



## Ecolabnet service packages as a response to the needs of manufacturing enterprises in the SME sector of the Baltic Sea Region

Edyta Kulej-Dudek<sup>1</sup> 

<sup>1</sup> Czestochowa University of Technology, ul. Dabrowskiego 69, 42-201 Czestochowa, Poland  
Correspondence: [e.kulej-dudek@pcz.pl](mailto:e.kulej-dudek@pcz.pl)

### Article history

Received 15.07.2021  
Accepted 24.09.2021  
Available online 15.11.2021

### Keywords

eco-innovations  
service packages  
Ecolabnet

### Abstract

Nowadays, the competitiveness of the economy, which is determined to a large extent by the innovative activities of enterprises and institutions, is of great importance for economic development. An important type of innovation is eco-innovations. Eco-innovations are currently a very timely topic undertaken by researchers, but also an important element of the activities of many companies. As a network of service providers for eco-innovations in small and medium-sized manufacturing enterprises, ECOLABNET fits perfectly in this trend. It aims to support, enable and empower companies to undertake sustainable eco-innovation activities in the Baltic Sea Region and beyond. The aim of this publication is to present the results of research on the eco-innovation needs of SME enterprises of the Baltic Sea countries and potential collaboration in this field with external entities. The services developed as packages of eco-innovation services in Ecolabnet that can meet the identified needs were indicated. The survey was conducted between March and May 2019 and covered SMEs in six countries: Poland, Lithuania, Estonia, Sweden, Finland, and Denmark. The subjects of the study were manufacturing companies that improve their products or services. The aim of the research was to gain an understanding of the needs and challenges related to eco-innovation in the context of sustainable development, to identify the future eco-innovation needs of manufacturing SMEs and collaborations with external actors, and to determine how and through which services the Ecolabnet can meet these needs and contribute to the growth of the enterprise. The manufacturing enterprises in this survey were motivated to eco-innovate. However, they lack knowledge on eco-innovation in its broadest sense, and therefore, urgently need the help of external experts, business partners, and networks in this area. The survey covered three areas: Business, Development, and Technology/Production. Business topic areas that entrepreneurs placed a high emphasis on were: branding and communication, supplier relations, customer insights and financial aspects. Within the needs in terms of development put most emphasis on product design, process development, bio-based materials and biodegradable materials. In the last category of identified needs Technology/Production respondents indicated increasing process efficiency, energy optimization and material efficiency. The research results also indicate that product design as well as branding and communication are urgent needs in the field of external expertise. Of the potential needs, the respondents also indicated customer insights, other alternative materials, business models, value chain assessment, and service design.

DOI: [10.30657/pea.2021.27.35](https://doi.org/10.30657/pea.2021.27.35)

JEL: O23

## 1. Introduction

In times of enormous economic challenges, innovation is viewed as a way to overcome difficulties, and support and ensure the socio-economic development of countries. The concept of innovation in the 21st century is perceived very differently, as it is defined as a system that generates social

challenges resulting from global activity and collaboration through innovation. According to the OECD, innovation is a key source of long-term growth, in both traditional and high value-added fast-growing sectors (Gliń, 2018).

In an ever-changing business environment, companies must be modern, progressive, move with the times, and, above all, meet the challenges of the modern market. Contemporary eco-

innovations are considered an important element of ecological policy, they are necessary to implement environmental protection requirements and at the same time to build economic competitiveness. It should also be stressed that the use of environmentally friendly processes is more and more often emphasized, appreciated, and even demanded by customers. It is especially important to implement eco-innovations to ensure the sustainability of production processes and supply chains under uncertainty for enterprises from the SME sector operating in an urban environment (Dzhuguryan et al., 2020; Grebski and Grebski, 2018).

Eco-innovations are of interest to researchers, practitioners, and policymakers alike. They offer many opportunities for cost reduction, competitive advantage, and sustainability in companies. However, eco-innovative business models differ from conventional business models and have special requirements in terms of stakeholder engagement, value definition, and value creation. In the face of technological advances, many companies need guidance on how to translate the potential of innovation into eco-innovative business models (Bierwisch et al., 2021).

As a relatively new concept, eco-innovation is not clearly defined. When defining eco-innovations, one should refer to the general definition of innovation formulated in the OECD's document Oslo Manual, in which product, process, organizational, and marketing innovations are specified. These innovations can be called eco-innovations if their implementation produces specific environmental benefits (Białoń, 2012).

Eco-innovations are defined as any forms of innovative activities aimed at a significant improvement in environmental protection, including new manufacturing processes, new products or services, and new business and management methods, with their implementation fostering environmental protection or significantly reducing the impact of raw material consumption (Dąbrowska, 2010). Eco-innovation can also be defined as innovation that consists of new or modified processes, practices, systems, and products that benefit the environment (Rennings, 2000; Daddi et al., 2012).

Eco-innovations are analyzed as a new paradigm because they encompass the growing importance of combining innovation and developed technologies with environmental protection, meaning that the demand for economic growth can be reconciled with sustainable development. Furthermore, innovativeness has been defined in the literature as incremental innovation, which includes adaptation, improvement, and intensification of existing products and services, radical innovation, which includes completely new products and services, and structural innovation, which refers to the change of systems. Eco-innovation can also be considered a broader concept, as it encompasses features of the production market, i.e. the production and exploitation of good green technologies, organizational innovation for the environment, or green innovation systems (Carvalho et al., 2018; Ab Rahman et al., 2018).

Eco-innovation provides an opportunity to overcome ecological vulnerabilities through economically viable business solutions that yield shared value (Porter, 2011) and stimulating corporate business strategies focused on marketing communications and social needs (Aagaard, 2018; Dyllick, 2016;

Kijek et al., 2012). Therefore, eco-innovation represents a very important strategic opportunity for enterprises by potentially reducing costs and improving competitiveness (Bierwisch et al. 2021).

Enterprises need a more systemic approach to eco-innovation, and innovation is a key factor that drives business growth (Okwiet and Grabara, 2013; Mele and Spina 2015). It is essential to understand how eco-innovation can be encouraged in enterprises so that it significantly changes the way they operate to ensure greater sustainability (Xavier, 2020).

There is a general consensus that eco-innovation is a key strategy because it represents a combination of the economic and environmental objectives of firms (Del Rio et al., 2017). According to Eurostat, the Baltic Sea countries have a low level of eco-innovation compared to other EU countries. The results show that the success of eco-innovation depends on the integration and collaboration developed between firms and institutional and external partners (Biscione, 2021). Other publications have also emphasized the positive impact of collaboration in eco-innovation, especially collaboration with external partners or stakeholders (Wagner, 2007; Shpak et al., 2017; Mothe et al., 2018).

The urgent need for process and product changes or changes in different organizational areas creates the potential for eco-innovation as a management strategy. This holistic approach to eco-innovation continues to challenge many enterprises (Xavier, 2020).

In response to changes in the market environment, modern enterprises must seek more improved and innovative ways of operating. The ability to change and use innovation as a necessary source of competitive advantage becomes a fundamental element of a company's competitiveness and success (Czarniewski, 2016).

According to Pomffyova, successful business performance is strongly dependent on managers' ability to acquire the most accessible information, expertise, and specialized knowledge using all IT capabilities and tools (Pomffyova et al., 2017). An increasing number of companies are also emphasizing the international potential of innovative activities (Mustafin, 2019).

Therefore, to meet the expectations of enterprises from the SME sector, there is a need to create a base of innovative services which could be used by these entities.

The aim of this publication is to present the results of research carried out in six Baltic Sea countries concerning the identification of eco-innovation needs in enterprises in the SME sector and to indicate developed packages of eco-innovation services that can meet these needs.

## **2. Network for providing consulting services for the development of eco-products for small and medium-sized enterprises in the Baltic Sea Region**

Employees of the Częstochowa University of Technology, Poland carried out an international research project "Network of Service Providers for Eco-innovations in Manufacturing SMEs - ECOLABNET (#R077)" funded by the Interreg Baltic

Sea Region 2014-2020 Programme, under the Innovation priority. The project was intended to be implemented from January 2019 to June 2021 but due to the ongoing pandemic, it was extended and its completion was scheduled for 31 December 2021. The core consortium of partners implementing the project consists of scientific and R&D institutions from six Baltic Sea countries. The mission of the Ecolabnet is to develop a network of supranational collaboration between:

- research and development institutes (RDIs)
- intermediary organizations (IOs)
- enterprises from the small and medium-sized enterprise sector (SMEs)

in the field of commercialization of eco-innovative pilot solutions, developed mainly by project partners.

Ecolabnet aims to increase access to expertise, new products and services, and to support the competitiveness of small and medium-sized enterprises.

Research on eco-innovation can be found in the Eco-innovation Observatory. The Eco-Innovation Observatory (EIO) is the initiative financed by the European Commission's Directorate-General for the Environment. It functions as a platform for the structured collection and analysis of an extensive range of eco-innovation and circular economy information, gathered from across the European Union and key economic regions around the globe, providing a much-needed integrated information source on eco-innovation for companies and innovation service providers, as well as providing a solid decision-making basis for policy development ([ec.europa.eu/environment/ecoap](http://ec.europa.eu/environment/ecoap)). In the literature on the subject, there are also research works by companies and universities where mainly the factors that drive eco-innovation (motivations) and projects that combine economic advantages for companies with a lower environmental impact to society (directives) (Bossle et al., 2015; Scarpellini et al., 2016). It may also be pointed out the need for investment in research for development of new eco-friendly materials (Pecorari and Camello Lima, 2020).

Based on the literature review and the author's research, it was concluded that there is a need to provide data and information about eco-innovative products and services to help connect the creators of these solutions with potential customers. Therefore, the ECOLABNET project aims to create a network of service providers supporting the development and implementation of eco-innovations in small and medium-sized enterprises in the Baltic Sea Region. ECOLABNET is the response to the lack of a professional network providing consulting services in eco-products development, which was pointed out by the respondents during in-depth interviews. The network will increase access to expertise and new products and services and promote competitiveness. To complete these tasks, it is very important to know the needs of SMEs in this field. Furthermore, the services that will meet these needs have to be offered.

### 3. Research methodology and structure of the enterprises surveyed

A survey on the needs of small and medium-sized enterprises in terms of eco-innovation and potential collaboration in this area with external entities was carried out as part of the project. The research focused on the needs of SMEs in relation to their current activities, but also future development activities and collaboration needs in the field of eco-innovation. The survey covered manufacturing SMEs in six different countries: Poland, Lithuania, Estonia, Sweden, Finland, and Denmark. To analyze the results, the responses were structured in three different datasets, with the number of responses varying according to different factors. The research sample included 296 production, trade and service enterprises. The results of a survey of 152 manufacturing enterprises will be presented for the purpose of the present publication. Due to the size of the sample, the survey cannot be considered representative. The research strategy was based on a mixed method (quantitative research using a survey questionnaire and qualitative research using an in-depth interview and an interview questionnaire). The survey was conducted between March and May 2019 and the in-depth interviews were made between April and June 2019. The subjects of the study were manufacturing companies that improve their products or services. The survey did not narrow the research area to any sector. Respondents in the enterprises were part of the management team. The survey questionnaire was developed using Survey Monkey and distributed electronically.

The aim of the research was to gain an in-depth understanding of the needs, vision, and challenges related to eco-innovation in the context of sustainable development, to identify the future eco-innovation needs of manufacturing SMEs and collaborations with external actors, and to determine how and through which services the Ecolabnet can meet these needs and contribute to the growth of the enterprise.

In the study, the most numerous group among the entities surveyed were microenterprises with up to 9 employees (44.74%). Small enterprises (10-49 employees) accounted for just under 28.29%, medium-sized enterprises (50-249 employees) - for 21.71%, whereas large companies (over 250 employees) - for just 5.26% of the sample. The structure of all manufacturing enterprises from the countries of project consortium partners was as follows: Denmark - 13.16% (20 entities); Estonia - 21.05% (32 entities); Finland - 23.68% (36 entities); Lithuania - 18.42% (28 entities); Poland - 16.45% (25 entities); Sweden - 7.24% (11 entities). A wide variety of manufacturing sectors were represented in the study. The most numerous groups were the enterprises of the machinery and equipment sector (15.79%), other manufacturing (13.16%), food products (11.84%), and rubber and plastic products (10.53%). This was followed by paper and paper products (5.92%), wearing apparel (5.26%), beverages, computer, electronic and optical products, and electrical equipment (4.61% each).

#### 4. Eco-innovative activity of SMEs and their needs in terms of eco-innovation - results

To examine the needs of SMEs in terms of eco-innovation, respondents were asked about specific subject areas related to eco-innovation that the given enterprise will focus on in the following 3 years. Respondents answered on a scale from 1 to 5, with 1 meaning "I absolutely disagree" and 5 meaning "I absolutely agree". Table 1 shows the results of this survey.

**Table 1.** Eco-innovation needs of enterprises under three categories: Business, Development, and Technology/Production

Categories of needs	Eco-innovation needs of enterprises	1 [%]	2 [%]	3 [%]	4 [%]	5 [%]
Business	Branding and communication	5.92	5.92	21.71	31.58	34.87
	Customer insights	4.61	8.55	23.03	32.24	31.58
	Financial aspects	6.58	9.21	25.66	30.26	28.29
	Supplier relations	7.24	11.18	27.63	34.87	19.08
	Value chain assessment	7.24	17.11	29.61	25.00	21.05
	Business models	7.24	14.47	32.24	28.29	17.76
	Legislation	7.24	15.79	40.79	25.00	11.18
	Intangible and legal assets (e.g. IPR)	11.84	17.76	35.53	25.00	9.87
Development	Product design	8.55	7.89	15.79	26.97	40.79
	Process development	5.26	5.26	22.37	40.13	26.97
	Bio-based materials	14.47	10.53	19.74	24.34	30.92
	Packaging development	12.50	16.45	22.37	24.34	24.34
	Biodegradable materials	15.13	12.50	23.03	23.68	25.66
	Life-cycle assessment (LCA)	7.89	16.45	32.89	23.03	19.74
	Service design	13.82	18.42	25.66	25.00	17.11
Technology / Production	Increasing process efficiency	4.61	5.92	15.79	35.53	38.16
	Energy optimization	7.24	8.55	17.76	30.26	36.18
	Material efficiency	6.58	9.21	19.74	33.55	30.92
	Other alternative materials	19.74	11.18	21.05	29.61	18.42
	Certifications	14.47	15.79	29.61	24.34	15.79
	Biocomposites	36.18	13.82	25.00	14.47	10.53
	3D printing	44.74	11.18	13.82	16.45	13.82
	Bioresins	42.76	20.39	22.37	7.24	7.24

The survey covered three different topics: Business, Development, and Technology/Production. Business topic areas that respondents placed a high emphasis on were: branding and communication (34.87%), supplier relations (34.87%), customer insights (32.24%), and financial aspects (30.26%). These aspects had relatively high indications by respondents in terms of urgent and long-term needs in the context of external expertise. The respondents also pointed to a strong and

growing demand for these solutions. Most of them feel that they read their customers' requirements well, but would use additional market analyses, particularly in the context of eco-innovation. This confirms the relevance of developing service packages that SMEs could benefit from. The survey also showed that there is a need for financial support to enhance the development of eco-innovation. Items such as materials development, material reuse, equipment, and manufacturing technology may require financial support.

Within the needs in terms of development, the respondents put most emphasis on product design (40.79%), process development (40.13%), bio-based materials (30.92%), and biodegradable materials (25.66%). These results are justified as a large part of the eco-innovation activities of manufacturing SMEs is related to the products manufactured, services offered, and materials used. Business representatives stress how product design can support lower consumption of materials and other resources and various aspects of recycling, including developing opportunities to reuse products or use more environmentally friendly packaging (Nielsen et al., 2020). Product design plays an important role in the selection of sustainable manufacturing technologies in order to reduce production waste and simplify the logistics aspects for their recycling in the context of the SME operation in an urban environment (Dzhuguryan, 2021).

Materials and processes also figure prominently in the last category of identified needs (Technology/Production). Respondents indicated increasing process efficiency (38.16%), energy optimization (36.18%), and material efficiency (33.55%). The selected areas of interest are correlated with the manufacturing activities of the enterprises surveyed. In the context of eco-innovation, respondents also indicated optimization of the production process and seeking knowledge about modern energy solutions and new energy sources. The use of new sources can have an effect on reducing energy consumption, costs, and CO<sub>2</sub> emissions. These activities may also have an impact on manufacturing technology.

During the survey, enterprises were also asked if they would need external expertise within the following 3 years in terms of eco-innovation (Table 2).

**Table 2.** Needs for external expertise on eco-innovation

Type of external expertise	No [%]	Maybe [%]	Yes [%]
Product design	30.26	33.55	36.18
Branding and communication	28.95	35.53	35.53
Customer insights	23.68	42.11	34.21
Material efficiency	30.26	37.50	32.24
Financial aspects	33.55	35.53	30.92
Recycling	33.55	35.53	30.92
Other alternative materials	26.97	42.76	30.26
Certifications	27.63	43.42	28.95
Packaging development	35.53	37.50	26.97
Legislation	35.53	40.13	24.34
Intangible and legal assets (e.g. IPR)	35.53	40.79	23.68
Life-cycle assessment (LCA)	40.13	41.45	18.42
3D printing	52.63	29.61	17.76
Business models	33.55	49.34	17.11

Value chain assessment	34.21	48.68	17.11
Supplier relations	44.74	38.82	16.45
Service design	34.87	48.68	16.45
Biocomposites	46.71	38.16	15.13
Bioresins	59.21	31.58	9.21

Responses were grouped into 19 topic areas to facilitate processing and analysis of results. In their responses, respondents highlighted both their current urgent needs for external expertise and their long-term needs for eco-innovation. The subject areas in which most respondents answered affirmatively to the need for external expertise were product design, and branding and communication. Of the potential needs, they also indicated customer insights, other alternative materials, business models, value chain assessment, and service design. These needs coincide with the previously indicated subject areas related to eco-innovation that the enterprise intends to focus on in the following 3 years.

The manufacturing enterprises in this survey were in general highly motivated to eco-innovate. However, they lack knowledge on key issues related to eco-innovation in its broadest sense, and therefore, urgently need the help of external experts, business partners, and networks in this area.

## 5. Service packages oriented to meet the identified needs

Observations and investigations show that small and medium-sized manufacturing enterprises have limited resources for collaboration with R&D and innovation organizations, such as universities and consulting and advisory firms.

On the basis of the obtained research results regarding the identified gaps and eco-innovative needs of SMEs and the interviews conducted among the staff representing SMEs from six countries in the Baltic Sea region, 8 packages of ECOLABNET services were developed. To meet the identified needs, several services composed in the form of service packages for small and medium-sized enterprises were developed within the framework of network collaboration. These services will enable SMEs to access the latest high-level expertise. Services were divided into different categories based on their nature. They guide international collaboration and support the expansion of networks. They can be developed on an ongoing basis as part of improving competencies and meeting the needs of potential service recipients, contributing to bridging the identified gaps.

Eight service packages were developed within the project and they were assigned individual services developed and offered by the project partners:

- SP1: Training and Counselling Services - 12 services
- SP2: Research and Development Services - 11 services
- SP3: Administration and Law Services – 2 services
- SP4: Marketing Services - 5 services
- SP5: Product Design and Development Services - 12 services
- SP6: Environmental Services Evaluation - 4 services
- SP7: Business Strategies Services - 8 services
- SP8: Innovation Management Services - 6 services.

Examples of proposed services in Ecolabnet concern the following aspects and activities:

- expert training on problems of eco-innovations, which include products, processes, and organizational/marketing activities,
- training and consulting in terms of developing concepts for conducting marketing research,
- support and consulting services provided by branding and marketing professionals, design of research on consumer behavior, prototype development and co-creation, testing and assessment,
- branding, brand management, knowledge of strategic and operational branding activities,
- carrying out a comprehensive analysis of how a given project (concerning new investments or the expansion or modernization of existing ones) will affect individual elements of the environment (air, water, soil) or forms of nature,
- consulting in buyer-supplier relations in the field of sustainable development and circular economy,
- material testing to order, according to the requirements of standards and customer needs,
- determination of the ultimate aerobic biodegradation of plastics based on organic compounds under controlled composting conditions,
- consulting and support for entrepreneurs in the process of implementing modern environmentally friendly technologies using waste heat to minimize energy consumption and, consequently, minimize production costs and maximize profits,
- examination of properties of biopolymers and polymer biocomposites (examination of kinetics of hardening, thermal and mechanical properties, swelling, optical properties, and biodegradability of biopolymers and biocomposites),
- design of bio-based polymers and polymer biocomposites from renewable sources,
- research and practical knowledge on service prototyping, technical and expert assistance on prototyping,
- 3D printing of custom designed micro/macro structures at resolutions from micrometers to nanometers,
- testing of bio-based materials for their suitability for 3D printing,
- designing products and services, creating concepts and 3D models,
- support targeted at locating and promoting specific R&D services and infrastructures in the context of searching for partners and starting contacts,
- collaboration and clustering leading to the creation of networks and new partnerships through conferences, seminars, business breakfasts and forums, and discussions on relevant business topics with top-level government and supervisory body representatives,
- active promotion of innovative services, products, and knowledge (technology transfer), providing advice on investment opportunities from EU structural funds,

- services in the field of planning used to apply for funding, strategic development, and informing stakeholders.

Service packages are designed to be used by intermediary organizations for connecting small and medium-sized enterprises with service providers. On the other hand, SMEs can find and use suitable services offered by service providers in their innovation activities. It should be noted that the portfolios in the various ECOLABNET service packages are open and can be expanded on an ongoing basis.

## 6. Summary and conclusion

Innovation is the most important driver of economic growth and is an important element of the economic and social challenges of modern economic systems. Eco-innovation knowledge should be activated and disseminated as often as possible through project networks as platforms available to enterprises to help them develop their eco-innovation activities. In small and medium-sized enterprises, there is a need to go beyond isolated solutions and eco-innovation initiatives aimed at greener operation of entities, use of resources, and implementation of processes. However, entrepreneurs lack good practices, models, and experiences of other enterprises that are leaders in implementing eco-innovations. These entities should undertake regular activities in this respect, in particular within project networks that support the environmental value creation process and offer products, services, and expert reports in the broad field of eco-innovation.

Small and medium-sized enterprises in the Baltic Sea countries have problems with access to R&D facilities, consulting services, and expert knowledge. The conducted research allowed for the development of services meeting the identified needs and gaps in the field of eco-innovations in SMEs, so the proposed service packages will be utilised in practice in the surveyed enterprises of the Baltic Sea region. Ecolabnet is therefore an excellent solution for these entities since through the network, they will have wider access to service providers, R&D entities, intermediary organizations, and the latest high-level expertise.

**Limitations:** The study has some limitations. The survey was limited to small and medium-sized enterprises. Furthermore, the study was conducted on a sample too small to be considered representative. The survey questionnaire was aimed at owners and managers rather than all the employees due to the design assumptions. The responses contained in the questionnaire represent subjective opinions of the respondents.

**Future research perspectives:** The problems of eco-innovations is a new field of knowledge and practice, requiring much in-depth research. The survey presented in this study allowed for the assessment of the innovative activity of enterprises from six Baltic Sea countries. Poland's presence in the EU structures makes it possible to extend the scope of research to other EU countries, and thus to provide a basis for the comparison of the effectiveness of innovative activities in individual national economies within the EU community. Therefore, this research can be further developed in the future to cover all

EU member states. The research area should, however, be narrowed down to a specific industry and type of activity, e.g. manufacturing companies in the machinery and equipment industry.

## Acknowledgements

The research was supported by the Interreg Baltic Sea Region 2014-2020 Programme, under the Innovation priority.

## Reference

- Aagaard, A., 2018. Managing Sustainable Innovation. In *Innovation Management and Corporate Social Responsibility: Social Responsibility as Competitive Advantage*. Altenburger R., Ed., Springer, Cham, Switzerland, 13-28
- Ab Rahman, Z.N., Ismail, N., Rajiani, I., 2018. Challenges for managing non-technological innovation: A case from Malaysian public sector. *Polish Journal of Management Studies*, 17 (1), 7-16, DOI:10.17512/pjms.2018.17.1.01
- Białoń L., 2012. Problemy ekoinnowacji, *Ekonomia, zarządzanie, informatyka, marketing*, 127-133.
- Bierwisch A., Huter L., Pattermann J., Som O., 2021. Taking Eco-Innovation to the Road—A Design-Based Workshop Concept for the Development of Eco-Innovative Business Models. *Sustainability*, 13(16), 8811, DOI: 10.3390/su13168811
- Biscione A., de Felice A., Gallucci T., Lagioia G., 2021. Four types of eco-innovation for Baltic firms. *Economic Research*, 1-17, DOI: 10.1080/1331677X.2021.1889393.
- Bossle, M.B., Barcellos, M.D., Vieira, L.M., Sauvée L., 2015. The drivers for adoption of eco-innovation. *Journal of Cleaner Production*, v. 113, 861-872, DOI: 10.1016/j.jclepro.2015.11.033
- Carvalho A., Zarelli P., Dalarosa B.M., 2018. Eco-innovation typology for incubators. *World Journal of Entrepreneurship Management and Sustainable Development*, 14(3), 291-308, DOI: 10.1108/WJEMSD-10-2017-0071
- Czarniewski S., 2016. Small and medium-sized enterprises in the context of innovation and entrepreneurship in the economy. *Polish Journal Of Management Studies*, 13(1), 30-39.
- Daddi, T., Tessitore, S., Frey, M., 2012. Eco-innovation and competitiveness in industrial clusters. *International Journal of Technology Management*, 58(1/2), 49-63, DOI: 10.1504/IJTM.2012.045788
- Dąbrowska M., 2010. *Ekoinnowacje*. Polska Agencja Rozwoju Przedsiębiorczości, Warszawa, 8-9.
- Del Rio, P., Romero-Jordan, D., Penasco, C., 2017. Analyzing firm-specific and type-specific determinants of eco-innovation. *Technological and Economic Development of Economy*, 23(2), 270-295.
- Dyllick T., Muff K., 2016. Clarifying the Meaning of Sustainable Business. *Organization & Environment* 29, 156–174, DOI:10.1177/1086026615575176.
- Dzhuguryan, T., Deja, A., Wiśnicki, B., Józwiak, Z., 2020. The Design of Sustainable City Multi-Floor Manufacturing Processes Under Uncertainty in Supply Chains. *Sustainability*, 12, 9439, DOI:10.3390/su12229439.
- Dzhuguryan, T., Deja, A., 2021. Sustainable Waste Management for a City Multifloor Manufacturing Cluster: A Framework for Designing a Smart Supply Chain. *Sustainability*, 13, 1540, DOI: 10.3390/su13031540.
- Gliń, W., 2018. Problems of Polish enterprises in the field of innovation. *Production Engineering Archives*, 21, 44-47, DOI: 10.30657/pea.2018.21.10
- Grebski, W., Grebski M.E., 2018. Building an Ecosystem for a New Engineering Program. *Management Systems in Production Engineering* 26(2), 119-123, DOI: 10.1515/mspe-2018-0019
- Kijek, A., Lisowski, M., Starzyńska, W., 2012. Innovation Activity of the Polish Manufacturing Enterprises. *International Advances in Economic Research*, 19(1), Springer, 33-43, DOI: 10.1007/s11294-012-9387-7
- Kulej-Dudek, E., Majchrzak-Kuceba, I., Bień, J., Panowski, M., Jędrzejczyk, W., Kuceba, R., Chmielarz, G., Dudek, D., 2021. WP 3.5. Service Packages, report by CUT. ECOLABNET project, Published by ECOLABNET project, Czestochowa University of Technology, Czestochowa, Poland

- Mele, C., Spena, T.R., 2015. Eco-innovation practices. *Journal of Organizational Change, Management*, 28(1), 4-25, DOI: 10.1108/JOCM-08-2013-0146
- Mothe, C., Nguyen-Thi, U. T., Triguero, A., 2018. Innovative products and services with environmental benefits: Design of search strategies for external knowledge and absorptive capacity. *Journal of Environmental Planning and Management*, 61(11), 1934-1954, DOI: 10.1080/09640568.2017.1372275
- Mustafin, A.N., Kotenkova, S.N., Shlyakhtin, A.E., Kotulič, R., Kravčáková, Vozárová, I., Benková, E., 2019. The governance of innovation in industrial enterprises. *Polish Journal Of Management Studies*, 20(1), 318-331
- Nielsen, T.M., Pedersen, P.W., Biltoft, H., Holm, S., 2020. Manufacturing Companies and Eco-Innovation. The main conclusions about the needs of manufacturing SMEs (small and medium sized enterprises) in relation to eco-innovation, Published by ECOLABNET project, VIA University College, Design and Business, Horsens, Denmark.
- Okwiet, B., Grabara, J. K., 2013. Innovations' Influence on SME's Enterprises Activities. *Procedia Economics and Finance*, 6, 194-204, DOI: 10.1016/S2212-5671(13)00132-9
- Pecorari, P.M., Camello Lima, C.R., 2020. Analysis of eco-innovation from a business perspective. *Revista Produção Online, Florianópolis, SC*, 20(3), 792-810, DOI: 10.14488/1676-1901.v20i3.3423
- Pomffýová, M., Kožárová, M., Krajčík, V., 2017. Innovative and Information Perspectives of Business Management. *Polish Journal of Management Studies*, 16(2), 221-232
- Porter, M.E., Kramer, M.R., 2011. Creating Shared Value: How to reinvent capitalism – And unleash a wave of H innovation and growth. *Harvard Business Review*, 62-77
- Rennings, K., 2000. Redefining innovation – eco-innovation research and the contribution from ecological economics. *Ecological Economics*, 32(2), 319-332.
- Scarpellini, S., Valero-Gil, J., Portillo-Tarragona, P., 2016. The economic-finance interface for eco-innovation projects. *International Journal of Project Management*, 34, 1012-1025, DOI: 10.1016/j.ijproman.2016.04.005
- Shpak, N., Satalkina, L., Sroka, W., Hittmar, S. 2017. The social direction of enterprises' innovation activity. *Polish Journal of Management Studies*, 16 (1), 187-201, DOI:10.17512/pjms.2017.16.1.16
- Wagner, M., 2007. On the relationship between environmental management, environmental innovation and patenting: Evidence from German manufacturing firms. *Research Policy*, 36(10), 1587-1602. DOI:10.1016/j.respol.2007.08.004
- Xavier A., Reyes T., Aoussat A., Luiz L.O., Souza L., 2020. Eco-Innovation Maturity Model: A Framework to Support the Evolution of Eco-Innovation Integration in Companies. *Sustainability* 12(9), 3773, DOI: 10.3390/su12093773

---

## Ecolabnet 服务包响应波罗的海地区中小企业部门的制造企业的需求

---

### 關鍵詞

生态创新  
服务包  
生态实验室

### 摘要

如今, 经济竞争力在很大程度上取决于企业和机构的创新活动, 对经济发展具有重要意义。一种重要的创新类型是生态创新。生态创新是目前研究人员开展的一个非常及时的课题, 也是许多公司活动的重要组成部分。作为中小型制造企业生态创新的服务提供商网络, ECOLABNET 完美契合了这一趋势。它旨在支持、支持和授权公司在波罗的海地区及其他地区开展可持续的生态创新活动。本出版物的目的是介绍波罗的海国家中小企业生态创新需求的研究结果以及与外部实体在该领域的潜在合作。指出了在 Ecolabnet 中作为生态创新服务包开发的服务, 可以满足确定的需求。该调查于 2019 年 3 月至 5 月期间进行, 涵盖六个国家的中小企业: 波兰、立陶宛、爱沙尼亚、瑞典、芬兰和丹麦。该研究的对象是改进其产品或服务的制造公司。该研究的目的是了解可持续发展背景下与生态创新相关的需求和挑战, 确定制造业中小企业未来的生态创新需求以及与外部参与者的合作, 并确定 Ecolabnet 如何以及通过哪些服务来满足这些需求并为企业的发展做出贡献。本次调查的制造企业积极参与生态创新。然而, 他们缺乏最广泛意义上的生态创新知识, 因此迫切需要该领域的外部专家、商业伙伴和网络的帮助。调查涵盖三个领域: 业务、开发和技术/生产。企业家高度重视的业务主题领域是: 品牌和沟通、供应商关系、客户洞察和财务方面。在开发方面的需求中, 最重视产品设计、工艺开发、生物基材料和生物降解材料。在已确定需求的最后一个类别中, 技术/生产受访者表示正在提高流程效率、能源优化和材料效率。研究结果还表明, 产品设计以及品牌和传播是外部专业领域的迫切需求。在潜在需求中, 受访者还指出了客户洞察、其他替代材料、商业模式、价值链评估和服务设计。

---