



Environmental management in the aspect of sustainable development in micro-, small-, and medium-sized enterprises

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ABSTRACT

Micro-, small-, and medium-sized enterprises (MSME) play an important role in the sectors of economy all over the world. The MSME sector in Poland is represented by 99.7% of the overall number of enterprises (according to the data of the Central Statistical Office 2013). In recent years, an essential role in operation of enterprises has been played by the concept of sustainable development economy, which is aimed at ensuring, for all people today and future generations, high ecological, economic, and socio-cultural standards within the limits of natural capacity of the Earth, using the principle of inter- and intragenerational justice. As a response to the increasing expectations of the environment, enterprises more and more often consider environmental management in social and ecological aspect, and implement the concept of corporate social responsibility (CSR). The primary aim of the study was to evaluate some activities connected with environmental management in the MSME sector in the aspect of CSR. Furthermore, using the statistical methods, the study presents relationships between the activities connected with management of the environment and competitiveness of MSMEs. A survey carried out in a randomly-selected group of enterprises from MSME group in Poland demonstrated a range of benefits of using the system of environmental management. The survey also allowed for determination of the main obstacles of ecological activities in MSMEs and a model was developed for environmental management in MSME. The model will help improve positive effects connected with implementation of the system of environmental management that also includes micro-pollution. In water and wastewater, a growing number of micro-pollutants are present, which has a destructive impact on the environment. This process is caused by the constant and systematic development of human activities. A number of micro-pollutants are released into the environment in the form of solid, liquid, and gas. These substances penetrate into the air, water, and soil, causing them to decay. The introduction of the concept of environmental management in enterprises affects the reduction of emissions of micro-pollutants.

Keywords: Sustainable development economy; Environmental management; Corporate social responsibility (CSR); MMSP

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1. Ecological responsibility as an element of the concept of sustainable development

An essential place in the management theory today is taken by the concept of sustainable development. The idea of sustainable development was present as early as in the 60s of the twentieth century, although many theorists have pointed to its earlier origins and there are some discrepancies between the exact times, when the term “sustainable development” was first used [1]. But, it was the 60s when much attention started to be paid to the problem of pollution of the natural environment, global warming, and depletion of the resources of natural raw materials. Therefore, some new ways of civilization development started to be analyzed, aimed at the protection of natural resources [2]. The problem of sustainable development as an essential topic for the public discussion have emerged internationally as driven by the discussion about the report published in 1972 by the Club of Rome titled *The Limits of Growth*. The commonly adopted definition of sustainable development was formulated in 1987, in the *World Commission on Environment and Development*, also termed the Brundtland Report. The sustainable development was defined as “a development that corresponds” to the needs of today, which does not limit the abilities of future generations to meet their own needs. This general and wide definition was specified in documents of the United Nations, where the sustainable development is considered as:

... a development that meets the basic needs of all human beings and which conserves, protects and restores the health and integrity of the Earth’s ecosystem, without compromising the ability of future generations to meet their own needs without going over the limits of long term capacity of the earth’s ecosystem [3].

A similar approach to sustainable development was defined in the documents adopted after the Earth Summit, which was held in 1992 under the auspices of the United Nations. Two documents were adopted after the end of the Earth Summit for implementation of the policy of sustainable development by the UN member state: the *Rio Declaration* and *Agenda 21*. The *Rio Declaration* defined 27 principles of sustainable development. The most important principles are the postulates of inclusion of the environmental protection in the development-oriented activities, with particular focus on adoption of the principle that the states should reduce or eliminate sustainable manufacturing or consumption systems. Furthermore, the principles contained declarations of adoption of varied postulates

concerning protection of the natural environment, including implementation of environmental problems to legal systems and instruments used for evaluation of the effect on the natural environment.

There have also been numerous synonymous concepts that emerged with respect to sustainable development: eco-development, sustainable development, or self-sustaining development. Sustainable development also means the development which helps meet the current needs without depriving future generations from the opportunities to meet them [4]. This term is also defined as a socio-economic growth, which integrates political, economic, and social initiatives while preserving some balance in nature and ensuring sustainability of basic natural processes in order to guarantee meeting the basic needs of individual societies or citizens for both contemporary and future generations [5]. According to this approach, the principles of sustainable development require that people, in their activities, should take into consideration not only the socio-economic factors but also those environmental ones [6].

Among the above definitions of sustainable development, one can easily demonstrate similar characteristics. Undoubtedly, one of them is socio-economic growth aimed at the integration of all human activities, which should also focus on future generations and lead to meeting the needs of all the people in a maximally equal way [7]. The literature also uses the “conceptual triad” concerning the semantic content of the term sustainable development. It includes the above mentioned concepts of eco-development, self-sustaining development, and sustainable development [8].

Sustainable development is a long-term process that requires balancing the three dimensions: economic, ecological, and social [9]. Stimulation of the economic development through technological advances and an increase in the effectiveness of functioning characterizes the economic dimension [10]. The particular focus should be on participation of human in implementation of the concept of sustainable development. It is accepted in the economics that this theory approaches the problem of long-term ability of contemporary economy to develop while meeting the criterion of inter-generational justice in a complex manner, which consists in maximization of net profits on economic development, and protects and ensures re-generation of the usefulness, and the quality of natural resources in a long-period of time. The economic growth must therefore mean not only an increase in per capita incomes, but also the improvement of other elements of social well-being. It must also take into consideration the

necessary structural changes in the economy and the whole society.

The most frequently pointed aim of the sustainable development is an increase in social and individual well-being and harmonious relationships between human and nature. Another aim is to meet physical and psychological human needs through proper relation to the environment as well as meeting the basic needs necessary for proper physical and psychological human development, i.e. achievement of sustainable quality of life [11]. The common characteristics can be indicated among the above definitions of sustainable development. Undoubtedly, one of them is socio-economic growth, aimed at the integration of all human activities which should also focus on future generations and lead to meeting the needs of all the people in a maximally equal way [12].

Different factors in sustainable development are attributed to the three categories:

- (1) *Natural environment*, which represents the necessary basis for sustainable development,
- (2) *Economy*, which is a tool for achievement of sustainable development, and
- (3) *Good quality of life* for all people, which is the aim of sustainable development.

The natural environment (ecosystem) is subjected, through human activity, to excessive utilization. Therefore, the primary role of society is to protect the environment of living and the natural environment, including natural resources, processes, and balance in the environment. It is necessary to define simple objectives with fundamental importance, such as limitation of the effect of global warming, stopping the process of disappearance of biological diversity, controlling and limitation of emissions of chemical pollutants, and return to natural cycles of nutrient circulation. The need for limitation of the effect of global warming perfectly supports the thesis that the natural environment represents the basis for sustainable development. One rational method to reduce global warming is to reduce, in a relatively short time, the level of emissions of pollutants generated by combustion. If the climate changes substantially compared with the present conditions, creation of good conditions for realization of the social aspect by means of any available economic and other tools might turn out to be impossible.

Economic well-being represents the essential element of sustainable development, since it allows for combating poverty, making changes in development, etc. Not all the aspects of economic growth mean, however, the progresses toward sustainable development.

Realization of the principle of sustainable development can be considered, with respect to sustainable development, to have limited effect on natural environment. In other words, the economic growth has to cease to have a negative effect on the environment through improvement of ecological efficiency. Economic policy and market mechanism must support sustainable development rather than to counteract. The economy is a particularly important tool for sustainable development, which, if properly used, should effectively motivate to make the choices that support sustainable development. These stimuli must be present at all levels of society and act to the benefit of the sustainable development through:

- (1) Making investments connected with sustainable development both in the public and private sector profitable,
- (2) Orientation of scientific research at these areas of knowledge and solution, which are conducive to sustainable development, and
- (3) Affecting consumer decisions at all level.

Making the economy such an effective tool means that while making economic and business decisions, all the costs of particular activity (long-term costs connected with environmental protection, social costs) should be taken into consideration.

The essence of the concept of sustainable development is to take into consideration meeting the needs of future generations. Therefore, the aim of sustainable development is to ensure sufficiently good quality of life for all people from present and future generations. Social aspect is also of much importance since sustainable development can be achieved only by the people, who feel that they have fair contribution to well-being, safety, and influence. The overriding assumption is not the individual benefits, but ensuring a fair growth, with the contribution from the whole society. Therefore, the social aspect assumes the support of the civil society, its involvement in solving a variety of problems, participation in decision-making at different levels. Furthermore, it assumes combating poverty through increased employment rates, improvement in food safety and actions taken against discrimination, and ensuring social safety for all [13].

An overriding task of enterprises is to stop progressing environmental degradation. The biological life should not be entirely extinct, since it is extremely difficult or impossible to restore its initial status. The initiatives to prevent degradation through the appropriate environmental legislature are more and more frequent, while rational methods of reclaiming the already degraded ecosystems are being promoted [14].

Another benefit of investments in sustainable development is rationalization of the use of natural resources. Natural resources are among the non-renewable natural resources. Their amount in the Earth is limited while regeneration is virtually impossible. The investments in sustainable development lead to the improvement of the standard of life, meeting the needs of contemporary and future generations, and, first and foremost, improve the economic growth.

Sustainable development in the case of enterprises is often associated with corporate social responsibility (CSR). Both concepts require, from the enterprises, to look at their own activities in broad and long-term perspective. Although the arguments of market nature are the most often proposed to support the adoption of these concepts (cost reduction, pressure from the consumers, meeting their needs, and new opportunities for business activities), it is also important to justify them in ethical terms.

Corporate social responsibility, according to the definition used in ISO 26000 should be understood as “responsibility of organizations for the effects of their decisions and activities (products, services, processes) on society and the environment” through transparent and ethical behavior, which:

- (1) Contributes to sustainable development, health, and social well-being,
- (2) Takes expectations of the stakeholders into consideration,
- (3) Is consistent with the current law and coherent with the international standards of behavior, and
- (4) Is consistent with the organization and practiced within its relations [15].

Seven CSR areas were included in its definition: corporate order, human rights, workplace practices, environment, market practices, consumer problems, social involvement, and development of society. The concept of corporate social responsibility is also an essential tool for achieving the idea of sustainable development in the EU, and is included in the priority areas of the new strategy *Europe 2020* as well as in a broader mainstream of “Beyond Polish gross domestic product (GDP)” [16]. A declaration of corporate social responsibility causes that the enterprises must face the necessity of choosing certain social objectives, since a conflict might be present between not only the economic profitability of certain enterprises but also their social usefulness and particular social objectives of the enterprise, e.g. environmental protection and maintaining the production, which pollutes the environments but offers employment to people. The choice

between these aims represents the choice between internal and external responsibility. The basic assumption of the concept of corporate social responsibility is to support the success of the enterprise on its long-term and sustainable development that results from consideration for the three dimensions: economic, ecological, and social [17]. This translates into planning the initiatives which are socially responsible, environmentally friendly, and economically valuable. The concept of social responsibility assumes that the enterprises should take actions, which are socially responsible, and aimed at formation of better society and cleaner environment in a voluntary manner that goes beyond legal expectations. Broad understanding of the functions of the enterprise, also determined by the emergence of ecological threats with global character, and taking formal steps in the form of the international conventions as well as national legislature that forces the protection of the natural environment are aimed at encouraging enterprises to respect regulations in these terms. The negative effect of the enterprises on the environment obliges to take responsibility for its status. If the enterprises are not willing to take responsibility for utilization of the environment voluntarily, the pressure from society, the necessity to adapt to market requirements (the willingness of being competitive and maintain in the market), the law, and tools used within ecological policies force to change the behavior. The concept of corporate social responsibility has been present in public debate, in Poland recently. At present, the enterprises and various organizations start taking common actions in order to implement the ideas of CSR in Poland. More and more enterprises see the necessity of implementation of ecological initiatives based on the idea of CSR, as a result, contributing to the increase in competitiveness of enterprises.

2. Characteristics of micro-pollutants released into the environment

With the development of cities, human economic activity, industrial centers, businesses, has been released more and more harmful substances into the environment.

The greatest environmental polluting emissions and industrial waste are from existing and emerging enterprises and power plants. Over the decades, the spatial extent of contamination has changed—initially local coverage became global.

Micro-pollutants are chemicals, in concentrations of the order of micrograms or nanograms per liter, which constitute or may constitute a potential threat to human health or water quality [18].

In the water and wastewater, one can find a growing number of micro-pollutants, which have a destructive impact on the environment. This process is caused by the constant and systematic development of human activities. A number of micro-pollutants is released into the environment in the form of solid, liquid, and gas. These substances penetrate into the air, water, and soil, causing them to decay. The introduction of the concept of environmental management in enterprises affects the reduction of emissions of micro-pollutants. The possibility of migration of these compounds between the components of the environment causes a major source of micro-pollutants, which are:

- (1) Precipitation,
- (2) Solid waste—landfill of municipal and industrial,
- (3) Canoeing area, and
- (4) Urban and industrial effluents.

The current micro-pollutants in the environment can be divided according to three criteria: the chemistry of water divides micro-pollutants into basic groups:

- (1) Inorganic compounds: heavy metal ions, and radionuclides,
- (2) Organic: polycyclic aromatic hydrocarbons (PAHs), pesticides, surfactants (SPC), chlorinated organic compounds, esters, alcohols, glycols, aliphatic and aromatic amines, phenols, and metabolites of aquatic organisms,
- (3) Natural: they are the result of processes occurring spontaneously in nature: metabolites of aquatic organisms,
- (4) Anthropogenic: are associated with industrial activity, technological and economic man, which led to the destruction of the natural balance of nature and of changes posing a threat to human health and life,
- (5) Primary: are those contaminants that are present in the source of pollution in the form of raw contaminants are present in raw water, and
- (6) Secondary: produced during water treatment processes.

The most important and commonly found air pollutants include sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), particulates, heavy metals (cadmium, lead, and mercury), ammonia (NH₃), volatile organic compounds, and persistent organic pollutants [19]. In addition to industry, primarily responsible for the degradation of the

environment, the negative impact on the level of pollution is agriculture. The use of synthetic fertilizers, sewage sludge, pesticides, and formulations to improve the structure of land influences the accumulation of toxic substances in the environment. These are mainly pesticides, nitrates, arsenic, cyanide, and heavy metals (lead and mercury). For the emission of the latter largely corresponds to the transport.

Due to the emission of pollutants into the environment, in water, and soil there are various organic micro-pollutants. They are polychlorinated dibenzodioxins, polychlorinated dibenzofurans, polychlorinated biphenyls, PAHs, pesticides, hexachlorobenzene, and other organic contaminants such as oxidation and disinfection of water [20].

Persistent organic pollutants are released by air emissions from the flue gases from combustion and other chemical processes (exhaust gases, other gaseous products of chemical reactions), with sewage, industrial dusts (with the flue gas, ventilation, and air transport systems), waste, as well as different products [21,22].

3. The concept and importance of micro-, small-, and medium-sized enterprises in the economy

Micro-, small-, and medium-sized enterprises (MSME) play a very important role in world economy as they account for nearly 99% of the enterprises throughout the European Union. Company size has an effect on the emission polluting. In Poland, MSMEs account for 99.8% of the overall number of enterprises and perform an important function in the economy through affecting the economic growth and employment rates. In light of a survey carried out by the Central Statistical Office in Poland, Polish enterprises generate nearly three fourth of GDP. The result at the level of 71.8% in 2011, after an insignificant decline in 2010, might indicate a return to the increasing tendencies observed in 2006–2009. Analysis of the structure of contribution of the enterprises in GDP points that MSMEs generate every second Polish zloty (47.3%), with the smallest businesses generating every third (29.4%). Contribution of medium-sized entities is three times lower (10.1%) compared with the macro-businesses, whereas this contribution of small enterprises is almost four times lower (7.8%). Compared to 2010, contribution of large enterprises in 2011 in creation of GDP increased, the contribution of MSME declined and, in small enterprises, it remained at a similar level. The enterprise is an organized group of intangible and tangible factors designed to carry out business activities. This concept is used for the determination of the entities of civil law, activities performed, subject of

activities, or legal status [23]. As a term, the enterprise is considered in three aspects: subject-oriented, functional, and object-oriented. In subject-oriented aspect, the enterprise is the subject of legal relations, the object of rights and obligations in terms of the civil law, and is also the subject of economic relations. According to a functional approach, the enterprise is understood as continuation of business activities in a manner that is vocationally constant, on its own initiative and organized. The criteria for classification of the enterprise include: the form of ownership, type of activity, market position, dimension of capital, extent of turnover, and level of employment. Definition of MSME considers the two criteria. The first is quantitative criterion, which is based on economic measures such as number of employees, turnover, level of assets, and scope of markets. Another criterion is qualitative, based on such characteristics of the enterprise as unity of ownership and management, decision-making, and financial independence [24], level of organizational structure, innovativeness, management system, and contribution in the market [25]. In light of the definition of the Art. 105 of the act on freedom of economic activity, a small enterprise (see Table 1) means an entrepreneur who, in two recent accounting years:

- (1) Employed annually fewer than 50 employees, and
- (2) Reached annual net turnover on sales of goods and services, and financial operations that did not exceed 10 million euro, or the total of assets from their balance did not exceed 10 million euro.

According to the Art. 106 of the act on freedom of economic activity, a medium-sized enterprise must meet at least two of the following conditions in the recent accounting year:

- (1) Employed annually fewer than 250 employees, and
- (2) Reached annual net turnover on sales of goods and services, and financial operations that did not exceed 50 million euro or the

total of assets from their balance prepared at the end of these years did not exceed the equivalent of 43 million euro.

The act on freedom of economic activity adopted the recommendations of the European Commission to Polish legal regulations.

Modern enterprise should be managed strategically [26], market-oriented, and innovative. It must operate in synergy with the environment, care for the market and modernity of their own products, and be open to changes. The use of the processes, which are environmentally friendly, are more and more often noticed and appreciated by customers. Current environmental protection concerns a number of domains of science and economy and the demand for innovative solutions is increasing [27]. The role of MSMEs in all the economies is essential. There are a number of reasons for that. MSMEs are a stimulant for development of the economy. Their number and potential in specific situations is one of the measures for evaluation of the economic growth. The presence of small- and medium-sized businesses in any economy represents a manifestation of a healthy competition and reflects the entrepreneurship of society. The MSME sector is characterized by high effectiveness of activities and a dynamic approach to the environment and is able to respond to the needs and preferences of the potential customers the fastest. Micro-, small-, and medium-sized businesses represent an important source of innovation and have an essential contribution to creating new workplaces and effect on overall economic development [28]. Therefore, the state should implement well-thought, planned, and consequent policies of continuous support for MSMEs. There is also a belief that small- and medium-sized enterprises are driving force for de-centralization of the economy transfer into the market economy. The freedom of activity for MSMEs, their tendencies and opportunities for utilization of local resources, and freedom of integration cause the emergence of effective economic processes, with increase in the wealth of society, change in the lifestyles of owners and employees, all based on the freedom of market choices, economic freedom,

Table 1
Division of the MSME sector according to employment and economic criteria

Division of the MSME sector	Number of employed annually or	Annual turnover	Total annual balance
Micro-	<10	≤2 million euro	≤2 million euro
Small-	<50	≤10 million euro	≤10 million euro
Medium-sized	<250	≤50 million euro	≤43 million euro

Source: Author's own elaboration based on the act of 2 July, 2004 on freedom of economic activity.

effective entrepreneurship, etc. The role of MSME sector is noticeable in market economy. The economic effects of this sector concern e.g. basic manufacturing processes, constantly developing opportunities for employment, and, consequently, creation of new workplaces and innovativeness. The MSME sector is also important to broadly understood services, starting from commercial services, tourist services, business services, through the consulting services, banking consulting through the education, health care, etc. Another problem of general characterization of the role of micro-, small-, and medium-sized businesses in the economy is the susceptibility of the sector to the program of Single European Market. Realization of this program includes removing of various barriers, which means intensification of competition for the enterprise previously protected and forces all the participants of the market processes to accept and adapt to the conditions, and competition present in the open market. MSME are regarded as more flexible in accepting the principles of the uniform market and fast adjustment to their requirements. The European markets are saturated ones, highly competitive, with dynamically formed subject-oriented and product structures, and are equipped in strong national systems of standardization for all the tools that affect the market and its operation. Undoubtedly, Polish MSMEs are facing and will continue facing the difficulties in beneficial establishment of their position in the Single European Market. This results from, especially the low export-oriented specialization of Polish enterprises, relatively poor knowledge about specific markets of the EU countries, lack of long-term development strategies in particular sectors, low willingness to integrate which is necessary to reinforce the effect of this strategy, relatively poor knowledge, and managerial skill among the owners and managers of MSME, etc.

Regardless of the above factors, the single market and participation of MSMEs in this market is a fact, and flexibility of their behavior determines the opportunities for entry, sustaining, and reinforcing the position in this market [29]. Promotion and implementation of ecological activities based on the idea of corporate social responsibility by MSMEs will affect the improved competitiveness in MSMEs through having higher trust in the environment [30].

4. Management of the environment of MSME in Poland

The statistical survey in the field of environmental management in the aspect of sustainable development in MSME was carried out in 2013. The survey was oriented at 400 randomly selected MSMEs with the headquarters located in Poland. One Hundred and eighty-four questionnaires which were suitable for further analysis were returned, which means a response rate of 46.0%. The microenterprises represented 42%, small enterprises 28%, and medium-sized enterprises 30% of the entities studied. Some 44% of enterprises were from production sector, 38% from commerce, 15% from services, and 3% from other types of business activities. The survey shows that the concept of corporate social responsibility is not commonly known among managers/owners of the enterprises in the MSME sector (Fig. 1). Only 25.4% of the respondents declared knowledge of this term and it is improving with the size of the enterprise (20.4% in microenterprises, 26.5% in small enterprises, and 39.1% in medium-sized enterprises).

Differentiation of the knowledge of the idea of corporate social responsibility is also noticeable, due to geographical location of the enterprises. This concept is essentially more often used in the enterprises

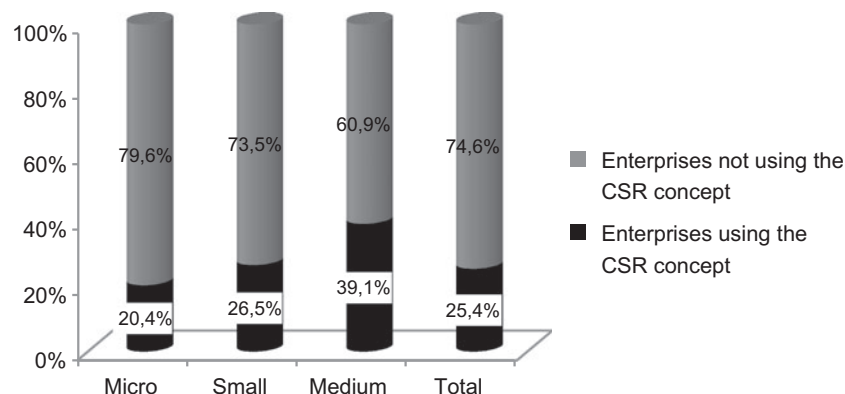


Fig. 1. Knowledge of the CSR concept in MSMEs.
Source: Author's own elaboration based on the author's study.

Table 2
Knowledge of the CSR concept in MSMEs in selected voivodeships

Voivodeship	Number of MSME where CSR concept is used (%)
Masovian voivodeship	48.2
Lower Silesia voivodeship	43.4
Silesian voivodeship	41.3
Greater Poland voivodeship	38.2
Lublin voivodeship	16.7
Subcarpathian voivodeship	14.6
Podlaskie voivodeship	9.8

Source: Author's own elaboration based on the author's study.

registered in the Masovian Voivodeship (48.2%), Lower Silesian Voivodeship (43.4%), Silesian Voivodeship (41.3%), Greater Poland Voivodeship (38.2%), and less frequent in Lublin Voivodeship (16.7%), Subcarpathian Voivodeship (14.6%), and Podlaskie Voivodeship (9.8%). These results point to the voivodeships, where actions should be taken to popularize knowledge of the CSR idea (see Table 2).

MSMEs investigations also concerned the issue of how the corporate social responsibility is understood by the managers and owners of these enterprises. Most frequently, this term was interpreted with respect to the relations which connect the enterprise with social environment, where it is used every day (answers: taking social interest into consideration: 26.2%; activities that include environmental protection in the enterprise: 21.8%; responsibility of the enterprise for employees: 16.2%; and meeting legal requirements: 8.1%). Ethical business is a term which appeared in the responses provided by 12.7% representatives of MSMEs, who declared the knowledge of the idea of corporate social responsibility. One of the most important indices of adoption of the idea of corporate social responsibility, as an essential factor, in business activity is taking into

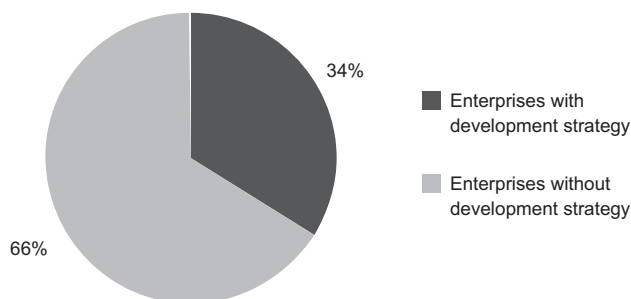


Fig. 2. Enterprises from MSME sector with strategy of development.

Source: Author's own elaboration based on the author's study.

consideration, such questions as social environment, enterprise, or improving qualifications of the employees in the strategy of enterprise development. However, this method of measurement is possible only in the enterprises which have already defined their development strategy.

As noted in Fig. 2, 34% of the, the enterprises studied have the strategy of development prepared. This low result is affected by the microenterprises with the dominant share in the structure of MSMEs. Among the enterprises with the strategy of development, 63% enterprises took into consideration the natural environment. It should be observed that this level in medium-sized enterprises is slightly higher: the strategies in 71% of them include the environmental problems (Fig. 3).

Undoubtedly, one of the most popular forms of ecological activities (96% of the MSMEs studied) included in the strategies of enterprises in the MSMEs sector is waste management, which is undoubtedly connected with implementation of the waste management reform. The leading position in ecological activities was taken by economical management of water, energy, and raw materials (it can be expected that these provisions were caused by economic factors) and reduction in emissions of dust, gases, and wastewater. Forty-three percent of the MSMEs studied have incorporated implementation of ecological innovations in their strategies. It should be emphasized that 31% of the enterprises studied declare environmental management systems in their strategies, and only 7% of them have implemented ISO 14001 "Environmental management system," which supports the activities connected with environmental protection and preventing pollution in a manner which is consistent with the enterprise needs. The enterprises studied indicated that implementation of the ISO 14001 system ensures:

- (1) Improvement in the enterprise image in light of public opinion,
- (2) Improving the number of customers,
- (3) Conformance to regulations, increasing credibility of the enterprise in terms of environmental protection viewed by public administration,
- (4) Cost reduction: more rational management of raw materials, energy, and material safety, reduction of environmental fees,
- (5) Improving profitability,
- (6) Improvement in ecological awareness among employees,
- (7) Improving safety in workplaces,
- (8) Ordering of management in the field of environmental protection,

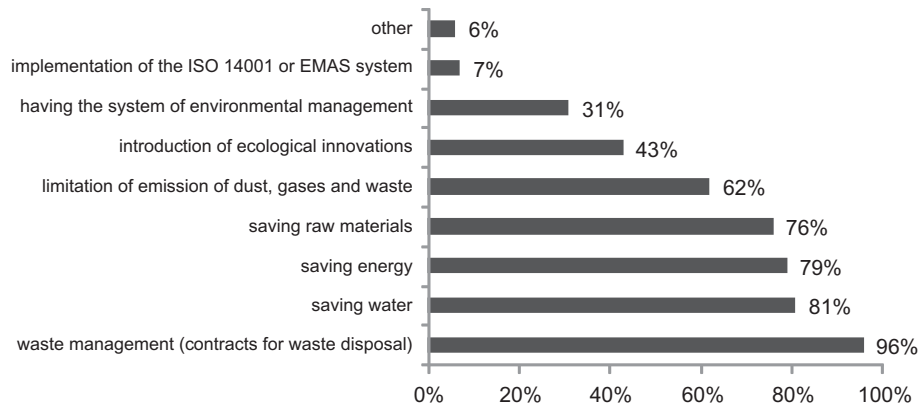


Fig. 3. The most important assumptions of the strategies in MSMEs with respect to the natural environment. Source: Author's own elaboration based on the author's study.

- (9) Reduction in emissions, waste, and wastewater levels,
- (10) Reduction of costs connected with limitation of energy consumption, reduction in the amount of waste,
- (11) Limitation of the risk of crisis situations,
- (12) Entire adjustment of the enterprise to legal regulations concerning the environment, and
- (13) Achievement of internal environmental aims.

The main determinants of implementation of the system of environmental management in the enterprises (31% of the MSMEs studied declare having the environmental management system implemented whereas 7% of them declare using ISO 14001 or EMAS) were increasing requirements in terms of environmental protection that resulted directly from the content of the acts and ordinances in Poland. Among them, the most important include:

- (1) Obligation to obtain suitable administrative decisions, authorization, permissions, agreements, etc.,
- (2) Obligation to pay fees for using the environment (e.g. due to emission of dusts and/or gases in the air, managing wastewater, water demand, and wastewater storage),
- (3) Obligation of recording the type and size of using the environment (e.g. recording waste levels, water consumption, emission of substances in the air),
- (4) Obligation to measure emissions of dusts and gases released in the air, waste released to water, and
- (5) Obligation to prepare the documents connected with the likelihood of serious breakdowns.

The investigations allow for finding that 39% of the enterprises in the MSMEs sector in the recent three years have not taken any environmental actions, whereas essential differentiation in this term can be observed due to the enterprise size. The percentage of microenterprises among the microenterprises which have taken environmental initiatives is 52%, with 61% recorded for small enterprises, and 86% for medium-sized enterprises, which leads to the general conclusion that the size of the enterprise has some effect on the inclusion of the problem of environmental protection in the strategy. However, no statistically significant differentiation was observed between the sectors concerning the fact of starting ecological activities, although they differed with the content.

Statistically significant relationships were found between having the environmental strategy and implementation of ecological solutions. This information supports the thesis that focus on the problems of the negative effect of business activity on the environment when developing the strategic documents of the enterprise is connected with actual activity of the enterprise in this area. Actually, the enterprises in the MSME sector are not interested in broader social activity connected with ecological questions. Therefore, they do not participate in ecological programs, platforms for cooperation, and are not involved in any form of education in this field, do not promote ecological knowledge, and do not publish any reports. Their operation is usually limited to basic activities, partly forced by regulations, such as using energy-efficient sources of energy or environmentally friendly waste management (sorting, recycling, and utilization). Active forms of environmental activities, such as modernization, implementation of environmentally friendly technologies are relatively more often used in medium-sized enterprises. Less-expensive solutions are more popular

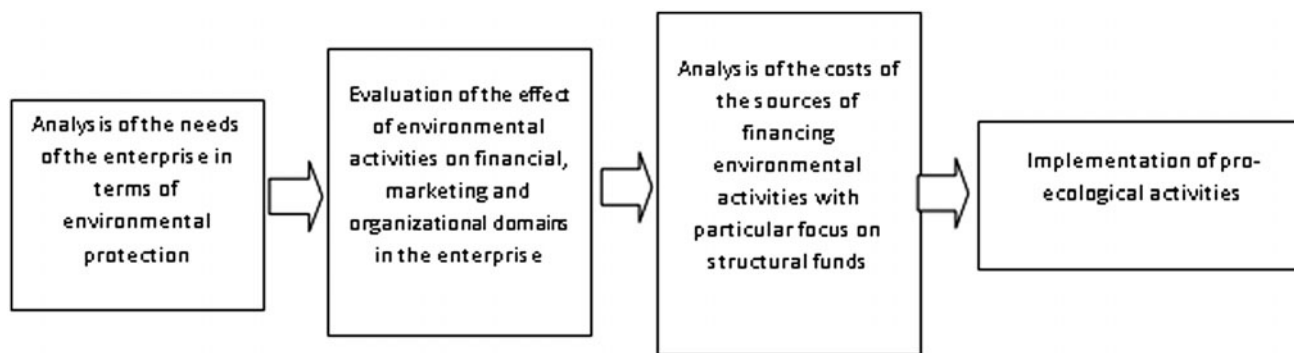


Fig. 4. Model of environmental management in MSME.
Source: Author's own elaboration based on the author's study.

in these enterprises, e.g. using energy-efficient sources of light or implementation of the practices of waste sorting/recycling in the enterprise. This fact indicates that differentiation in taking ecological initiatives is not only connected with varied economic potential in the enterprises, but also with ecological awareness of managers and owners.

The main motives behind ecological actions taken in the MSMEs surveyed include:

- (1) Savings connected with using water, raw materials, and energy,
- (2) Thinking about the status of the natural environment,
- (3) Adjustment to legal requirements,
- (4) Improvement in enterprise image,
- (5) Opportunities for obtaining financial funds, and
- (6) Other.

The main barriers to ecological activities which were indicated by the MSME enterprises were:

- (1) Insufficient level of internal capitals for ecological investments [31],
- (2) Limited access and complex procedures of internal sources of financing ecological decisions,
- (3) Frequent changes in legal regulations,
- (4) Insufficient knowledge of managers, and
- (5) Other (Fig. 4).

An essential role in the model of environmental management presented in the study is played by the analysis of the environmental needs and evaluation of the effect of activities planned on the holistic functioning of the enterprise taking into consideration the cost-effectiveness of the sources of financing those ecological activities.

5. Conclusion

An effective system of environmental management makes it possible for enterprises from MSME sector in Poland to continuously improve their activities aimed at environmental protection. Preventing risks, meeting legal requirements as well as improving environmental awareness of the employees are additional aspects, which reinforce competitiveness and ensure continuous growth and success in the future. The main activities of enterprises in the reduction of emissions to the environment are:

- (1) Changes in technology in order to eradicate any harmful impact by preventing emissions into the environment,
- (2) Changes in technology to reduce the demand for energy, water, and raw materials, with particular emphasis on re-using waste heat and the elimination of waste, and
- (3) Investments in equipment to reduce emissions of pollutants into the environment (the so-called device "end of pipe"), which are necessary to meet the increasingly stringent emission standards or emission limits characterizing BAT when the emission reductions achievable through changes in technology and operational activities are not within the acceptable range. Unfortunately, the analysis presented in this study shows that a number of obstacles should be overcome, in order to improve the level of environmental management in MSME.

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