol, 2006; Mróz and Mróz, 2014).

6. Conclusions

In the future, eco-innovation and eco-investments are forecast to become a driving force for economic development, especially sustainable development. Unfortunately, the activation of such projects faces numerous obstacles (both locally and regionally). Chief among the barriers are economic constraints, e.g., related to gaining access to low-cost funding sources, as well as formal, legal and institutional barriers, especially at the local level.

Despite existing barriers, local initiatives for eco-innovation and eco-investment are being undertaken. Examples of good practice in the city of Szczecin (thus locally) include the Szczecin Civic Budget (<https://sbo.szczecin.eu/zielone-sbo>, 2023). It is worth mentioning eco-innovative activities in the field of:

- improving the condition and increasing the surface area of green areas, including: building a pocket park, planting climbing plants on noise barriers or walls of public buildings, putting a green roof on an existing building, setting up flower meadows e.g. on tram loops, in road lanes, creating rain gardens;
- sustainable use of natural resources, including: realisation of educational paths and information boards on natural resources from the site, construction of paths/access to green areas with limited access;
- increasing the role of green infrastructure in mitigating the effects of climate change, creating micro retention reservoirs to recharge public greenery, increasing green space in strictly built-up areas, e.g.: realisation of green bus stops, realisation of green facades of public buildings;
- counteracting the negative effects of climate change, including: public photovoltaic and wind farms, water reuse and the creation of a network of water curtains during the summer period located in a way that refers to the characteristic elements of the city, reconstruction of traffic routes with the implementation of water supply for green areas.

The regional economy is a relatively coherent system in terms of economic specialisation, spatially separated from other regions in the country, while the local economy comprises all actual and potential natural, human, material, financial and immaterial resources, as well as socio-economic phenomena and processes taking place in a relatively small space, separated according to specific criteria.

Nowadays, the importance of issues related to the effective and socially responsible functioning and development of local and regional economies, as well as their efficient and effective management, is increasing.

These issues are the subject of general or specific research inquiries by scientists representing various scientific disciplines, as well as interdisciplinary research. They are also of interest to representatives of economic practice, relevant authorities (especially at the local government level), the media (including social media), and various organisations, including non-economic organisations.

An important role should be played by the level of involvement, i.e. the scope and frequency of social initiatives undertaken (social campaigns, employee volunteering, patronage in the fields of culture, sport, education, investments of public interest, e.g., infrastructure related to road construction, sewage treatment plants). These undertakings should be characterised by voluntariness, organisation, continuity and purposefulness (focus). In addition to building positive relations with stakeholders,

an important role should be played by taking care of the environment - preservation, protection and promotion of natural heritage, which should be treated as a coherent, coordinated and common goal, both of tourism policy makers, tourists, businesses and other actors, organisations and institutions.

References:

- Bartram, J., Brocklehurst, C., Bradley, D., Muller, M., Evans, B. 2018. Policy review of the means of implementation targets and indicators for the sustainable development goal for water and sanitation. *Clean Water*, 1(3), 1-5. <https://doi.org/10.1038/s41545-018-0003-0>.
- Brojak-Trzaskowska, M. 2028. Innowacyjne modele biznesu w podmiotach gospodarczych turystyki. Wydawnictwo Naukowe Uniwersytetu Szczecińskiego, Szczecin.
- Brol, R. 2006. Rozwój regionalny jako kategoria ekonomiczna. In: *Metody oceny rozwoju regionalnego*, red. D. Strahl. Wrocław: Wydawnictwo Akademii Ekonomicznej.
- Benson, D., Gain, A.K., Giupponi, C. 2019. Moving beyond water centrality? Conceptualizing integrated water resources management for implementing sustainable development goals. *Sustainable Science*, 15(2), 671-681. <https://doi.org/10.1007/s11625-019-00733-5>.
- Charter, M., Clark, T. 2007. *Sustainable innovation*. Farnham: The Center for Sustainable Design.
- Cristea, M., Noja, G.G., Thalassinos, E., Cîrciumaru, D., Ponea, C.Ş., Durău, C.C. 2022. Environmental, social and governance credentials of agricultural companies—the interplay with company size. *Resources*, 11(3), 30.
- Fussler, C., James, P. 1996. *Driving eco-innovation: a breakthrough discipline for innovation and sustainability*. London, Washington DC: Pitman Publishing.
- Ganapathy, S.P., Natarajan, J., Gunasekaran, A., Subramanian, N. 2014. Influence of eco-innovation on Indian manufacturing sector sustainable performance. *International Journal Sustainable Development and World Ecology*, 21(3), 198-209. <https://sbo.szczecin.eu/zielone-sbo>.
- Isenhour, C. 2015. Sustainable consumption and its discontents. In: Kopnina, H., Shoreman-Ouimet, E. (Eds.). *Sustainability*. London: Routledge. <https://doi.org/10.4324/9780203109496>.
- Kemp, R., Arundel, A. 1998. *Survey indicators for environmental innovation*. Oslo: The STEEP Group.
- Kuo, T.C., Smith, S.A. 2019. A systematic review of technologies involving eco-innovation for enterprises moving towards sustainability. *Journal of Cleaner Production*, 192, 207-220. <https://doi.org/10.1016/j.jclepro.2018.04.212>.
- Kyung Jang, E., Sun Park, M., Woo Roh, T., Joo Han, K. 2015. Policy instruments for Eco-Innovation in Asian Countries. *Sustainability*, 7, 12586-12614. <https://doi.org/10.3390/su70912586>.
- Lipnik, A., Lipnik, M.C. 2020. Sustainable innovation: definitions, Priorities and Emerging Issues. In: Martini, M., Hölsgens, R., Popper, R. (Eds.) *Governance and Management of Sustainable Innovation*. Sustainability and Innovation. Cham: Springer. https://doi.org/10.1007/978-3-030-46750-0_2.
- Little, A.D. 2005. *Study for the conception of a programme to increase material efficiency in small and medium sized enterprises*. Wuppertal: Wuppertal Institute.

- Lulewicz-Sas, A. 2011. Ewolucja drogą do zrównoważonego rozwoju przedsiębiorstw. In: Powichrowska B. (red.), *Przedsiębiorstwo w warunkach zrównoważonej gospodarki opartej na wiedzy*, Białystok: Wyższa Szkoła Ekonomiczna.
- Machado, C.G., Winroth, M.P., Ribeiro da Silva, E.H.D. 2020. Sustainable manufacturing in Industry 4.0: an emerging research agenda. *International Journal of Production Research*, 58(5), 1462-1484. <https://doi.org/10.1080/00207543.2019.1652777>.
- Mróz, M., Mróz, D. 2014. Znaczenie gospodarki kreatywnej w rozwoju regionalnym i w podnoszeniu konkurencyjności regionów. *Gospodarka i Finanse*, 4.
- Pham, T.H., Hoang, T.T.H., Thalassinos, E.I., Le, H.A. 2022. The impact of quality of public administration on local economic growth in Vietnam. *Journal of Risk and Financial Management*, 15(4), 158.
- Podgórska, M., Zdonek, I. 2022. Sustainable Technologies Supported by Project-Based Learning in the Education of Engineers: A Case Study from Poland. *Energies*, 15(1), 278. <https://doi.org/10.3390/en15010278>.
- Rzeńca, A. 2016. Ekoinnowacje polskich przedsiębiorstw: dobre praktyki na przykładzie projektu GreenEvo – akcelerator zielonych technologii. *Acta Universitatis Lodziensis Folia Oeconomica*, 2(313). <https://doi.org/10.18778/0208-6018.313.11>.
- Sarkar, A.N. 2013. Promoting eco-innovations to leverage sustainable development of eco-industry and green growth. *European Journal of Sustainable Development*, 2(1), 171-224. <https://doi.org/10.14207/ejsd.2013.v2n1p171>.
- Tietenberg, T., Lewis, L. 2023. *Environmental and Natural Resource Economics*. New York: Routledge. <https://doi.org/10.4324/9781003213734>.
- Tietenberg, T., Lewis, L. 2023. *Natural Resource Economics. The Essentials*. New York: Routledge. <https://doi.org/10.4324/9781032689111>.
- Tietenberg, T., Lewis, L. 2023. *Environmental Economics and Policy*. New York: Routledge. <https://doi.org/10.4324/9780429503849>.
- Varadarajan, R. 2017. Innovating for sustainability: a framework for sustainable innovations and a model of sustainable innovations orientation. *Journal of the Academy of Marketing Science*, 45, 14-36. <https://doi.org/10.1007/s11747-015-0461-6>.