MARKET ANALYSIS OF ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATION ACCORDING TO ISO 14001 AND EMAS

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Abstract: The paper presents the idea of formalized Environmental Management Systems (EMS), its main elements and the benefits arising from the implementation and operation of EMS at today's enterprises. It also presents Eco-Management and Audit Scheme - EMAS, which is an important element of action for sustainable consumption and production and sustainable industrial policy. Moreover, the paper presents the analysis of the market of environmental management system certification according to ISO 14001 and EMAS, in 2009-2013 on the world, with particular emphasis on European countries and Poland.

Keywords: certification, Eco-Management and Audit Scheme EMAS, Environmental Management System, ISO 14001, sustainable development

JEL Classification: M11, L15

1. INTRODUCTION

Technological and economic development, as well as an increase in the civilization level of societies is supported by innovation, technological changes, availability of capital, raw materials and energy. The necessity of meeting the growing needs and expectations of society, functioning of transmitting and processing information systems, which meet specific needs, the accessibility to various material resources and knowledge are the main factors affecting the competitiveness of the economy, as well as indirectly contribute to a certain level of quality of life. Availability of energy, renewable and nonrenewable resources is an essential part of the functioning of sustainable development, which beside meeting current needs should also take into account the needs of future generations (Wawrzyniak, 2005, p.4).

In fact, every action that uses material technology remains in interaction with the environment. The aim of the proecological actions should be therefore, in accordance with the technical capabilities, preventing and minimizing the adverse influence of manufacturing processes on environment. In market economy conditions additionally there are very important aspects of the production that concern productivity, costs and economic viability and acceptance of the product by the purchaser. The ecological awareness of existing threats, conscious consumption and available potential possibilities of minimizing risks are also very important. It is therefore necessary to develop and implement in industrial technological processes manufacturing techniques that are environmentally correct and contribute to: the rational and economical use of raw materials and energy, waste reduction and reduction of degree of harmfulness, to reduce level of noise and the influence of the produced pollution on soil, groundwater and surface water. In the environmental management, an important role has also a state through the creation of environmental legal standards and supervision of its observance. In specific cases the ecological standards define the emission and immission standards of pollution, preventing excessive degradation of the environment. After accession of Poland to the European Union it has been made the unification of law, adapting the environmental requirements to EU directives and standards. Particularly significant meaning in environment creating and protecting has "Environmental Protection Law" Environmental Protection Law" (Journal of Laws No. 62, pos. 627, 27April 2001) and "Act on Waste" (Journal of Laws No. 62, pos. 628, 27April 2001). Into the Polish legal system have been also introduced requirements of the IPPC Directive (Zwoździak et al.,2005, p.103), which rigorously introduces the compulsory use of the Best Available Techniques (BAT) for installation in a way that has a significant impact on the environment (Zwoździak et al., 2006, p.9). Its main task is to systematically adapt the methods of planning and production to the requirements of the rule of permanent and sustainable development, while ensuring a high level of environment protection as a whole by integrating the entire process of preventing emissions of pollutions, and where it is entirely possible - the maximum of its reduction. The main instrument provided by the IPPC is the integrated permit to use the environment, which includes individual emission limit standards regarding the principle of the BAT for specific installations. Guidelines for the qualifications and recommendations in terms of the Best Available Techniques represent the BREFs, which are the reference documents issued and available via the EU office in Seville, through it is possible a comparison and determination of limit values of emission and other parameters characterizing the BAT for a particular installation (Jansen, 2003, p.231), (Dijkmans, 2000,p.11).

For proper combination of manufacturing requirements, marketing and materials management with environmental issues, by the strategy of creating of the image and modernization of the technological level many companies join the different programs related to environmental protection, ie: Clean Production, pro-environmental programs - Responsible Care (Jansen, 2003, p.231), or they implement an environmental management system based on the requirements of ISO 14001 (Gajdzik et al.,2010) or EMAS (Pochyluk, 2005). Companies that implement environmental management in their all operation stages become more competitive, they have a better reputation and appreciation among their regular and potential customers as well as the trust among the media and public administrations. Moreover, pro-environmental actions are an integral part of the work for sustainable development through it is possible to rebuild ecological balance.

2. ENVIRONMENTAL MANAGEMENT SYSTEM ACCORDING TO ISO 14001 AND EMAS

Currently, there are two formalized environmental management systems. One of them is ISO 14001standard published by the International Organization for Standardization (ISO) and another one is the regulation allowing voluntary participation of the organization in the Eco-Management and Audit Scheme of the European Community - EMAS regulation (Regulation of the European Parliament and the Council EC of 25 November 2009. No. 1221/2009). The overriding aim of these regulations is to indicate to the organizations¹ the formal possibilities of redevelopment of the rules and procedures concerned with the management of production processes or services. Through this, associated with this impact on the environment may be identified properly and eliminated or continuously reduced in an integrated manner with the fundamental objectives of the business (Wawrzyniak, 2005, p.4). Also greater emphasis is put on more prudent use of natural resources, in particular those non-renewable. The concept of the EMAS regulation requires the implementation and maintenance of a properly operating environmental management system based on the model of continuous improvement. The essence of this legal provision is to regulate the rules of implementing the environmental management system with strict requirements of testing and minimizing of the pollution (Pochyluk, 2005).

The environmental management consists of those aspects of general management functions that concern creation, implementation and realization of environmental policy and objectives of any organizational unit. The management system creates an object of management (object of control) and managing system (control system), with occurring relations between them, which usually are control signals (Fig.1). Generally the management system may be defined as (Wawrzyniak, 2005, p.4), (Gajdzik et al., 2010):

- 1. coordinated system of elements, set that creates a whole which is determined by permanent and logical ordering of its components,
- 2. principles of organization of something, general provisions and rules in force and used in any field, according to which something is done.

The general part of the management system that includes the organizational structure, planning, responsibility, rules of conduct, procedures, processes and resources needed for creation, implementation, realization, review and maintain the environmental policy is the **environmental management system** (Gajdzik et al., 2010).



Fig. 1. The general model of the environmental management system (Wawrzyniak, 2005, p.4)

In the literature may be found several definitions of the environmental management system. The PN-EN ISO 14001⁵ defines EMS as a part of the overall organization's management system, used to create and implement environmental policy and to manage its environmental aspects. Undeniably the environmental management system (control system) is a selected and properly structured part of the reality, which is associated with the management and use, protection and creation of natural environment. This system is complex and heterogeneous, and its essence is ensuring a continuous development of the company in the field of environmental management. To meet the posed tasks, all employees should be involved in realization of tasks related to the protection of the environment through pro-ecological education and ensuring the adequate competencies and responsibilities to their position. The EMS should be precisely combined with economic and social management system. The purpose of the system mentioned above is a constant reduction of the organization's impact on the environment and pollution prevention while caring about socio-economic needs. The overriding aim is also to meet the requirements or expectations of third parties which do not arise from the fact of signed contracts, but from government and local regulations, regional communities' expectations or public opinion, and even international agreements¹⁰.

ISO 14001 is strongly connected with the philosophy of Cleaner Production, which fundamental concept is also a continuous improvement, so an iterative process of improving the environmental management system. Its aim is to improve the overall environmental performance, according to the environmental policy of the organization (Jansen, 2003,p.231).

Management system requirements included in the standard are based on the **Deming cycle**, which includes the following phases (Fig.2)⁹:

- Planning phase setting of general goals and objectives of the company and creating the verification methods, according to the organization's environmental policy;
- Performing phase implementation of a plan and agreed actions in pursuit to realization of the company's objectives;
- Verification phase verification of the actions taken according to the plan because of their efficiency and effectiveness, and a comparision of the results with the plan;
- 4) Corrective actions phase (improvement) "repair" of any identified deficiencies; improvement and adaptation of

¹ ISO 14001 and EMAS regulation the term "organization" refers to all economic operators (operating in manufacturing and services and public administration bodies and institutions of public benefit) that implement an environmental management system.).

Market Analysis of Environmental Management System Certification According to ISO 14001 and EMAS

objectives and principles to changing circumstances, provide information to top management and replanning.



Fig.2. The PDCA (Plane, Do, Check, Act) cycle or the Deming Cycle in environmental management⁹

The basic EMAS idea is to aware the managers of the enterprises of the necessity of closer look at the production and management processes at their enterprises, and to show them the way in which good management practices may ensure higher efficiency of the taken actions and to improve efforts to protect the environment in the enterprise (Pochyluk, 2010). The EMAS system is open to all companies and institutions, both public and private sector (manufacturing and service companies, administration, municipal enterprises, local governments, hospitals, schools, etc.) that systematically identify environmental aspects and create and realize action plans allowing progressively reduce their own impact on the environment. Registration in the EMAS system means that the organization has an efficient environmental management system compatible with ISO 14001, which significantly contributes to reduction of operating costs, eg. related to the waste disposal, reduction of energy consumption, water, etc., affecting simultaneously an increase of the competitiveness of such organization on the market. The requirements of EMAS regulation are binding for the EU countries, while the implementation of requirements and participation of enterprises in the EMAS system is completely voluntary¹¹.

The basic elements of eco-management and eco-audit in EMAS system are: the environmental policy which determines main objectives and principles of operation, the environmental management programs, the systematic and objective assessment of the effectiveness of actions taken by the internal and external verifier, the creation and publication of the environmental statement, that is credible to the public opinion.

The overriding aim of EMAS is promotion of continuous improvement of operating results to protect the environment in the sphere of technical and organizational aspects and presentation to society the full information on production activities (environmental reports), and the resulting ecological problems. This is the role of the environmental statement. It also has to include an assessment of all the quantitative ecological facts and relates to policies, programs and goals of the enterprise.

Introduction of EMAS system improves the risk management, and therefore influences on reduction of the number of failures and accidents in the enterprise. There are also additional benefits of the introduction of the system as showing the society that the organization in a responsible manner treats its business and the risks associated with it, giving a clear signal that it fully controls all threats. Moreover, the environmental statement validated by an independent accredited verifier ensures that public authorities and the society gain an authentic picture of the impact of the organization on the environment. Companies belonging to EMAS are obliged to prepare the environmental statements and to their public sharing, what favorably affects the company's credibility as an organization reducing negative impacts on the environment (Krupnik, 2011, p.24)

3. CERTIFICATION OF ENVIRONMENTAL MANAGEMENT SYSTEMS ACCORDING TO ISO 14001 AND EMAS

The environmental management systems based on the requirements of the international standard ISO 14001 or EMAS regulation for several years have been remarkably popular among different types of organizations and enterprises, what shows the unceasing increase in the number of certification (for ISO 14001 - Table 1 and 2) and registration (for EMAS – Fig.3) on the world and in the countries of Community. In a recent edition of the review issued by the International Organization for Standardization on the number of ISO 14001 certificates², on the world has been again recorded an increase in the number of issued certificates attesting accordance of the environmental management system with the requirements of the international Standard ISO 14001.

It was found that at the end of 2013, on the world, was issued over 301 thousand of certificates, what presented an increase by 35% in comparision with 2009. However, in comparision of the number of certificates issued in 2013 with the previous year there was 3% decrease (Table 1). It was also observed an increase in the number of countries where ISO 14001 certificates were issued - the study from 2013 presented that in 171 countries were implemented and successfully certified the environmental management systems according to the requirements of the international standard ISO 14001. In comparison with 2012 the number of countries in which were using the certified environmental management systems according to the international standard ISO 14001 was increased by eleven. The undisputed leader, when it came to the number of certificates attesting accordance of the environmental management system with the requirements of the international standard ISO 14001, was the Asian market, where up to December 2013 was issued more than 151 thousand of them (Table 1). The Asian market was dominated by China, where in 2013 was issued more than 104 thousand of certificates, and to a lesser extent by Japan - 24 thousand of certificates issued by the end of 2013 (Table 2A). The total number of certificates issued in Europe in 2013 reached over 120 thousand. In Europe dominated Italy - almost 25 thousand of certificates, the second place ranked Spain, where till the end of 2013 was certified almost 16 thousand of organizations. The third place ranked Germany with almost 8 thousand of certificates in 2013. Poland was ranked at 11th place among European countries with more than 2 thousand of issued certificates (Fig.3), what demonstrates the growing interest of the organizations in implementation and certification of the environmental management system according to ISO 14001. The table 2A presents the ranking of 10 countries in which

 $^{^{\}rm 2}$ The ISO Survey of Certifications 2013; Data from 2014 years will be published in September 2015

(till 31.12.2013) recorded the highest number of issued certificates relating to the environmental management system according to ISO 14001, whereas the table 2B - 10 countries in which recorded the highest increase of the number of issued certificates relating to the standards above. It was found that the highest growth rate of the number of issued certificates of compliance with ISO 14001 characterized sequentially China (13 thousand), Italy (5 thousand) and India (1.5 thousand).

Table 1. Total number of issued certificates of compliancewith ISO 14001 in 2009-2013 on the world

	Year					
Pagian	2009	2010	2011	2012	2013	
region	Total number of issued certificates					
	222974	251548	261926	284654	301647	
Africa	1531	1675	1740	2084	2538	
Central / South America	3748	6999	7074	8202	9890	
North America	7316	6302	7450	8573	8917	
Europe	89237	103126	101177	111910	119107	
East Asia and Pacific	113850	126551	137335	146069	151089	
Central and South Asia	4517	4380	4725	4969	6672	
Middle East	2775	2515	2425	2847	3434	

Source: own study based on: "The ISO Survey of Certifications - 2013"

Table 2. Countries with the largest number (A) and growthrate (B) issued certificates of compliance with ISO 14001 –balance at the 31.12. 2013

	Α		В			
No.	Name of country	Number of issued certificates	Name of country	Number growth of issued certificates in 2013		
1.	China	104735	China	13162		
2.	Italy	24662	Italy	5047		
3.	Japan	23723	India	1586		
4.	United Kingdom	16879	Colombia	1345		
5.	Spain	16051	Australia	1339		
6.	Romania	8744	United Kingdom	996		
7.	Germany	7983	Germany	968		
8.	France	7940	France	846		
9.	USA	6071	Czech Republic	577		
10.	India	5872	Indonesia	523		

Source: own study based on: "The ISO Survey of Certifications - 2013"

At the turn of 2009-2013 in Poland was observed a dynamic increase in number of issued certificates of compliance with ISO 14001 – there were issued approx. 720 of them (Fig.3), what shows the involvement of top management in the organization in efforts to minimize the negative impact on the environment, as well as to increase the ecological awareness of the Polish entrepreneurs. By 2009, in Poland was issued 1500 of certificates of compliance with ISO 14001. Compared to 2009, in 2010-2012 the number of ISO 14001 certificates issued in Poland increased by 293, 400 and 514 of certificates. By December 2013, in Poland was issued over 2,200 of issued certificates relating to the environmental management system according to ISO 14001.

There are many reasons that influence on the decision to implement EMS into organizations (Fig.4), however the main reason of the popularity of these formalized EMSs are benefits of the implementation of the system to the company. Even 75% of companies (Fig.4) introduce EMS to meet legal requirements and improve or reduce the risk of unfavorable image of the company related to the violation of environmental regulations and provided for it fines. Less than 20% of companies claim that the implementation of ISO 14001 was the first step to participate in EMAS.



Fig. 3. Evaluation of ISO 14001 certificates in Poland Source: own study based on: "The ISO Survey of Certifications - 2013"

By December 2013, the Eco-Management and Audit Scheme in the European Union registered 3721 organizations (including 10826 objects - Fig.5). From March 2009 to September 2012 there was observed a gradual increase in number of organizations (by almost 270 organizations) registered in the EMAS system. Currently, there is a noticeable downward trend related to the EMAS registration of the Community countries (Fig.5). According to data of the European Comission in the current year, the most of registered organizations, even 1048 (5898 objects) come from Italy. Slightly lower in the ranking is Spain with 899 (1038 objects) registered organizations and Austria with 278 (994 objects) registered organizations. Further down in terms of the number of registered organizations in the EMAS are Germany - 269 organizations (439 objects) and Denmark - 48 organizations (335 objects). In Poland are registered only 44 organizations (127 objects). However, it should be pointed out that in Poland the first EMAS registration was made just in the fourth quarter of 2005.





The lower number of registration in EMAS system, compared to the number of ISO 14001 certification is the result of higher and more restrictive requirements of the EMAS Regulation, ie: ensuring compliance with legal requirements, the requirements for demonstrating results of the environmental activity and an open dialogue with the society. However, enterprises that have received a registration in EMAS system achieve better results in the field of environmental management than those that have ISO 14001 certification^{10,11}.





2013 Source: own study based on: http://ec.europa.eu/environment/

Based on the analysis of the data of International Organization for Standardization and the European Commission it was found that the Environmental Management System according to ISO and EMAS are increasingly willing implemented by small and medium-sized these regulations were enterprises. Until 2010, implemented primarily by large enterprises employing more than 200 employees. Lower popularity of this system among small and medium-sized enterprises could be caused by difficulties related to eg. development skills of the companies. A smaller company has more difficulties to conduct a costly modernization or realize research and development activities.

4. CONCLUSIONS

Summing up, the provisions of environmental management systems based on the opinion that proper environmental management is the key to improve both the environment and the financial results of the company. The implementation of the environmental management system enables organizations to maintain themselves in the group of companies representing global standards that ensure the proceedings in accordance with the law and ensure the use of the idea of continuous improvement of the impact on environment and to prevent its contamination. In the era of rapidly developing markets and rapidly increasing competition, the fact that an enterprise has the ISO 14001 standard or is registered in EMAS system often becomes a major determinant that decides about increase in demand and a better sale of offered products. The organization that implemented the environmental management system is able to make a proper and fully documented assessment of its impact on the environment, also complying with the certification requirements, what confirms the ecological credibility of the company and increases the trust of customers, employees and suppliers.

In recent years, there has been observed a growing interest of enterprises in operating according to the requirements of environmental protection. It is presented by the increasing number of enterprises implementing EMS. However, despite many benefits of implementing the EMS according to ISO 14001 and EMAS and almost immediate visible effects of its use, it should not be forgotten that the Environmental Management System, like any other, requires continuous improvement and control. The announced revision of ISO 14001 will be a good opportunity for these actions.

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