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## Article

# The problem of environmental awareness in terms of the eco-innovation implementation in enterprises

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# The Problem of Environmental Awareness in Terms of The Eco-Innovation Implementation in Enterprises<sup>1</sup>

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**Abstract:** Environmental awareness of managers and employees can be an important factor favouring the implementation of eco-innovation in enterprises. This article aims to identify the role of entrepreneur's ecological awareness in implementing the eco-innovation. In order to attain this purpose, the literature analysis in the field of environmental awareness and eco-innovation was conducted. The results of this analysis were the basis for the design and performance of the in-depth qualitative research based on a case study of a selected enterprise. As shown in the presented example, the high level of environmental awareness of entrepreneur translates into the company value systems and, additionally, it shapes the right attitude and pro-ecological preservation.

**Keywords:** environmental awareness, eco-innovation, sustainable development

**JEL codes:** Q01, Q5, L31

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## **1. Introduction**

Ecological awareness plays a significant role in the shaping of social attitudes regarding our natural surroundings, including the implementation of ecological innovations in enterprises. The ecological awareness of entrepreneurs, mainly from the small- and medium-sized sector, may considerably limit the negative impact exerted on the nature (Seroka-Stolka, 2011: 159-165). Extensive analyses of actions taken for the nature show that it is critical to transform the ecological awareness of the man, awareness which defines attitudes towards ecosystems (Majchrowska, 2010: 2). It is therefore desirable to improve the ecological awareness of entrepreneurs, which influences the system of values and shapes eco-friendly attitudes and behaviours.

This paper shows a literature review and qualitative research study results concerning the role of ecological awareness in the implementation of ecological innovations, or eco-innovations, in an enterprise specially selected for the study.

The importance of ecological awareness in introducing eco-innovations in enterprises has been discussed in the paper incorporating the case study of a selected enterprise. It has been assumed that the identification and formation of ecological awareness and its social determinants has a strong impact on furnishing enterprises with eco-innovations. The problem tackled in this paper concerns the identification of social awareness and declared attitudes towards issues related to eco-innovation implementation in enterprises. The aim of this study may be justified by a sweep of factors, e.g. changing environmental regulations or EU directives which force entrepreneurs to radically change their attitude towards the environment. It is necessary to take various steps to put an end to nature degradation by minimising the harmful influence of business entities, households and the society as a whole (Bojar et al., 2012: 107-113). In this respect, what is especially significant is the issue of ecological awareness of entrepreneurs.

## **2. The term of ecological awareness and its determinants**

The problem of ecological awareness has frequently been tackled by many authors, who point to the ambiguity of the term, particularly in the ontological view. The said ambiguity appears to be grounded in differences between individual academic disciplines. Many authors define the notion of ecological awareness by reference to social awareness, e.g. Hull (1984: 3-4) or Penc (2003:

105). According to the former, ecological awareness is a form of social awareness manifesting itself in the thinking and experiences of individual people and in socially approved standards of understanding, feeling and valuing the nature (Hull, 1984: 3-4). Similarly, Penc claims that ecological awareness is a form of social awareness which manifests itself by the possessed knowledge, way of thinking, intellectual and emotional experiences, making informed choices as well as functioning in the society of certain biosphere valuing standards and models, consolidated respect for the nature and ideas and actions for the protection of environment (Penc, 2003: 105).

Hence, it seems indispensable to characterise the general notion of "social awareness". The term at hand was first used by Émile Durkheim and meant a set of ideas, symbols, notions, opinions, beliefs and superstitions shared by the majority of a given community. Sztompka (2002: 290) defines social awareness as a set of beliefs, convictions and ideas widespread and accepted in a given community, which become thinking models or patterns instilled into members of that community and enforced by social pressure. Those definitions give social awareness a markedly collective character. As pointed out by Sztompka, however, it has to be borne in mind that by defining thinking patterns, beliefs, convictions and opinions, social awareness - as it were - goes back to individual awareness, shaping and forming its convictions (Sztompka, 2002:307). This reflexive character of social awareness implies a relationship between individual and collective awareness, which is important in further attempts as defining ecological awareness (Majchrowska, 2010: 5).

Wódz suggests that the notion of ecological awareness include all social beliefs, opinions and judgments as well as social values, norms and behaviour patterns related to the attitude of the man to the natural surroundings (Wódz, 1990: 13). Huczek understands "ecological awareness as a responsible attitude of the man to the environment and life arising from the knowledge on that environment and motivation to preserve it in unchanged form" (Huczek, 1999).

Ecological awareness may be seen as an indicator showing to what degree are the guidelines set forth by sustainable development implemented in a given area. One of the creators of the eco-philosophy, Skolimowski, states that "ecological awareness is a component of eco-development and a sine qua non condition which - when met - makes the development sustainable and set on the proper foundation (Skolimowski, 2003: 181). It is precisely the proper awareness and proper values that form such foundation. Thus, ecological awareness is an integral part of sustainable development (Sarzała, 2003: 88) and it will allow us to overcome the global

crisis of modernity and build a new human civilisation (Gawor, 2006: 59-66). For the eco-friendly ideas and sustainable development to be implemented, it is crucial to rebuild the traditional, human-centred worldview for the benefit of ecological awareness. Such a change should be historically seen as groundbreaking and radical, lead to a change in the entire thinking pattern and employed practices and form ecological awareness.

Shaping ecological awareness of entrepreneurs substantially depends on the level of ecological knowledge, which influences their system of values and contributes to bring in eco-friendly attitudes and behaviours (Seroka-Stolka, 2011: 159-165). Obtaining, processing and applying that knowledge to various undertakings is the operational basis of a prudent business. Education is imperative in this respect. According to Nakonieczna (2008: 170), ecological knowledge includes knowledge on relationships and mutual links introducing balance to the system, knowledge on pollution, ecological threats and knowledge on how to fight them. Therefore, ecological knowledge is based on the knowledge of processes happening in the biosphere and ecosystems (Nakonieczna, 2008: 170). Ecological education, which promotes knowledge on sustainable development, ecological risks and environment protection and values connected with the treatment of nature and propagates eco-friendly behaviours, has an impact on shaping ecological awareness of managers and specialists in many a field. This knowledge is becoming ever more influential in their making strategic business decisions. They also have another important role to play, i.e. increase ecological awareness among their employees by - for instance - aiding them in acquiring and strengthening their ecological knowledge. Furthermore, it is significant to establish adequate systems motivating and rewarding employees who are the most involved in eco-friendly activity. Ecological education among employees may be also facilitated with internal information campaigns promoting ecological activity such as efficient waste management or consumption of water, power, etc. Thanks to this, employees form proper habits and attitudes which influence their eco-friendly actions implementing strategies set by their managers.

To sum up, the notion of ecological awareness comprises various components. Frątczak (1995:20) suggests the following:

- basic knowledge on the natural environment,
- ability to see the specificity and complexity of natural phenomena and to identify their major links, relationships and regularities,

- ability to think openly and creatively, which gives the sensitivity to accept innovations guaranteeing increased ecological safety.

In defining social awareness in terms of knowledge, opinions, ideas and values, it is crucial to allow for the role of motivation for eco-friendly actions as well, as pointed out by A. Papuziński (2006: 33-40) and J. Wódz and K. Wódz (2001: 171-181), who have it that "ecological awareness embraces the entire sphere of motivation for eco-friendly behaviours".

The above deliberations suggest an interdisciplinary approach towards the issue of ecological awareness, which is one of the contemporary trends in the academia.

### **3. Role of ecological awareness in implementing environmental innovations in enterprises**

The above deliberations on ecological awareness show that it can be highly influential in shaping behaviours and eco-friendly activity taken up by enterprises, including the environmental innovations and eco-innovation implementation. Ecological awareness regulates (motivates) behaviours and initiatives aiming at set goals (Penc, 1995: 169), which is an important component of modern idea of social accountability in business.

Ecological awareness is a foundation of management greening (eco-management) and its components are as follows (Matejun, 2008: 126-138):

- full perception of the nature,
- knowledge on phenomena, processes and relationships in the biosphere,
- ethical attitudes, beliefs and convictions concerning the value of the nature,
- opinions, views and evaluation patterns concerning the participation of people and organisations in sustainable development,
- feeling of responsibility for the natural environment.

The greening of management, grounded mostly in ecological awareness, is carried out with a set of tasks performed in enterprises and leading to improved environmental parameters of operation, which in consequence results in the idea of environment protection being implemented in all areas of activity of such an enterprise (Matejun, 2008: 126-138). One of those areas is the implementation of ecological innovations.

The discussion held so far suggests that ecological awareness affects implementing ecological innovations strongly. Those innovations are widely defined in the literature and may

effect improvement to environment protection and influence sustainable development (Kłosok-Bazan et al., 2015: 433-436).

In the literature, there are many terms the meaning of which overlap, i.e. ecological innovations, environmental technologies, eco-innovations and ecological technologies. It has to be underscored, however, that they appear to have a common feature: they all contribute to reducing stress exerted on the environment by businesses.

After Rennings (2000: 319-332), the notion of ecological innovations covers all actions taken by significant entities (enterprises, politicians, associations, churches and households) thanks to which which new ideas and behaviour patterns, production processes and products are initiated, employed and implemented and which support environment protection or aid the ecological dimension of sustainable development (Urbaniec, 2009: 21). Huczek (1999, cited in Chodyński, 2007: 132) argues however that "ecological innovations" cover those changes in technology, organisational structure and management of enterprises which reduce negative influence on the natural environment.

Eco-innovations mean the innovations which serve to prevent and reduce environment pollution as a result of human activity, remove the damage done and identify and monitor environment pollution (Urbaniec, 2009: 59). Eco-innovations were first comprehensively defined in 2009 by GUS (i.e. Central Statistical Office), which at the same time presented the results of studies on those (GUS, 2010). According to GUS, an eco-innovation is "an innovation bringing benefit for the environment (eco-innovation) is a new or a significantly upgraded product (a commodity or a service), process or organisational or marketing method which is beneficial for the environment compared to its alternatives" (GUS, 2010).

The implementation of eco-innovations is very much linked with the trends of EU policy. The European Commission established the Eco-Innovation Observatory (EIO), which is a platform gathering structured data and analyses concerning many various ecological innovations in the European Union and key regions in the world (Eco-Innovation Observatory, 2016). The European Commission conducts studies on the level of development and introduction of eco-innovations in the EU states (Eco-Innovation Scoreboard). The Eco-Innovation Scoreboard in question is the first to to thoroughly assess and compare the performance of implementing eco-innovations in the EU-27 Member States. The ranking is based on 16 indices in 5 areas: outlays, actions, results, environmental effects and socioeconomic effects (Eco-

Innovation Observatory, 2016). The scoreboard of 2013 shows that the states with the highest level of eco-innovation index are the following: Sweden, Finland, Germany and Denmark. On the other hand, the scoreboard closes with the states like Bulgaria, Poland or Slovakia (EU Eco-Innovation Scoreboard 2013, 2016). Those states have not even reached half of the eco-innovation index for the entire EU. It is therefore imperative to shape ecological awareness of Polish entrepreneurs in terms of benefits derived from and possibilities of implementing ecological innovations, or eco-innovations, in enterprises. On the basis of the conducted literature analysis, it can be stated that the ecological awareness plays a significant role mainly in the process of shaping attitudes of social managers and enterprise employees towards the surrounding natural environment, which should translate into a higher motivation as to the implementation of environmental innovations, eco-innovations. Therefore, in the aspect of implementation of the environmental innovations in enterprises, it can have impact on:

- taking innovative actions the aim of which is counteracting negative impact of production processes on the natural environment as well as actions for the benefit of the society,
- shaping appropriate patterns of employee behaviours, pursued ecological values and standards connected with the human's relationship with the natural environment,,
- triggering and development of the need for eco-innovations,
- application of environmental innovations that are favourable for the environment, both targeted at the client and applied in production processes,
- increasing the number of implemented environmental innovations,
- well-thought selection of resources in the context of processes of implementation of environmental innovations,
- actions targeted at management of post-industrial waste, recycling.

Therefore, ecological awareness can play a significant role in the decision-taking process concerning the implementation of eco-innovations as well as at the stage of specific innovative projects in enterprises. The ecological awareness of managers and employees is a key factor impacting the direction of enterprises for the benefit of sustainable development. It can be assumed that, along with the increasing ecological awareness, there is a growth of undertaken innovative initiatives in enterprises for the benefit of sustainable development which is a tip for



social, environmental and economical challenges. At the same, it contributes to increase of the human life quality.

#### **4. Research Methodology**

In order to achieve the selected purpose, the research methodology consisting in theory-cognitive studies and qualitative studies based on the case study method was adopted.

The theory-cognition studies were based on the secondary analysis of data from the field of ecological awareness, its role in relation to implementation of environmental innovations in enterprises as well as the concept of environmental innovations, eco-innovations.

The studies based on the case study method concerned the identification of the role of ecological awareness in implementation of ecological innovations, eco-innovations in the example purposefully selected for the enterprise study. The enterprise selection was made in the purposeful manner, considering such criteria as:

- inclusion of the enterprise in the sector of small and medium-size enterprises (SME) - the company was established as a microenterprise, however, with development of its resources and employment, at the moment of performance of this paper, it belonged to the SME group;
- specifics of the technological process - the enterprise is a service-production company, using raw materials and materials in the production process which negatively impact the work and natural environment;
- looking after the external company image - the company has an implemented and certified system of quality management ISO 9001 and takes efforts to create its positive image;
- company's inclination to conduct innovative activity - the company is an organisation quickly developing, following and implementing new technical and technological solutions.

The technique of environmental audit conducted on the basis of the interview with the company owner and employees as well as technique of non-participant observation were used in these studies. The interview in the scope of the environmental audit concerned, e.g. such matters as:

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- conformity of company operation with the effective law on environmental protection
- company's impact on the environment with subdivision into particular environmental components (water, air, waste, noise, electromagnetic field)
- evaluation of threat to natural environment posed by owners and employees
- knowledge and awareness of the topic of nature protection and threats posed by the company as well as problems connected with it
- awareness of possibilities of individual impact on the environmental protection
- examples of implementation of environmental innovations, eco-innovations examples of pro-ecological behaviours.

**5. Importance of ecological awareness in implementing environmental innovations on the basis of selected enterprise - case study**

The above deliberations and assumptions considered, studies were undertaken in an enterprise producing industrial hoses and technical conduits from plastics and metals with broad technical application. The enterprise was selected on purpose, taking into account the following criteria:

- the enterprise as a member of the SME sector - it started as a microenterprise, but it developed its resources and workforce and at the moment of selection was a member of the SME group;
- specificity of technological process - the enterprise is a manufacturer and a service provider and employs materials which deteriorate the work and natural environment;
- care for reputation - the enterprise has implemented an ISO 9001-certified quality management system and strives to create a positive image;
- propensity of the enterprise to conduct innovative activity - the enterprise is developing dynamically, keeping abreast of and implementing new technical and technological solutions.

The study process involves an environmental audit based on an interview with the owner and employees, review of documents and passive observation. The examined business is the owner's own undertaking has been operating since 1994. The enterprise is located in a post-industrial

area. One of old production halls was adopted for manufacture purposes. It was acquired from a liquidator conducting bankruptcy proceedings of a large enterprise dealing with electrical installations. During the manufacture process, the enterprise employs a range of raw materials, including plastic granulates, metal wires, solvents and chemical agents, which have a negative impact on the work and natural environment. Since the very beginning, the business has created many innovative solutions which translated into its great success in the Polish and European market. The enterprise manufactures flexible PVC cords, polyurethane, polyethylene and polypropylene industrial hoses resistant to abrasion, Teflon and thermoplastic vulcanisate hoses resistant to chemicals, ventilation ducts and extraction hoses from technical fabrics in a wide range of gauges and lengths. What guarantees the high quality of the offered products is a system managing quality in terms of design and manufacture of technical conduits, which is compliant with the DINEN ISO 9001 standard. The analysis of technological processes performed in the enterprises as for natural environment hazards and of actions taken to limit that influence showed that there are potential risks for the natural environment and the workers in the enterprise, but the application of proper procedures and certain preventive measures should limit those risks. The manufacture process conducted in the enterprise results in the production of waste harmful for the natural environment and emission of air pollution. Most waste consists of PVC waste, which is produced during excess material purification and finished part cutting. Such waste was initially disposed of. Over time, however, it became significant part of the manufacture process. Internal innovative actions led to the creation of a team which designed and independently produced a waste-grinding mill and simultaneously carried out technological trials concerning the use of the ground material as raw material addition. The trials were completed successfully and so made it possible to limit the amount of both the waste produced and the raw material consumed. The enterprise also generates hazardous waste, which is collected selectively, stored safely and provided for disposal to entities with permits as regards waste management required as a matter of the law. When investigating what influence do the technological processes of the enterprise have on the environment, it is important to account for the emission of pollutants into the air. This results from thermal processing of plastics. The analysis conducted as part of bench testing did not indicate a violation of the current standards. Moreover, the existing ventilation system and personal protection measures are sufficient to provide safe working conditions. The enterprise also reported the emission of gases into the atmosphere to the City Mayor. It may be

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inferred from the above that the management of the enterprise pay much attention to complying with the provisions on environment protection, at the same time using the existing mechanisms to develop its innovativeness (solution for the waste issue). Strong ecological awareness and social conscience of the owner translated into the implementation of the so-called "social eco-innovations" as well. After the production hall was bought and production launched, the enterprise undertook activity in the interests of the local community. The owner of the studied enterprise became the leader of a local action group, which helped resolve many urgent problems concerning the everyday functioning in the post-industrial area, including environmental problems related to rainwater drainage, landscaping or waste management. Actions of the enterprise eventually led to the establishment of a Green Business Park: the enterprise owner was granted the "Green Cheque" award by the Voivodship Environment Protection Fund. During the studies, based on the interview with the owner and the employees, three basic area shaping ecological awareness in the enterprise were found:

- knowledge on technological processes occurring in the enterprise and their influence on the natural environment;
- actions taken to counteract negative effect on the natural environment and actions taken for the benefit of the local community;
- innovative and social activity of the enterprise.

The interviews conducted with the owner and employees of the studied enterprise in the context of the role and impact of environmental awareness on eco-innovation implementation show that:

- the owner and employees appreciate the importance of taking decisions concerning the environmental protection and importance of implementation and application of environmental innovations,
- the motivation behind taking actions aiming to implement environmental innovations constitutes acknowledged ecological values, knowledge of the topic of threats as well as economical and health values.
- what is of particular importance is the high level of ecological awareness, knowledge and attitude of the company owner who involves in undertakings, innovative projects for the benefit of environmental protection not only within the company. but also for the benefit of the local society, e.g. the owner of the studies

company became a leader of the local group acting for the benefit of solving problems concerning the post-industrial area, environmental problems as well as creation of the Green Entrepreneurship Park,

- the owner's attitude has also a significant impact on behaviours and attitudes of company employees who have a sense of responsibility for environment and sense of possibility to make a change through their own actions taken for protection of this environment.

According to the results of conducted research, the somewhat high level of ecological awareness of the owner and employees plays a significant role in initiation and implementation of environmental innovations, projects not only within the company, but also in its surroundings.

## **6. Conclusion**

The presented analyses and case study of the enterprise confirm the assumption that what is crucial in implementing ecological innovations is the ecological awareness, particularly that of leaders and managers of such enterprises. This was confirmed by in-depth interviews on the basis of case study of the enterprise purposefully selected for the study which showed that both the owner and employees have a quite high level of ecological awareness as well as sense of possibility to counteract threats by implementation of eco-innovations. Ecological awareness can therefore be an important factor in implementing ecological innovations in enterprises. As shown by the conducted investigations, enterprises introducing ecological innovations may be characterised by a high level of ecological knowledge, which the basis for shaping ecological awareness. In turn, strong ecological awareness influences the system of values and shapes eco-friendly attitudes and behaviours of entrepreneurs. Entrepreneurs with keen ecological awareness are not afraid of taking up ecological challenges. This frequently translates not only into environmental, but also economic profits, which have an impact on improving business competitiveness.

A substantial role in intensifying the implementation of ecological innovations in enterprises should be played by a policy which influences the shaping of ecological awareness in entrepreneurs and which - with use of many instruments - may result in a markedly higher number of ecological innovations in the entire enterprise sector. In consequence, notable benefits

may be generated not only for the environment, but also for the society and economy.

The way to increase the level of ecological awareness in enterprises is education the aim of which should be the development of ecological sensitivity, shaping appropriate patterns and values, behaviours towards natural environment as well as of knowledge of ecological innovations that can be implemented.

The analysis of available subject literature also allowed to state that there are few studies concerning the role of ecological awareness in the context of implementation of environmental innovations in enterprises. Therefore, it constitutes an interesting research field and research challenges.

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### ***Problematyka świadomości ekologicznej w aspekcie wdrażania innowacji ekologicznych w przedsiębiorstwach***

#### ***Streszczenie***

Świadomość ekologiczna menedżerów i pracowników może stanowić ważny czynnik sprzyjającym wdrażaniu innowacji ekologicznych w przedsiębiorstwach. Celem artykułu jest identyfikacja roli świadomości ekologicznej przedsiębiorstw we wdrażaniu innowacji ekologicznych. Dla realizacji założonego celu przeprowadzono analizę literaturową z zakresu świadomości ekologicznej, uwarunkowań ją kształtujących, a także z zakresu innowacji ekologicznych. Wyniki tych analiz stanowiły podstawę do zaprojektowania i przeprowadzenia pogłębionych badań jakościowych opierających się na studium przypadku wybranego przedsiębiorstwa. Jak pokazuje opisany przykład przedsiębiorstwa wysoki poziom świadomości ekologicznej przekłada się na system wartości i kształtuje właściwe postawy i zachowania proekologiczne przedsiębiorców. Świadomość ta jest jednocześnie impulsem do poszukiwania nowych rozwiązań, których wdrożenie sprzyja ograniczaniu negatywnego wpływu na środowisko.

***Słowa kluczowe:*** świadomość ekologiczna, innowacje ekologiczne, zrównoważony rozwój