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ANALYSIS OF PRO-ENVIRONMENTAL AWARENESS AND APPROACH TO MAKING DECISIONS IN THE CONTEXT OF SUSTAINABILITY

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Purpose: The aim of the study is to analyze environmental awareness among employees of companies producing plastics, and subsequently to draw conclusions about the level of their pro-environmental awareness. The motive for the implementation of pro-environmental awareness research in plastics-producing plants was their harmful impact on the environment.
Design/methodology/approach: The research was a survey that was carried out among 44 workers of plastics enterprises located in south-eastern Poland in the first quarter of 2018. During the selection of companies for research, it was included: their location (south-eastern Poland), long-term operation (more than 30 years), the same type of activity (production of plastics), and whether pro-environmental activities were practiced.
Findings: It was concluded that the level of awareness of the employees of plastic industry employees was on a low level.
Research limitations/implications: The research sample is only a preliminary sample. It is planned to obtain data from a larger number of companies and verify the data.
Practical implications: Enterprises should focus on meeting customer needs and maintaining high-quality products, but taking into account pro-environmental measures that should be a priority. This is possible if pro-environmental awareness is continually shaped.
Social implications: The pro-environmental awareness is small among employees from the enterprises, in which pro-environmental actions were not practiced. Employees do not know how the processes are carried out in the company and whether they have any impact on the natural environment. Additionally, the employees of companies not used pro-environmental activities are unaware of the threats resulting from the activities of their company and do not know that other companies about the same activities already apply such activities.
Originality/value: These results will allow better decisions in the context of sustainability and improvement actions to achieve a higher level of awareness among the plastic production companies' employees.

Keywords: sustainability, production engineering, pro-environmental awareness.

Category of the paper: Research paper.

1. Introduction

The concept of sustainable development consists of striving to fully satisfy the needs of present customers along with maintaining the potential for the next generations. The foundation of the main idea of balanced thinking is to maintain a balance between the social, economic, and ecological dimensions (Aguilar-Salinas, et al., 2017; Armeanu et al. 2017). It is in particular important for the factors that cause increasingly use of natural resources, which are hardly renewable, for example, the evolution of civilization, massive population growth, or high demand of recipients (Pacana, Siwiec, Bednárová, 2020; Pacana et al., 2014; Lumnitzer et al., 2018). Currently, activities are related, among others, to the use of renewable energy sources, the use of ecological materials, or the strict adherence to the principles of recycling. A favorable phenomenon is the growth of companies that are certified in accordance with applicable environmental protection programs (Malindzak et al., 2017; PN-EN ISO 14001:2015). One of the stages that occur in the process of evolution of environmental management in Poland is: dilution, filtration, cleaner production, product life cycle management, as well as renewable energy and environmental management strategies (Armeanu et al. 2017; Pacana, Siwiec, Bednárová, 2020; Lumnitzer et al., 2018; Gherghina, Vintilă, 2016). These actions are realized according to the philosophy of sustainable development under which popular techniques are practiced for example, Clean Production (CP) and EMAS systems (Eco-Management and Audit Scheme) (Budynek et al., 2014; Siwiec, Pacana, 2021a, 2021b; Masternak, 2009). The mission of the continuously improved global Cleaner Production Program is to meet the challenges of, for example, well-considered management of natural resources, the evolution of biotechnology, the optimal use of energy, and the strengthening of industrial production (Lin et al., 2017; Gajdzik, 2007; Siwiec, Pacana, 2021d). The Cleaner Production System is based on the principle of sustainable development, which is based on minimization of pollution at the source of its formation (Lin et al., 2017; Pacana et al. 2019; Pacana, Siwiec, 2021). Next, an essential pro-environmental activity is the EMAS eco-management and audit system (Eco-Management and Audit Scheme, EMAS). EMAS is the first European standard that has an international character and scope. It is based on the philosophy of continuous improvement of environmental areas according to the Deming cycle (Budynek et al., 2014). It includes the strategy of the company, which, on a voluntary basis and taking into account the capabilities and needs of the company, sets goals and measures (Siwiec, Pacana, 2021b, 2022a). Through the ever-growing popularity of the environmental management system, its effectiveness is improving. The use of pro-environmental activities in organizations brings many benefits, both on the company's and the environment's side in the 21st century, the issue of environmental protection in the world is becoming increasingly important (Cichy, Szafraniec, 2015; Díaz-Siefer et al., 2015; Górzycki, 2002; Siwiec, Pacana, 2022b). Given the increasing environmental pollution and unexpected climate changes, it can be assumed that pro-environmental activities will be the foundation of

the leading organizations on the market. The publicity of threats resulting from noncompliance with pro-environmental principles means that responsible and caring customers are increasingly looking for products and services that have proven and credible ecological quality (Gajdzik, 2007; Galeja, 2006; Pacana, Siwiec, 2022; Pacana et al., 2015; Siwiec, Pacana, 2021c; Siwiec et al., 2019; Wolniak, Skotnicka-Zasadzien, 2014; Dumitrescu et al., 2015). That is why it is so important to make people aware of behavior within the framework of pro-ecological activities, and it is also important to check whether this awareness is at the appropriate level.

The review of the selected positions of the subject literature on the awareness of pro-environmental activities was carried out. It was concluded that in order to explore the relationship between ecological awareness and pro-environment behavior, surveys were made (Fu et al., 2018; Afonso et al., 2016). The influence of factors on the consumer behavior was explored in view of pro-ecological activities, in the context of the reduce the waste and reducing climate changes (Kim, Hall, 2019), disaster awareness, value and attachment to the place of residence (Zhang et al., 2014), environmental sensitivity and personal standards (Wu, 2018), health awareness (Shimoda et al., 2020) and education in the context of ecological activities. It was also checked if there are differences in pro-ecological awareness among consumers from different countries (Jotanovic et al., 2017). The impact of various pro-ecological behaviors on life satisfaction was studied (Schmitt et al., 2018), and the impact of financial and pro-ecological behavior in the context of behavior to satisfy material values and its maximize was analyzed (Helm et al., 2019) and also the factors that testify about the behavior of pro-ecological were identified (Jagers et al., 2016). The results of the surveys showed that the relationship between social media, attachment to the place attachment, and pro-ecological behavior was analyzed, and the impact of social interactions on pro-ecological public behavior and its mechanisms was studied (Janmaimool, Khajohnmanee, 2019). In addition, an analysis of the impact of employee behavior in managerial positions in the context of pro-ecological behavior was carried out (Fatoki, 2019), and the relationship between knowledge of the environment and environmental attitudes, as well as knowledge about the environment and pro-ecological behavior (Ostasz et al., 2022).

After the literature review, it was concluded that the topics of pro-environmental awareness and pro-environmental activities are being analyzed, as well as being an important area of research. However, the issues that made up the analyzed area of research (environmental awareness among employees of companies producing plastics) were not analyzed. Plastic production companies are a branch of industry that largely impacts the environment. In addition, as part of raising pro-environmental awareness among employees of the organization, achieving many benefits, which is another aspect affecting the efficiency of raising pro-environmental awareness. Selected benefits from practicing the pro-ecological actions in organizations are the strengthening their position on the market or acquiring a new market. In addition, modern business management is practically a guarantee of maintaining a high level of quality of products and services offered to customers. Pro-ecological activity

strengthens the relations of the organization with institutions providing financial and insurance services and enables enterprises to develop uniform technological development and introduce new and innovative projects. Employees will be more likely to identify with the organization in which they operate and possibly also to improve their motivation and relationship with the company's environment. At the moment when the enterprise introduces and applies environmental activities, it is positively perceived by the authorities and the local society, and thus improves the image of the organization, gaining the favor of the environment (Siwiec, Pacana, 2021a; Cichy, Szafraniec, 2015). Therefore, the motivation was to analyze the level at which ecological awareness is shaped among employees of selected enterprises. The aim of the study is to analyze environmental awareness among employees of companies producing plastics, and subsequently to draw conclusions about the level of their pro-environmental awareness. The article analyzes selected pro-environmental activities and policies as well as benefits from them. An analysis of the results of preliminary questionnaire surveys conducted among 44 employees of plastics producing companies was carried out.

2. Method

The purpose of the research was to analyze environmental awareness among employees of plastics producing plants. The research was carried out in a questionnaire among 44 plastics located in south-eastern Poland. The research was carried out in January and February 2018.

The motive for the implementation of pro-environmental awareness research in plastics-producing plants was their harmful impact on the environment. During the selection of companies for research, it was included: their location (south-eastern Poland), long-term operation (more than 30 years), the same type of activity (production of plastics) and whether pro-environmental activities were practiced.

Because this research, was the pilot research the manner of selecting the respondents to the survey was random; however, the respondents had to include managerial and administrative positions. And, it was included: age (18-25; 26-35; 36-45 and over 45 years of age), place of residence (city and village), and period of work (less than 1 year; 2-5 years; over 5 years).

Statistical tests were carried out to check whether there are statistically significant differences between the employees of the companies involved in the environmental awareness survey. The statistical test was made using the Minitab program. It was defined as follows:

- number of respondents (y),
- location of the enterprise (x1),
- the average number of all employees of the company (x2),
- implemented pro-environmental activities (x3),
- the average period of activity (x4).

Depending on the number of employees surveyed (y – continuous data), the ANOVA one-way test for x3 (attribute data) and two correlation tests for x2 and x4 (continuous data) were performed.

For the one-way ANOVA test, it was assumed that when the significance level p-Value > 0.05, it was concluded that there is no statistically valid difference between the analyzed variables, i.e. the null hypothesis (H_0) was accepted and when p-Value < 0.05 it was concluded that there is a statistically justified difference between the analyzed variables, i.e. an alternative hypothesis was accepted (H_1). In the case of the first ANOVA one-way statistical test, it was analyzed whether there is a statistically significant difference between the number from respondents of three companies and the environmental activities implemented in the company (Figure 1).

One-way ANOVA: y versus x3

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Source  DF     SS     MS      F      P
x3       1  32,67  32,67  16,33  0,154
Error    1   2,00   2,00
Total    2  34,67

S = 1,414   R-Sq = 94,23%   R-Sq(adj) = 88,46%

                          Individual 95% CIs For Mean Based on
                          Pooled StDev
Level  N    Mean  StDev  --------+---------+---------+---------+-
N      2  17,000  1,414             (------------*-----------)
T      1  10,000      *  (-----------------*-----------------)
                          --------+---------+---------+---------+-
                                  0        10        20        30

Pooled StDev = 1,414
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Figure 1. The result of the ANOVA One-way test for y depending on x3.

For this analysis the value of the p-value was greater than 0.05, therefore hypothesis H0 was adopted, which indicates that there is no statistically significant difference between the number of respondents from the companies analyzed. Subsequently, two tests were performed for x2 and x4 (Figure 2) using correlation analysis. In the correlation analysis, it was assumed that when the p-Value > 0.01 was reached, it was concluded that there was no statistically valid difference between the variables analyzed, that is, the null hypothesis was accepted (H0). When the p-value < 0.01, it was concluded that there is a statistically valid difference between the variables analyzed, that is, an alternative hypothesis (H1) was accepted.

Correlations: y; x2

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Pearson correlation of y and x2 = 0,406
P-Value = 0,734

MTB > Correlation 'y' 'x4'.
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Correlations: y; x4

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Pearson correlation of y and x4 = 0,091
P-Value = 0,942
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Figure 2. The result of the correlation analysis y depending on x2 and x4.

The value of p-value in two cases was greater than 0.01, so there was no correlation between the number to respondents of the enterprises and the number of all employees of the enterprises, as well as the period of activity. The analyses showed that there are no significant differences between the employees of the companies in which the research was carried out, therefore, for further analysis, it was assumed that in terms of statistics, the obtained results for the analyzed groups of respondents are equal.

After a literature review, the survey was created, and the results were analyzed in the next part of the study.

3. Results

Analyzing the responses, it was noticed that respondents predominantly declared that they know more than three companies with pro-environmental activities such as EMAS or ISO 14001. Most of respondents replied that when purchasing products, they pay attention to their environmental performance. The results of respondents of enterprises that have not implemented pro-environment actions yet show that these respondents do not know any company that uses pro-environmental activities. A large number of respondents believe that the natural environment in their area of residence is highly polluted (Figure 3).

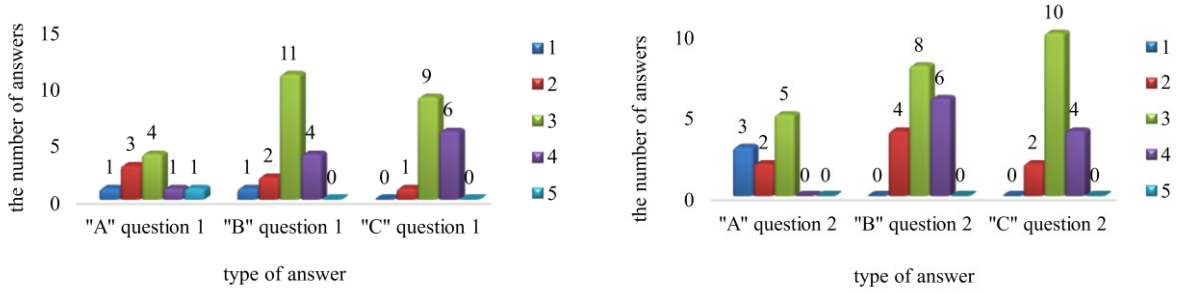

Figure 3. Answers to Questions: a) What extent do you think the local (town and surrounding area) is polluted? a) What extent does the activity of the workplace where you work affect the deterioration of the natural environment?

In addition, a very large number of respondents claim that the company in which they work affects the deterioration of the environment. Most of the respondents admitted that the state of the environment has deteriorated over the last 10 years (Figure 4a). Moreover, a large number of respondents recognized that the condition of the natural environment improved and much fewer people said that the state of the environment for the last 10 years has not changed.

The respondents in most responded that the greatest impact on the deterioration of the local environment can be caused by the lack of compliance with applicable environmental protection rules and the lack of awareness of people about activities the protection of the natural environment (Figure 4b).

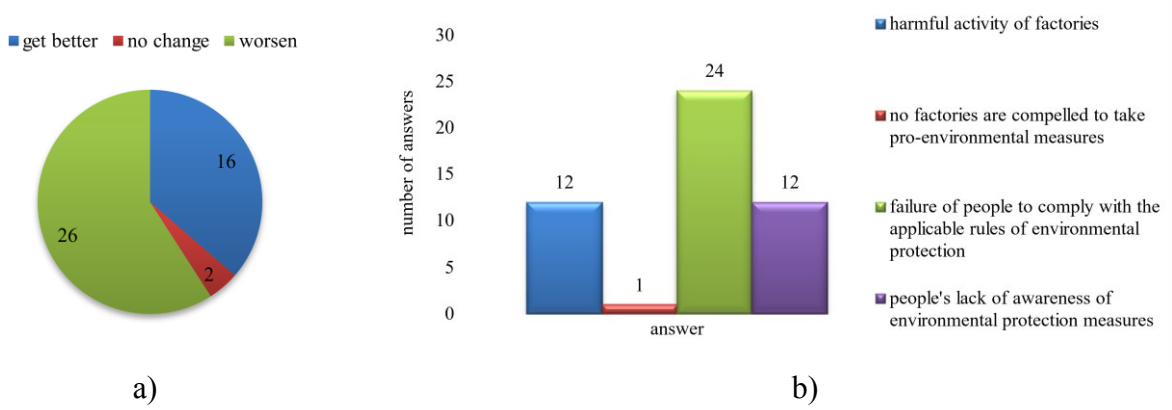

Figure 4. Answer of Questions: a) Opinion of the state of the natural environment for the last 10 years, b) Opinion of the respondents about factors that may affect the deterioration of the local environment.

The employees claim that the lack of compulsion to introduce and apply pro-environmental actions and harmful activities of factories that have the greatest impact on the deterioration of the state of the local environment in companies is irrelevant to the deterioration of the natural environment.

In the company, where certified pro-environmental activities are applied, employees in 80% know that when designing products and services at their workplace, they apply activities to ensure the protection of the natural environment. The responses of other employees show that they do not know if such activities are practiced (Figure 5).

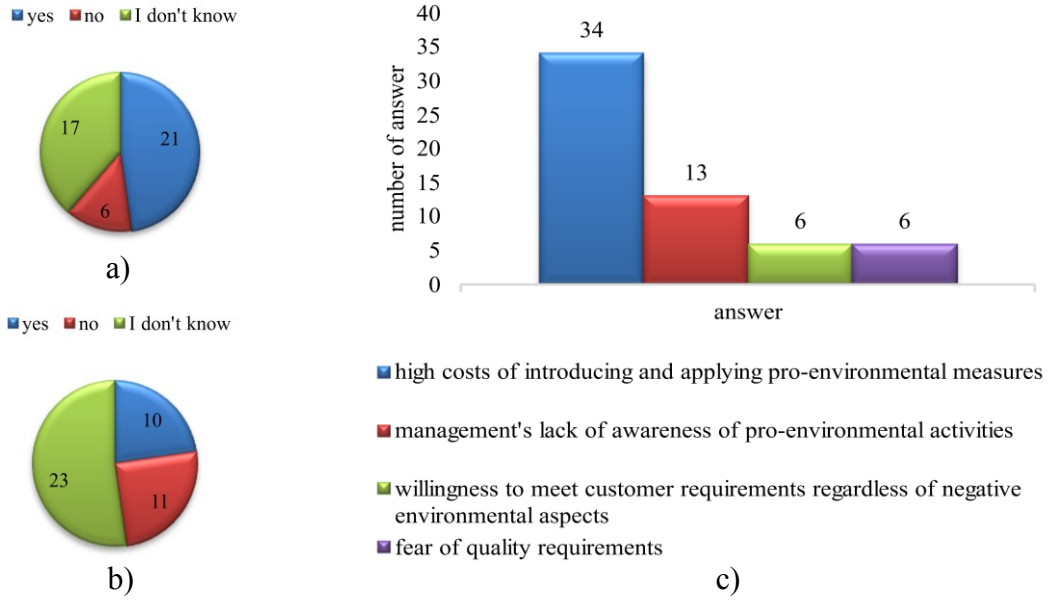

Figure 5. Answer of Questions: a) use of pro-environmental activities in enterprises, b) application of activities that protect the environment during project activities, c) influence of factors on taking pro-environmental activities in everyday life.

In response to the question whether pro-environmental activities are applied in the workplace, employees of the organization which practiced the pro-environmental actions were aware of what organization are used and most of them were able to name examples, such as actions in accordance with ISO 14001, waste reduction, waste segregation, or reduction of consumption natural waste and monitoring of environmental indicators. The respondents who worked in enterprises which not practiced pro-environmental activities, in the vast majority did not know whether pro-environmental activities are applied. Only a small number of people answered yes, and some people could give an example, using the heat generated on the production floor for heating office space or segregation of rubbish and practicing material recovery. A large number of respondents did not know whether such activities are used. Additionally, for the question about waste segregation in the workplace, 99% of all respondents answered in the affirmative. The respondents indicated that when taking environmental action in their everyday life, they are mainly guided by the fear of their health and the health of other people and are aware of possible threats.

Also, all answers of the organization that practiced the pro-environment actions to Question 19 were affirmative, where the respondents acknowledged that the highest management and employees are aware of the possible harmful impacts on the business environment of the enterprise in which they work. A large degree evaluate the motivation of management and employees to making changes to improve the natural environment. For others, the majority of responses were negative, and in case of the evaluation of the motivation of the management and employees as to make changes to improve the natural environment, the score was negligible and small extent.

Additionality, respondents responded that the introduction of mandatory compliance of enterprises with environmental activities could have a good impact on the improvement of the environment.

Most of responses of the employees (34 answers) pointed out that they claimed that the lack of compliance of enterprises with pro-environmental activities is influenced by the high costs related to the introduction and use of pro-environmental activities and the lack of management awareness of pro-environmental activities. Employees decided that the most effective are pro-environmental actions, which can be practiced in enterprises, were the elimination of pollution at the source and the optimal use of energy, and the management of nature reserves.

The question of whether the plant uses noise and vibration limiting elements (plugs or headphones, screens) and whether sound levels are checked, the vast majority of all answers were affirmative. The same applies to the question in which employees were asked if there is air pollution, dust, or odor emission. In the case of using energy sources, most responses were for gas fuels and for electricity.

Analyzing the remaining questions asked to the surveyed, it was noted that the employees were informed about possible environmental threats that occur in the company in which they work. Some of them have heard complaints from the environment about the harmful effects on the environment resulting from the activities of their company. However, half of the respondents from the company in which pro-environmental activities were not practiced were claimed that they have not been informed about the harmful effects of their company's activities on the environment. Moreover, virtually no one heard complaints from the surroundings of the harmful impact on the immediate environment of the company's operations.

4. Discussion and Summary

The concept of sustainable development consists of striving to fully satisfy the needs of present customers along with maintaining the potential for the next generations. The foundation of the main idea of balanced thinking is to maintain a balance between the social, economic, and ecological dimensions. Therefore, it is so important to make people aware of behavior within the framework of pro-ecological activities, and it is also important to check whether this awareness is at the appropriate level. The aim of the study was to analyze environmental awareness among employees of plastics companies and subsequently to draw conclusions about the level of their pro-environmental awareness. In the article selected pro-environmental activities and policies as well as benefits from it were analyzed. An analysis of the results of questionnaire surveys conducted among 44 employees of plastics was carried out.

It was concluded that the employees of the company in which the environmental activities were practiced are more aware of the environmental protection and the use of pro-environmental activities than in the case of the responses by employees' companies, in which pro-environmental activities were not implemented. The pro-environmental awareness is small among employees from the enterprises, in which pro-environmental actions were not practiced. The management and employees of these enterprises do not talk to each other about the possibility of threats resulting from the activities of their company. Employees do not know how the processes are carried out in the company and whether they have any impact on the natural environment. Furthermore, respondents agreed that one of the factors by which enterprises do not implement environmental protection measures is the lack of management awareness of them. Additionally, the employees of companies not used pro-environmental activities are unaware of the threats resulting from the activities of their company and do not know that other companies about the same activities already apply such activities. It was concluded that the level of awareness of the employees of a plastic industry employees was on the small level. In the case of this type of industry, it is problematic, because this enterprise in particular affects on the environment, so it will be necessary to conduct training in the field of

pro-environmental activities, in which it would be possible to increase pro-environmental awareness. In addition, good practices should be implemented in enterprises like these. Clean Production (CP) or EMAS. Enterprises should focus on meeting customer needs and maintaining high-quality products, but taking into account pro-environmental measures that should be a priority. This is possible if pro-environmental awareness is continually shaped.

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