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## The Analysis of the Functioning of Eco-innovative Activity of the Sector of Micro-, Small and Medium Enterprises

### Analiza funkcjonowania działalności ekoinnowacyjnej sektora MMSP

The basic goal of the research is to recognize the situation and the level of eco-innovation in Poland, including the MSME sector and to compare the obtained results with the ones from EU countries. The result of the research is indicating the barriers and opportunities to support the development of eco-innovation in the MSME sector in Poland. Moreover, there has been made an assessment of effectiveness of the financing of eco-innovation by micro-, small and medium enterprises, and in particular the assessment of determinants affecting the selection of sources of funding of eco-innovation, including the use of structural funds.

**Keywords:** eco-innovation, sustainable development economics (SDD), MSME

### Introduction

The sector of micro-, small and medium enterprises (MSME) plays an important role in all economies around the world. In Poland, there are 1.84 million non-financial companies, defined as active enterprises, including 99.8% of companies of the MSME sector (according to the data for 2014, following the publication *The activity of non-financial enterprises in 2014*, GUS 2015) [1]. When assessing the number of companies operating in Poland in absolute terms, it must be concluded that it is high, however, when using the indicator of the number of enterprises in relation to the size of the population, Poland occupies only the 22<sup>nd</sup> position among EU countries (according to Eurostat 2014) [2]. The number of large enterprises in Poland was only 3.4 thousand in 2014. The sector of enterprises belonging to MSMEs is a stimulator of economic development while generating 50.2% of GDP of the whole sector of enterprises and employing 69.8% of people employed in enterprises (according to GUS - Central Statistical Office 2015) [3]. Growing expectations of the environment, taking into account environmental management in social and environmental terms (including reduction in micro-pollutants) affect the decision of enterprises concerning the implementation of the concept of corporate social

responsibility (CSR). The need for the implementation of the concept of sustainable development (SDE), by means of an increase in eco-innovation, is an essential development goal, which is reflected among others in the Europe 2020 strategy, adopted by the European Commission. The position of the sector of Polish enterprises in terms of total innovation as well as eco-innovation is low against the background of EU countries. The introduction of eco-innovation by companies in Poland is mainly the result of adjustments to legal regulations imposed by the State. Relatively most of eco-innovation concerns the solutions aimed at reducing environmental pollution (including micro-pollutants) by the industrial sector. However, a long-term improvement in the field of eco-innovation requires an increase in financial outlays on this type of investments and greater awareness of enterprises from the group of MSMEs. Sustainable development determines the use of eco-friendly technologies, which requires investments in eco-innovation, enabling more effective use of resources and reduction in pollution. The introduction of modern technologies compliant with the concept of sustainable development is becoming an important challenge for modern economies. Unfortunately, in Poland, a large share in economy belongs to traditional energy intensive industrial sectors. Therefore, it becomes necessary to take actions aimed at rational use of resources, raising awareness and investments of MSMEs in the field of eco-innovation. The basic goal of the research is to recognize the situation and the level of eco-innovation in Poland, indicating the barriers and opportunities to support the development of eco-innovation in the MSME sector in Poland.

## **1. The concept, role and functions of eco-innovation**

In modern highly developed economies, there is a view that for the proper management of natural assets the man should more effectively use natural resources available to them. The depletion of some natural resources, their prices rising, brings about that rational entrepreneurs manage the resources more and more rationally so that they reduce operating costs thus becoming increasingly competitive in the global market. The vision of the further development of the European Union, adopted in the Europe 2020 strategy, includes three interrelated priorities [4]:

- smart development: economic development based on knowledge and innovation;
- sustainable development: supporting a more resource efficient, greener and more competitive economy;
- inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

Sustainable development means building a sustainable and competitive resource efficient economy using environmentally friendly technologies. Investments in innovation, enabling more effective use of resources, positively affect all sectors of the economy. The implementation of modern environmental technologies is becoming an important challenge for modern economies, particularly in the MSME sector as the dominant one.

The concept of eco-innovation occurred at the end of the 20th century as a result of the growing awareness of risks associated with the natural environment and responsibility for the environment. The concept of eco-innovation in literature is defined multidimensionally although in general terms it applies to innovation bringing the effects for the environment. The classic definition of eco-innovation says that eco-innovation means a new product which provides value to the customer and business and at the same time significantly reduces the negative impact on the environment [5]. Eco-innovation is production, technological and service processes which reduce the negative impact on the natural environment [6]. The essence of eco-innovation is an integrated approach to the use of the created concepts in the field of environmental protection at each stage and in each sector of the economy [7]. These are production, technological and service processes that reduce the negative impact on the natural environment [8, 9]. Eco-innovation is an opportunity for the implementation of sustainable solutions that will allow for more effective use of natural resources and reduction in the harmful impact on the environment while simultaneously maintaining a high level of innovation [10]. The concept of eco-innovation is also understood as creating new and competitively assessed goods, processes, systems, services and procedures which may satisfy human needs and provide the quality of life to all people along with the minimum use of natural resources per production unit and minimum emission of toxic substances [11].

The main result of eco-innovation is an increase in environmental performance meaning directly e.g. reduction in energy intensity of production, and indirectly - an increase in cost competitiveness of the company [12]. Eco-innovation can be perceived as any innovation reducing the negative impact of economic processes on the natural environment and reducing environmental damage [13]. Therefore, eco-innovation is a type of combination of innovation (novelty, creativity, change) with environmental sensitivity or environmental awareness. Some authors indicate the specific feature of eco-innovation distinguishing it from other innovation, namely, apart from the benefits achieved by the company implementing it, its effect is also the so-called external benefits. External benefits arise since the inventor usually cannot usurp all or most of social benefits of R+D activities [14].

M. Carley and P. Spapens give a lot of arguments for the use of eco-innovation:

- less waste and pollution and, in the interpretation of these authors - really logical, all pollution is useful resources, frequently lost, which, as a result of economic errors, were in the wrong place and time;
- better quality of life, eco-innovation leads to reduction in the use of resources but at the same time, it improves the quality of the results achieved. In many cases, it also positively influences the level of life;
- jobs and social justice, most of eco-innovation, e.g. the solutions of organic farming, increases a share of human capital in the economy, stimulates the emergence of new jobs, thus decreasing unemployment, simultaneously, it reduces the use of resources;
- competitiveness, since eco-innovation always means an increase in quality, better technologies, processes and products, which have increasingly greater market opportunities;

- benefits for business, market attractiveness, since eco-innovation reduces a lot of costs, allows for avoidance of different categories of environmental charges, creates more effective processes, their result is also the environmental image of business;
- profitability, concerning savings in the field of the resources used, associated with reduction in consumption of electricity and resources, which prove to be more effective than additional purchases of increasingly expensive raw materials. It has been proven that, in many cases, the prevention of pollution is cheaper than other solutions associated with the need for environmental protection;
- smaller risk since eco-innovation poses a risk neither to consumers nor at different stages of production in the company, both in terms of health and other safety categories;
- it allows for more effective use of scarce development capital, e.g. instead of the construction of new power plants there should be promoted the construction of such enterprises that will supply the market with energy-saving devices, which leads to reduction in demand for energy or reduction in its continuous growth;
- international safety since increasingly apparent competition for limited resources of the planet may lead to the emergence of conflicts, even on a very large scale. Effectiveness may prevent an increase in international tensions [15].

According to OECD, eco-innovation improves the efficiency of use of natural resources in the economy, reduces the negative impact of human activity on the environment or strengthens the economy resistance to environmental pressures.

In literature, there are a lot of ways to classify eco-innovation, adopting, as a criterion, e.g. benefits for the enterprise or the results of the environmental impact. Among these classifications, there are also two groups: eco-innovative products and eco-innovative services. The product can be described as eco-innovative if its innovation or the innovation of the technology of its manufacture exerts less pressure on the environment. In turn, services are innovative in nature when eco-innovative products are used for their production or when the entity providing them uses eco-innovative organizational or process solutions. Within this concept it is possible to talk about eco-innovation of services or eco-innovative services nowadays. The service company may provide services which are not eco-innovative but at the same time it can be eco-innovative in the way of management and organization [16]. Both types of eco-innovation carry a range of positive effects: reduction in consumption of energy and materials, an increase in competitiveness, profitability of enterprises, an opportunity to invest in human capital. At present eco-innovation is one of the main priorities of the policy of the Member States of the European Union.

In literature, most frequently there are distinguished five types of eco-innovation:

- technological eco-innovation within products and production processes;
- social eco-innovation, e.g. behavior, consumption habits;
- organizational eco-innovation, e.g. eco-audits;
- institutional eco-innovation, e.g. platforms of cooperation, informal groups, networks appointed to deal with environmental issues;
- marketing eco-innovation, eco-labels, eco-packaging [17].

The examples of eco-innovation applied in MSMEs in the field of energy eco-innovation, among others, are:

- product eco-innovation: photovoltaic cells, solar panels, biogassing (anaerobic digestion), new generations of wind turbines, geothermal systems, heat regenerators, heat pumps;
- process eco-innovation: distributed energy; intelligent energy management systems in buildings; trigeneration (combined management of energy, heat and cold); energy efficiency;
- organizational eco-innovation: solar farms; wind farms; implementation of energy management system - ISO 0001 (BS EN 16001); implementation of environmental management system - ISO 14001, or EMAS;
- marketing eco-innovation: modern campaigns raising awareness and advertising solutions in the power industry [18].

The greatest barrier to the development of eco-innovation in enterprises is lack of capital, therefore, it becomes necessary to develop financial instruments supporting the financing of eco-innovation.

## **2. Barriers to development and sources of financing of eco-innovation of MSMEs**

Micro-, small and medium enterprises (MSMEs) play a very important role in the world economy, amounting to about 99% of companies in the European Union. MSMEs in Poland amount to 99.8% of the total number of enterprises in Poland and perform a vital function in the economy affecting economic growth and employment [19]. In EU countries, business activity is conducted by the total of 22 million enterprises, with the largest number of companies operating in Italy (about 3.7 million), France, Spain, Germany and Great Britain. Poland, when compared to other countries of the European Union, takes the sixth position in relation to the number of enterprises (more than 1.5 million by Eurostat for 2014). The statistics are worse in terms of the number of companies in relation to the population of a specific country. With the number of 41 enterprises per 1000 inhabitants Poland occupies the 22<sup>nd</sup> position in the EU. Large enterprises in Poland amount to 3.4 thousand entities in 2014. The sector of enterprises included in MSNEs is a stimulator of the economy while generating 50.2% of GDP of the whole sector and employing 69.8% of people employed in enterprises (the data by GUS 2015). The classification criteria of the enterprises are: form of ownership, type of the conducted activity, market position, amount of capital, turnover, level of employment. In defining MSMEs two criteria are taken into account: quantitative - based on economic measures such as the number of employees, turnover, size of assets, scope of the market. The other criterion is qualitative - based on the characteristics of the company such as: unity of ownership and management, decision-making and financial independence, degree of organizational structure, innovation, management system, market share [20]. The entrepreneur is considered to be a micro-entrepreneur, who in at least one of the last two financial years:

- employs less than 10 employees annually,
- has achieved annual net turnover from the sale of goods, products and services and financial operations not exceeding the PLN equivalent of 2 million euro, or the total assets of its balance sheet prepared at the end of one of these years did not exceed the zloty equivalent of EUR 2 million.

A small enterprise in the light of the definition of Article 105 of the Business Activity Freedom Act [21], is an entrepreneur who, in at least one of the last two financial years:

- employed on an annual average fewer than 50 employees,
- achieved an annual net turnover from sales of products and services and financial operations not exceeding the PLN equivalent of EUR 10 million or total assets in its balance sheet not exceeding EUR 10 million.

A medium enterprise, in accordance with Article 106 of the Business Activity Freedom Act, fulfills at least 2 conditions in at least one of the last two financial years:

- employed on an annual average fewer than 250 employees,
- achieved an annual net turnover from sales of goods, products and services and financial operations not exceeding the PLN equivalent of EUR 50 million or total assets in its balance sheet at the end of one of these years did not exceed the PLN equivalent of EUR 43 million.

The Business Activity Freedom Act adopted the recommendations of the European Commission to the Polish legislation.

A modern company should be managed in terms of strategy, market and innovation. It must cooperate with its environment, take care of the market and modernity of its products but, most of all, it must be open to changes. The use of environmentally friendly processes is more and more frequently recognized, appreciated and demanded by customers.

The most important barriers to the acceleration of dissemination and development of eco-innovation are:

- uncertain market demand, uncertain return on investment or too long payback period for eco-innovation;
- lack of funds in the enterprise;
- insufficient access to the existing subsidies and financial incentives;
- applicable provisions and structures not providing sufficient incentives for eco-innovation;
- lack of external funding [22].

In the subject literature, an important position is occupied by the problem of barriers to the implementation of eco-innovation in enterprises, including MSMEs. Among them, there can be identified:

- legal barriers (e.g. unclear and non-transparent regulations, unpredictable changes in provisions bringing about uncertainty of the market and discouraging from investments, too detailed technical requirements limiting the potential of eco-innovative activity, incorrectly established standards);

- economic barriers (e.g. lack of funds in the company, lack of external funding, high costs of the innovation process, high risk and uncertain return on investment, uncertainty of benefits by the pioneers in the market);
- demand barriers (e.g. uncertain demand in the market, the market dominated by the existing companies, lack of possibility to distinguish the product in terms of its eco-preferentiality in connection with deficit of reliable information, market prices reflecting only economic costs, distorting the market with interventionism in the form of subsidies for the solutions burdensome for the environment);
- technological barriers (e.g. technological potential, limited availability of technology, the solutions dominating in the market creating the input barriers to new technologies, outdated infrastructure as a barrier to economic development, long period of replacement of the existing infrastructure);
- research and development barriers (e.g. maladjustment of the activity of research and development institutions to innovation needs, underfunding of research and development projects, lack of support for cooperation between science and industry);
- staff barriers (e.g. lack of experienced and qualified staff, lack of proper managerial skills and technical expertise, resistance to changes, inability to manage tasks associated with the eco-innovation process, inability to absorb the solutions developed outside the company);
- cooperation barriers (e.g. lack of suitable suppliers, lack of suitable business partners, lack of cooperation between enterprises and research and development institutions, limited access to external information, expertise, weak interactions between the actors of the innovation system) [23].

The most important barriers to the implementation of eco-innovation in MSMEs include, most of all, the lack of funds. The sources of the financing of eco-innovation may include many financial instruments depending on the criteria:

- ownership right: own capital [24], foreign capital,
- sources of capital: internal, external,
- time of disposal of specific capital, including short-term capital, long-term capital [25].

Own capital should be one of the major sources of the financing of eco-innovation of MSMEs (Table 1). Its increasing, creating may be internal (self-financing) and external, this may consist in increasing own capital e.g. by means of accepting new co-partners.

Table 1. The sources of the financing of eco-innovation with own capital of MSMEs

Own capital	
Internal sources	External sources
Net profit	Shareholders' additional contributions
Depreciation	Searching for new partners
Transformations in assets	Venture capital funds
Transformations in capital	Public offering in OCT market

Source: own study

Foreign capital is the capital acquired from the outside from the environment in which the company operates (Table 2). It is to finance the activity of the company and its development, it is frequently used in the financing of eco-innovation. The main division of this capital due to the time of disposal of specific capital is into: long-term capital and short-term capital.

Table 2. The sources of foreign capital financing eco-innovation in MSMEs

Foreign capital	
Long-term capital	Short-term capital
Reserves	Short-term bank loans
Long-term bank loans	Renewable obligations
Credit guarantees	Loans from suppliers
Leasing	Loans from customers
Franchising	Factoring
Obligations	Loans from non-banking sector
Grants and subsidies	Short-term debt securities
Aid funds	
Loans from family and friends	Loans from family and friends

Source: own study

The instruments supporting the development of the economies of EU countries, belonging to Structural Policy, are Structural Funds. They are directed to different sectors of economies that need help to catch up with others, more developed ones. MSMEs can receive grants from various funds for eco-innovation provided they meet certain requirements. Poland like any other Member State has the strategy which is aimed at creating the conditions for growth in innovation and competitiveness of the economy and entrepreneurship ensuring employment growth and an increase in the level of social, economic and spatial cohesion. The funds for this strategy come from the following: the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development and the European Fisheries Fund.

The prospect for years 2014-2020 is implemented in Poland by means of 6 national operational programs managed by the Ministry of Development and 16 regional programs managed by Marshall Offices. To finance eco-innovation MSMEs will be able to use:

- Smart Growth Operational Program,
- Infrastructure and Environment Operational Program,
- Knowledge-Education-Development Operational Program,
- 16 Regional Operational Programs.

MSMEs that want to develop the eco-innovation project at the local or regional level should focus on the monitoring of the provisions of Regional Operational Programs. Regional Operational Programs (ROP) are adopted for each voivodeship



individually. The objectives of Regional Operational Programs are the activities associated with the improvement in competitiveness and promotion of individual regions. Within the framework of ROP the support, among others, includes: the environment, preventing and combating environmental and technological threats, energy investments, investments in health care infrastructure and in social infrastructure. An important problem in the case of the national operational programs is a weak link of environmental issues with innovation. Most of the funds were allocated for Infrastructure and Environment Operational Program. The priorities of this program are: low-carbon economy, environmental protection, development of technical infrastructure of the country and energy security. The second largest program in terms of the amount of funds is Smart Growth Operational Program. It is also the largest program in the European Union financing research, development and innovation due to which the support, among others, for joint research and development projects will be received by scientists and entrepreneurs and the results of R+D will be practically applied in the economy. "From ideas to market" is the main assumption of this program. It means the support for the emergence of innovation: from creation of concepts of unique products, services or technologies, through preparation of prototypes/pilot lines to their commercialization. The objective of Knowledge-Education-Development Operational Program is professional activation of young people under 30 who are unemployed, support for higher education, development of social innovation, mobility and transnational cooperation, and also the reform of public policies in the areas of employment, social inclusion, education, health and good governance.

Infrastructure and Environment Operational program does not emphasize innovation and Smart Growth Operational Program - environmentally friendly solutions. The result is a support gap at the interface of these two areas filled in by eco-innovative projects. The subsidies for applicants are mainly in the form of non-repayable grants. Subsidizing projects with EU funds mostly consists in refunding some of the costs incurred. There are also pre-financing projects. In this case, the financial resources coming from EU funds are non-repayable after the fulfillment of all the conditions included in the project. The selection of projects is carried out in the competition procedure, each application is subjected to the procedure of formal and substantive evaluation. From time to time, there are announced the calls for applications in the framework of the activated another portion of allocated funds.

### **3. Evaluation of eco-innovation of MSMEs operating in Poland against the background of Eco-IS indices of EU countries**

The measurement of eco-innovation of national economies is a difficult task since it is necessary to take into account the effects of the implementation of innovative pro-environmental solutions, i.e. the solutions aimed at reducing environmental pollution (including micro-pollutants) [26]. Due to the increasing role of eco-innovation, particularly in the context of the Europe 2020 strategy, the European

Commission appointed the Eco-Innovation Observatory (EIO) which, on the basis of the system of indicators, created the first tool for evaluation of eco-innovation - Eco-Innovation Scoreboard - Eco-IS) [27]. It is a new research area of international statistics only being developed, among others, by OECD and the European Union. The main task of EIO is collecting data associated with eco-innovation in EU countries. On the basis of these indicators, there was created the ranking of Eco-Innovation Scoreboard. In 2015 Poland occupied the second-to-last - 27th position among 28 Member States of the EU. Eco-IS index is calculated on the basis of 16 sub-indices concerning five thematic areas.

The construction of Eco-IS index includes the total of five areas three of which directly relate to eco-innovation. These are: eco-innovation inputs (government expenditure on environmental and energy R+D, green investments of PE/VC funds, total number of researchers), eco-innovation activities (enterprises introducing eco-innovation improving material and energy efficiency and possessing ISO 14001) and eco-innovation outputs (patents, publications, information on eco-innovation in media). The other two groups of indices are the ones showing the effects of the implementation of eco-innovation such as resource efficiency (energy efficiency, water efficiency and emissivity) and socio-economic outcomes (development of "eco-industries" of economies) [28]. It should be noted that the indicators on the side of effects are relatively poorly correlated with the indices of intensity of development and implementation of eco-innovation. On the one hand, environmental effects are measured with statistical indicators which still mainly depend on the historical paths of development of economies and not eco-innovation implemented in recent years. On the other hand, the definition of eco-industries adopted by Eurostat and Ecorys (2009), on which socio-economic indicators are based, refers to a wide range of activities (among others, recycling, treatment plants, renewable energy sources), however competitiveness and the level of employment of some of them does not have to directly depend on innovative solutions (e.g. photovoltaics). At the same time, an essential part of economic effects of eco-innovation appears in enterprises of other industries for which they are e.g. a way to improve productivity. Therefore, the indicators of effects do not differ between the countries of UE28 as much as the ones directly referring to eco-innovation, which is evident also in the case of Poland.

When analyzing the results concerning eco-innovation inputs (Table 3), they were generally above the average for all the countries of the EU. The specific cases are Denmark and Ireland where the performance in this component of the Scoreboard was significantly higher than for the other countries. In the case of Denmark, investments in eco-innovation exceed 1200 USD per capita and in the case of Ireland - more than 900 USD per capita and for Poland - 2 USD. Due to the outstanding performance of Denmark and Ireland, this component is also by far the highest range of ratings (the difference of 354 points between the highest and the lowest point) and the highest standard deviation in the result set. In the second element of the actions associated with eco-innovation (activities) - the country of the highest efficiency is Czech Republic. In terms of eco-innovative outcomes the leader is

Luxembourg with the result of 205, and the lowest result of Ireland amounting to 65 is due to low results concerning the patents connected with eco-innovation (only 5 patents per one million inhabitants).

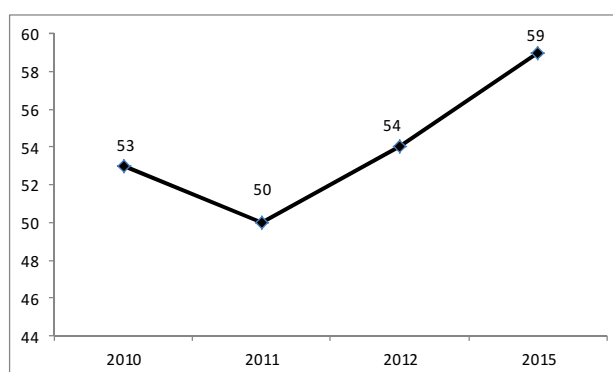
Table 3. **Eco-Innovation Scoreboard (Eco-IS) in EU countries in 2015**

		EU countries	Eco-innovation inputs	Eco-innovation activities	Eco-innovation outputs	Indicator Eco-IS
EI leaders	I	Denmark	368	71	157	167
		Finland	182	152	190	140
		Ireland	310	135	65	134
		Germany	154	162	140	129
		Sweden	121	154	160	124
		Luxembourg	106	115	205	124
		France	111	110	108	115
Average EI performers	II	Austria	98	126	136	108
		Spain	94	134	102	106
		Italy	75	118	117	106
		United Kingdom	126	116	74	106
		Portugal	79	167	83	102
		Czech Republic	63	181	47	99
		Netherlands	66	77	106	98
		Belgium	89	116	111	97
Countries catching up in EI	III	Romania	39	138	53	82
		Hungary	72	98	27	81
		Estonia	78	129	53	80
		Latvia	43	60	95	75
		Lithuania	43	94	59	73
		Greece	57	37	101	72
		Slovakia	38	101	52	72
		Croatia	21	100	89	67
		Malta	25	72	55	64
		Cyprus	14	54	132	60
		Poland	40	54	58	59
Bulgaria	19	71	27	49		
		Min	14	37	27	49
		Max	368	181	205	167
		Average	93	108	96	96

Source: own study based on EIO 2016

Poland, in the period considered, was included in the group of “the countries catching up in eco-innovation”, unfortunately occupying the second-to-last position ahead of Bulgaria with Eco-IS index result of 59. Eco-IS index in the analyzed years placed the economy of Poland in the fourth position from the end in 2010, in 2011 in the last position and in 2012 - in the second-to-last. The position of Poland in this ranking is low. However, there can be observed a slight increase in points - from 53 to 59 in 2015. If taken into account only the first three areas referring directly to eco-innovation, Poland occupies the last position, however its distance to the EU average is growing (1/3 of the average in relation to 1/2 for the general index). However, this is mainly due to general weakness of Poland in the area of innovation. Low public and private expenditure on green R+D result from the low level of expenditure on the total of R+D activity in Poland.

It is the same in the case of patents where there is noticeable a high share of technologies associated with environmental protection among few patent applications. In turn, Polish companies introduce not only little eco-innovation but innovation in general, moreover, larger enterprises and the ones belonging to the public sector are more eco-innovative. Decomposition of Eco-Innovation Scoreboard index may indicate which areas of eco-innovative activity are well developed and which require specific actions. The achievements of Poland in five thematic areas are taken into account in Eco-SI in years 2010-2015 (Fig. 1). In Poland, all the areas require the intensification of activities. The most disturbing is the worsening of the position of Poland in relation to the average for the European Union (28) in the area of eco-innovation inputs. Poland is characterized by unsustainable potential of eco-innovation mainly based on socio-economic outcomes, with very low expenditure on eco-innovation and poor results in the area of eco-innovation activity.



**Fig. 1. Eco-IS index for Poland in selected years**

Source: own study based on the EIO data 2016

Taking into account the low position of Poland in the rankings of eco-innovation, there was conducted the statistical survey aimed at the identification of the scope of the barriers to and opportunities for the development of eco-innovation in terms of sustainable development of micro-, small and medium enterprises. The survey

was carried out in 2017 on a randomly selected group of 300 MSMEs with headquarters in the area of Poland. There were received 224 questionnaires suitable for further analysis, which gives a rate of return of 74.7%. The questionnaire results indicate that the main motivation for undertaking activities for the benefit of the environment is the willingness to reduce costs of the business activity (82% of the surveyed MSMEs). The second reason indicated by the entities in question is modernization of technology (73%), followed by improvement in the image by the implementation of CSR (corporate social responsibility) (58%). 34% of those questioned consider the introduction of eco-innovation in their company e.g. in the form of photovoltaics, renewable energy etc. This indicates that Polish entrepreneurs perceive high-efficiency dimension of eco-innovation and economic benefits coming from its implementation, which reflects growing environmental awareness of entrepreneurs. Lack of financial resources for eco-innovation was indicated as the largest barrier by MSMEs in Poland (86%).

## Conclusions

Raising funds to support eco-innovative projects in Poland is not impossible, however, in many cases, very difficult. Eco-innovation very rarely constitutes an activity of MSMEs isolated by the funders. Innovative projects developed in the area of ecology are assessed according to the same criteria as other investments, including innovative ones. Taking into account the fact that they are often less focused directly on economic effects, when using the same evaluation criteria, they may get worse overall ratings. The problem is significant funds for environmental protection provided for the local government units, which carry out projects typical of a specific area, i.e. they focus on construction of sewerage, sewage treatment and dissemination of more eco-friendly sources of energy. This results in limiting the possibilities to obtain funds for investments by MSMEs. There has been too little emphasis placed on the connection in the cases of a single investment in innovativeness and environmental protection in the current programming period. It has been probably due to the fact that one of the serious problems is generally low competitiveness and innovativeness of Polish enterprises. It seems that low public and private expenditure on eco-innovation is the consequence of generally very low level of expenditure on research and development activity in Poland. However, on the other hand, in years 2010-2016, there was an increase in public expenditure on R+D but the effects of those actions are only to a limited extent noticeable in the presented data of Eco-Innovation Scoreboard. It can be expected that the position of Poland in terms of Eco-IS in subsequent editions of the research will improve, of course, provided there is an increase in expenditure on eco-innovation. The need for implementation of the principles of sustainable development through dissemination of eco-innovation is a vital goal of the present and future generations, which is reflected, among others, in the Europe 2020 strategy, adopted by the European Commission. Unfortunately, a relatively weak position of Poland in terms of total innovation as well as innovation contributing to the benefits for the environment is

reflected in the results of the research commissioned by the European Commission. Polish economy lags far behind not only the leaders of eco-innovation but also the countries which like Poland are included in the group of the countries catching up in the field of eco-innovation. An improvement in the indicators in the field of eco-innovation in Poland requires a substantial increase in expenditure on innovation, construction of appropriate support instruments and greater awareness of MSMEs in the field of benefits from eco-innovation. It should be emphasized that enterprises that successfully financed eco-innovation most of all used own capital, loans and structural funds, which contributed to an increase in their competitiveness and innovativeness.

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## Streszczenie

Podstawowym celem badań jest rozpoznanie stanu i poziomu ekoinnowacji w Polsce, w tym w sektorze MMSP, oraz porównanie otrzymanych wyników z krajami Unii Europejskiej. Efektem tych badań jest wskazanie barier i możliwości wsparcia rozwoju ekoinnowacji w sektorze MMSP w Polsce. Ponadto przeprowadzono ocenę efektywności finansowania ekoinnowacji przez mikro, małe i średnie przedsiębiorstwa, a w szczególności ocenę determinant wpływających na wybór źródeł finansowania ekoinnowacji, w tym wykorzystania funduszy strukturalnych.

**Słowa kluczowe:** ekoinnowacje, ekonomia zrównoważonego rozwoju (EZR), MMSP