

## ANALYSIS OF THE DESIGN AND IMPLEMENTATION PHASE OF ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEMS IN MANUFACTURING ENTERPRISES

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**Abstract:** Increasing awareness and the number of activities for environmental protection has influenced the development of environmental management systems. Currently, there is a wide range of environmental management systems that can be implemented thus organizations can choose which system suits their activities best. Among small and medium-sized manufacturing enterprises, the most popular is a system based on the ISO 14001 standard. Therefore, it seems advisable to promote the skillful implementation of this system. The study was devoted to this issue. It pointed out that the participation of an external consultant, the size of the enterprise as well as the nature of the activity in small and medium manufacturing enterprises has a small importance at the time of its implementation. To implement such a system skillfully, preparation work period for designing and implementing should last about 9 - 12 months.

**Keywords:** Environmental management system, ISO 14001, small and medium enterprises, time of system implementation

### 1. INTRODUCTION

One of the challenges facing the modern economy and its participants is to improve the relationship between the economy and the natural environment (Zhu, 2012; Łuczak, 2016; Hys, 2018). In the long run, the current nature of this relationship based on achieving economic benefits by enterprises at the price of environmental degradation cannot be maintained (Castillo-Rojas, 2012). Meanwhile, the change of approach consisting in incorporating environmental goals into the company's operations, despite the fact that it is dictated by the need to adapt to the requirements of sustainable development, often faces resistance. A good tool for learning to manage enterprises in a systemic way while minimizing the negative impact on the environment are environmental management systems described, for example, by the most popular ISO 14001 standard (Boira, 2012; Campos, 2012). In Poland, more than 2012 organizations have already obtained ISO 14001 certification.

The environmental management system according to the ISO 14001 standard is addressed to those who undertake activities aimed at caring for the environment. The realizing of environmental programs required by the standard aims to reduce the negative impact of an enterprise on the natural environment (Kabdi, 2010). Theoretically, the implementation of the system should be common, costs should be minimal and benefits significant. Unfortunately, in practice there are many obstacles that destroy this ideal image, because the success of the environmental management system implementation is mainly dependent on the involvement of all services at all levels of the organization, in particular top management, and on ensuring employee participation at the stage of designing, implementing and maintaining of the system (Pacana, 2017). This fact shows the desirability of conducting of research and analyses on increasing the effectiveness of implementing an environmental management system in an ever-changing environment.

## **2. METHODOLOGY OF RESEARCH**

Analysis of the effectiveness of implemented environmental management systems often encounters many problems (Balzarova, 2008; Nowicka-Skowron and Ulewicz, 2015). Therefore, the studies were preceded by preliminary research. Their goal was to determine the main factors affecting the efficiency of implementing an environmental management system compliant with ISO 14001. Such a task cannot be implemented without analysing the answers to several dozen questions. The research sought to look at the problem of implementation in a comprehensive manner. The following assumptions were made in the research:

- the research covered organizations located mainly in south-eastern Poland,
- the research concerned production enterprises with different numbers of employees,
- any form of the organization's property was also allowed,
- the research was directed at enterprises that already have the ISO 14001 certificate (PN-EN ISO 14001),
- to complete the survey, representatives of the top management of the EMS (EMS proxy) or experienced internal auditors were recommended as the most competent persons.

The main established questionnaire was sent to expertly selected organizations. A return of 81 questionnaires was received. At a rough approximation, it can be assumed that this number is a small but representative sample of the population of organizations with an environmental management system. Adoption of this thesis is possible first of all because it can be assumed that the questionnaire was completed by Proxies who know and understand the philosophy of systemic environmental management and engage for its improvement in the right way. With a certain probability, it can be assumed that organizations that are negatively oriented to their system were not willing to complete the survey. This condition is beneficial from the point of view of the credibility of the survey. Information on implementation and improvement received from competent people is not obscured by extremely negative, biased opinions coming from organizations that could not implement such systems skilfully. Due to this, the conclusions drawn from the study and recommendations resulting from them will be more useful to organizations wishing to effectively and

efficiently implement an environmental management system compliant with ISO 14001.

### 3. ANALYSIS OF TEST RESULTS

The decision to begin perform activities implementing the management system based on ISO 14001 should be based on an analysis of benefits and costs. The advantages of implementing of an environmental management system occur in principle only in organizations where it has been carried out in a thoughtful manner. Such real factors include, for example, active participation of employees, reliance on previous experience, taking into account the specificity of the company, etc. It is important that the implementation does not only take place in order to obtain a certificate print and it serves to improve management. It is also important that the time for designing and implementing the system should not be too long and too short. In the surveyed companies, a question about the time of system implementation was asked in the survey. Answers were obtained as in Tab. 1.

Table 1

Percentage of responses regarding the time of EMS implementation in the surveyed enterprises correlated with the provision of assistance by the consultant.

Time of the EMS implementation	Percentage share	Consultant assistance	
		Yes	No
Up to 4 months	5.5	0.0	0.0
4-6 months	27.5	13.6	3.7
6-9 months	25.3	19.8	8.6
9-12 months	31.9	23.5	14.8
12-18 months	5.5	13.6	2.5
18-24 months	2.2	0.0	0.0
More than 24 months	2.2	13.6	3.7

As it can be noticed by analysing the results in Tab. 1, the largest part of enterprises implemented the system in a period of 9 to 12 months. The actual implementation time of the system is important, but it is not entirely reliable. It is worth to see how it presented itself in correlation with the participation of the external consultant during implementation. About half of the surveyed organizations used the help of an external consultant. Both small and medium organizations in close participation benefited from the help of external consultants. From those organizations that did not use the consultant's help, it can be observed that mostly large and small organizations did not use his help. Perhaps it results from expenses saving during implementation of an environmental management system, or having well-prepared employees for implementation. Reflecting on the participation of external consultants in the implementation work, it can be assumed that their participation probably influenced the implementation of the environmental management system to a small extent, but most of all caused a skilful development of the system. It seems, therefore, that organizations should strive to employ a consultant for the duration of the EMS implementation, who knows not only the requirements of the model standard, but also the specificity of the organization.

It seems advisable to analyse how the time of implementing the ISO 14001 system in the correlation with the size and form of ownership of the surveyed enterprises was presented. These correlations are presented in Tab. 2.

Table 2

Percentage of responses regarding the time of EMS implementation in correlation with the size and form of ownership of the surveyed enterprises

Time of the EMS implementation	Size of organization [%]					Ownership form of organization [%]				
	W1	W2	W3	W4	Σ	F1	F2	F3	F4	Σ
Up to 4 months	0.0	0.0	0.0	4.9	4.9	0.0	0.0	0.0	5.4	5.4
4-6 months	0.0	3.7	12.4	11.1	27.2	5.4	0.0	0.0	25.0	30.4
6-9 months	0.0	7.4	7.4	6.1	20.9	5.4	0.0	0.0	14.3	19.6
9-12 months	0.2	3.7	6.2	25.9	36.0	10.7	0.0	0.0	26.8	37.5
12-18 months	0.0	0.0	2.5	3.7	6.2	0.0	0.0	0.0	5.4	5.4
18-24 months	0.0	1.2	0.0	1.2	2.4	0.0	0.0	0.0	1.8	1.8
More than 24 months	0.0	1.2	0.0	1.2	2.4	0.0	0.0	0.0	0.0	0.0
Indication										
<ul style="list-style-type: none"> <li>the size of the organization: W1- to 10 employees, W2- 10-50, W3- 51-250, W4- Above 250 employees.</li> <li>forms of organization: F1- private ownership, F2- capital group, F3- cooperative, F4- company.</li> </ul>										

The research shows that there is a weakly visible dependence that the typical implementation time is more or less the same (9-12 months) and it is not correlated with the size of the organization. In the case of "quick" implementations (up to 6 months), the largest number of implementations was in medium-sized organizations. Occasionally implementations took place in less than 4 months, as the system should operate for a minimum of 3 months in accordance with the guidelines for setting audit time and costs contained in the document IAF Mandatory Document for Duration of QMS and EMS audits Issue 1 (IAF MD 5: 2009), so that it can be certified. Thus in organizations the proposed implementation time, included in the implementation schedule, should be within 9-12 months. Of course, the conditions of a specific organization that may affect the implementation time should be taken into account.

Tab. 2 and Fig. 1 show that the size of the organization does not have a significant impact on the implementation time of the ISO 14001 system.

A separate issue during the implementation of environmental management systems is the issue of elements that were the most difficult during implementation. The results of the research are presented in Tab. 3.

Table 3

Answers concerning the elements of the standard that were the most difficult to implement

What elements of the standard were the most difficult to implement in the system:	Percentage share
Formulating environmental goals and policy	10.9
Operational activities planning	15.1
Functioning	56.3
Checking, auditing, correcting	15.1
Management overview	2.5

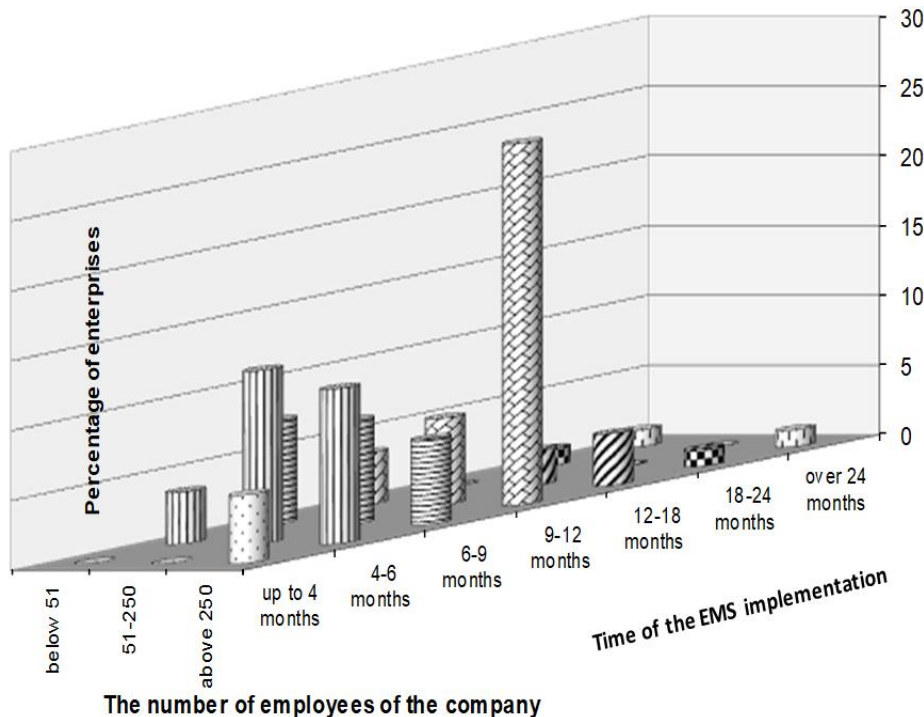


Fig. 1. Correlation graph between the time of EMS implementation and the type of activity of the surveyed manufacturing enterprises.

In the surveyed organizations, the most problems were with the functioning of the system, which involved the implementation of the documentation and subsequent proceedings in accordance with it. In particular, this concerned the system documentation, which has not been used in the organization so far. Some problems were indicated when planning and checking the system.

**3. CONCLUSION**

The environmental management system based on the ISO 14001 standard is dedicated to any organization that undertakes activities aimed at caring for the natural environment. Manufacturing enterprises in this group are included primarily. (Korzyński, 2009, Pacana, 2014) It does not exclude small and medium enterprises, whose total share in the environmental impact is significant. In order for these activities to be effective, it is necessary to skillfully implement an environment-friendly management system that should be integrated into general management. These conditions are set by ISO 14001(Fortuński, 2011; ISO 14001:2015). Environmental management is beneficial for the natural environment as well as for organizations that

respect the environment, mainly for economic reasons. However, these goals are achieved only when the system is skillfully introduced. For this to happen, it is necessary to acquire adequate knowledge of how to overcome implementation difficulties and what benefits can be expected after implementation. Ideally, if this knowledge is derived from the experience of the organization, that already finished their implementation. The study presents a fragment of the research of 81 small and medium manufacturing enterprises. Based on the research, it has been shown that most often the implementation time of a system compliant with ISO 14001 is between 9 and 12 months. This time is not correlated either with the participation of a consultant or the size of the organization. Also the form of ownership has only a small effect on the time of implementation of this system. Hence the conclusion that the system should not be implemented too fast. It is better to decide on the implementation during the time that other companies achieve and focus on the quality of this implementation. This will probably result with a better way of managing and, at the same time, a smaller negative impact on the natural environment. Having such a knowledge may help to avoid many implementation difficulties, frustrations and disappointments which would be unprofitable for both to enterprises and to the environment.

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