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System of environmental management as an element of bioeconomy development

Izabela Straczewska
Gdynia Maritime University, Poland
marekg@am.gdynia.pl

Abstract. The aim of the article is to present and analyze in detail the requirements imposed on the entrepreneurs through the environmental management norm ISO 14001. Moreover, the article shows the disadvantages and advantages for companies to introduce this system of environmental management. The constant growth of the number of certified organisations confirms the need for entrepreneurs to act in accordance to the rules of sustainable development. The pure introduction of the system nevertheless doesn't mean necessarily its efficiency.

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INTRODUCTION

Bioeconomics is a broad term and includes (according to the definition of the Organization for Economic Cooperation and Development) any activity basing on the usage of biotechnology, bioprocesses and bioproducts aiming at creating goods and services. As an effect of the constant degradation of the natural environment, and resulting from this - the reduction of natural resources, it seems necessary to change the way of thinking of society in aspects of production, consumption, storage and recycling of biological resources. This concerns individual citizens as much as any kind of institution or company. The share of citizens in creating an economy which is harmonized with its natural environment bases mainly on popularizing and promoting style of living that may be called ecoconsumption, which is purchase of products and services, which in a special way care about the environment – or at least in any way don't damage it. The needs of society in this area force the entrepreneurs to adjusted behaviours, which often constitute a source of competitive advantage on the market. The adaption of modern ecotechnology during the production process, the limitation of pollution to the environment, the possibility of use of ecoethics (under the condition of fulfilling certain criteria) – all this makes, that companies stand out among thousands others and are perceived by customers or competitors not only as the ones environment friendly, but also as socially responsible. In taking professional proecological activities through entrepreneurs it is unusually helpful to make use of formalized systems of environmental management, among which ISO 14001, which give the

opportunity to receive an appropriate certificate confirming the commitment and concern of the company about matters connected with the nature protection.

SYSTEMS OF ENVIRONMENTAL MANAGEMENT

Systems of environmental management base on basic functions of management, so on planning and decision making, organizing, guiding (leading people) and controlling. Surely building a system of environmental management it is necessary to consider the outside surrounding of the company as much as processes occurring internally (Hortensius, 2005, p.35).

Environmental management encompasses both its usage and protection, and shaping. This wide term refers to every step undertaken by the enterprise/organization which is related to environment; it also refers to all agents, whose activity influence them (Poskrobko, 1998, p.10). Consequently, environmental management is a set of tools that support the general function of enterprise's management that enable the elaboration, implementation and realization of environmental policy and aims. As a result the negative impact on environment is constantly minimized in an optimal way for both firm and environment (Pochyluk, Grudowski, Szymański, 1998, p.35). One of the most vital characteristics of environmental management is its integration with the overall management system of an enterprise. Therefore, the systems of environmental management include the organizational structure, rules of responsibility, operational practice, procedures and the regulations necessary for development and application of a certain policy of a firm. Moreover, their aims are usually to fulfil the requirements or expectations of the third party, which do not result from the signed contracts but from biding national and regional laws, expectations of religious communities, public opinion or even the neighbour countries.

In general it can be assumed that environmental management consists not only of rational allocation of natural resources but of various other factors such as i.e. : management of human resources (increase in environmental awareness), production cycle management (reduction of production waste), management of production cycle's outputs (maximal usability with minimal waste), management of finance needed for investment activity that brings ecological effects, information management (needed for realization of a dynamic model of environmental protection and the principle of constant improvement in relations between the firm and environment (Nowak, 2001, p. 258)).

Furthermore, a vital element of environmental management is the concept of permanent improvement, which stays in tune with so called Deming cycle which defines four key stages of performance: planning, doing, checking and adjusting.

In a global context there are two main operating systems of environmental management; that is: Eco-Management and Audit Scheme *(pl. Wspólnotowy System Ekozarządzania i Audytu EMAS)* and Environmental Management System according to ISO 14001 (*System Zarządzania Środowiskowego wg normy ISO 14001*).

ISO 14001- STRUCTURE OF THE STANDARD AND THE AMOUNT OF CERTIFIED ORGANIZATIONS ON A GLOBAL SCALE

One of the thousands of standards for various aspects of the operation established by the. International Organization for Standardization's is the environmental management standard ISO 14001, commonly called by traders environmental management system. It is addressed to all parties who care for the environment. Companies seeking to obtain this certification need to give a formal expression of their real commitment to nature, what gives them credibility. Of course, part of economic agents may effectively

limit their negative impact on the environment without having a certificate thanks to own or external concept, but when a firm holds the certificate, it imposes on it a legal obligation to fulfill given rules and ways of conduct.

In the aspect of a company's operation, the environmental management system concerns mainly the managers (Skrzypek, 2000, p.182) or specialized organizational units, which is a planned, structured set of actions that enable environmental policy realization and which is an element of a general management system that defines company's behavior towards environment. It encompasses organizational structure, procedure, rules of conduct, planning, responsibility, environmental policy, processes and resources needed for elaboration and implementation of various environmental programs (Systemy zarządzania środowiskowego..., p.13).

The structure and the main essential content of the above mentioned standard are presented in the table below.

Table 1

The structure of the ISO 14001 Standard

1.	**Range** „This International Standard is applicable to any organization that wishes to: a. implement, maintain and improve an environmental management system; b. be confident to act in accordance with established environmental policy; c. demonstrate the compliance to others; d. seek certification / registration of its environmental management system by an external organization; e. determine and declare on its own the compliance with International Standard [1]"
2.	**References to norms/standards**
3.	**Definitions** In this point 20 of the main terms used in the further part are explained; including: *auditor, continuous improvement, the environment, the environmental aspect, impact on the environment, the environmental objective, environmental performance, environmental policy, pollution prevention*
4.	**Environmental Management System**
4.1.	**General Requirements** The establishment of an environmental management system and its maintenance
4.2.	**Environmental Policy** This should include a commitment to continual positive impact on the environment and to comply with legal requirements governing the protection of the environment, and should be appropriate to the nature, scale and impacts of the company. Furthermore, it must be documented, implemented, maintained and made available to the public and be communicated to all employees. Its objectives are mainly the reduction of the emission of pollutants to the environment, the design of environmentally-friendly, motivating and improving employees' environmental awareness and recycling.

cont. tab. 1

4.3.	**Planning** **4.3.1. Environmental aspects** The organization should identify all environmental aspects at the beginning of the implementation of the system and when any significant change occurs in the legislation or in the same organization. They must be constantly updated and included in the determination of the environmental objectives. **4.3.2. Legal and other requirements** The organization shall establish, implement and maintain a procedure to identify and have access to legal requirements / international, national, regional / environmental protection in terms of its functioning. They can be either acts, directives, permits, orders, judgments and also in special cases covered by the guidelines streaming not from law but voluntary principles and commitments, and other corporate needs. **4.3.3. Objectives, goals, programs** They should be measurable and consistent with the environmental policy, provided in the form of programs defining milestones, the responsibility for its implementation and the means and time at which they are to be achieved. They also must be defined at the appropriate levels of management and by relevant departments. In addition to the environmental aspects the financial and operational requirements of the company, its business, its technological options and the views of interested parties should be taken into account
4.4.	**Implementation and operation** **4.4.1. Resources, roles, responsibilities and authorizations** The organization implementing environmental management must ensure adequate resources in the form of infrastructure, financial and human resources, training, technology and information systems. Furthermore, it should be set up by the management agent with the relevant powers, competence and awareness, which would be responsible for the implementation and maintenance of an environmental management system. **4.4.2. Competences, training and awareness** Employees / performing tasks that may have an impact on the environment / must have appropriate training and experience and also be constantly retraining to increase environmental awareness 4.4.3. Communication Proper communication between the various levels in the organization is particularly important. Internal communication: meetings, newsletters, bulletin boards, intranet External communication: annual reports, internet, social meetings The organization must possess the specific procedure for internal communication and for receiving, documenting and responding to external party. **4.4.4. Documentation** Key documents include: procedures, legal requirements, statements of policy, environmental objectives and targets, organizational charts, emergency plans of the facility. **4.4.5.Control of the documents** The documents are mainly controlled for proper circulation, clarity, updates or appropriateness. Rules of control are determined by the appropriate procedure. **4.4.6. Operational control** For each area of the organization the methodology conduct/environmental management must be established. Also, activities associated with the identified environmental aspects consistent with its policy, objectives and tasks of the organization should be specified. **4.4.7. Readiness and emergency response** The organization should be ready to respond to emergencies / accidents in particular / and therefore must have identified potential accidents together with the methods of reaction to them. Activities related to reactions to failure can be preventive, of emergency nature and post-emergency.

4.5.	**Verification** **4.5.1. Monitoring and Measurement** The organization must regularly monitor and take measurements of key characteristics of its operations that affect the environment according to the established procedure **4.5.2. Assessment of compliance** The organization must demonstrate that it has assessed compliance with legal requirements. In the assessment among others, plant inspections, audits, site visits, etc. are used. **4.5.3. Nonconformity, corrective action and preventive action** Due to the possibility of the emergence of non-compliance, the organization shall have a procedure for taking corrective and preventive actions that should specify the requirements for i.e.: recording the results of action taken, reviewing their effectiveness, assessing the need for action to prevent incompatibilities and identifying and correcting non-compliance. **4.5.4. Control of the records** The organization must have set in procedures rules for the supervisiing records. **4.5.5. The internal audit** Conducted periodically by the staff or external consultants to provide information on the results of audits to higher management and to determine whether the system is implemented in accordance with the planned arrangements in line with environmental management and if it is properly implemented and maintained.
4.6.	**Overview performed by top management** It serves to check and evaluate the effectiveness of the system and motivate to continuously improvement.
5.	**Annex A (informative)** Provides guidance on the application of this standard, it is strictly informative.
6.	**Annex B (informative)** This appendix lists the most links ISO 14001:2004 to ISO 9001:2000 and vice versa.
7.	**Bibliography** Contains items used during the development of this standard.

Source: created by author, based on PN EN ISO 14001:2005 and Urbaniak M. „Zarządzanie jakością, środowiskiem oraz bezpieczeństwem w praktyce gospodarczej" Wyd. Difin W-wa 2007, pp.234-273.

The exact determination of the number of certified companies (in relation to ISO 14001) is practically impossible due to the fact that there is no central register, which would monitor the amount of certificates issued or received. However, the ISO, as the result of a very large number of requests for such information order an annual examination in this direction, so that there exist estimate numbers of the above issues.

Table 2

Number of ISO 14001 certificates in various regions of the world (years1999-2011).

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Total	13 994	22 847	36 464	49 440	64 996	90 554	111 163	128 211	154 572	188 574	222 974	251 548	267 457
Africa	129	228	311	418	626	817	1 130	1 079	1 096	1 518	1 531	1 675	1 740
Central/South America	309	556	681	1 418	1 691	2 955	3 411	4 355	4 260	4 413	3 748	6 999	7 067
North America	975	1 676	2 700	4 053	5 233	6 743	7 119	7 673	7 267	7 194	7 316	6 302	7 465
Europe	7 253	10 971	17 941	23 305	30 918	39 805	47 837	55 919	65 097	78 118	89 237	103 126	106 700
East Asia and Pacyfic	5 120	8 993	14 218	19 307	25 151	38 050	48 800	55 428	72 350	91 156	113 850	126 551	137 335

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Central and South Asia	114	267	419	636	927	1 322	1 829	2 201	2 926	3 770	4 517	4 380	4 725
Middle East	94	156	194	303	450	862	1 037	1 556	1 576	2 405	2 775	2 515	2 425

Source: ISO Survey – 2011 http://www.iso.org/iso/home/standards/certification/iso-survey.htm

Table 3.

The top ten countries in the world in terms of the number of ISO 14001 certificates /state for the year 2011/

Rank	Country	Number of certificate
1	China	81 993
2	Japan	30 397
3	Italy	21 009
4	Spain	16 341
5	Great Britain	15 231
6	Korea	10 925
7	Romania	9 557
8	France	7 771
9	Germany	6 253
10	USA	4 957

Source: ISO Survey – 2011 http://www.iso.org/iso/home/standards/certification/iso-survey.htm

According to the above mentioned data, it appears that the number of organizations with ISO 14001 at the global level is 267 457 (as of 2011). Clearly in terms of the number of certificates European and East Asian countries stand out representing respectively 39.9% and 51.3% of the total.

The clear global leaders in this area are China and Japan, where respectively 81 993 and 30 397organizations have such certificates. Italy (21 009), Spain (16 341), United Kingdom (15 231) and Korea (10 925) are classified on the consecutive further positions. Other countries of the global top ten (Romania, France, Germany, USA) possess certificates in a number not exceeding 10 000. Among European countries, most of ISO 14001 certificates are granted in Italy (21 009), United Kingdom (15 231) and Spain (16 341).

Despite the constant growth of the amount of certified organizations on the global scale, the percentage decreases from year to year systematically. Between 2000-2001 the rise accounted for 60-63 per cent, between 2004-2005 it dropped to 23-39 per cent and between 2010-2011 they constituted only 6-13 per cent. The reason behind the declining trend are most probably the difficulties with implementing the environmental management systems.

ADVANTAGES AND DISADVANTAGES OF ENVIRONMENTAL MANAGEMENT SYSTEMS

Elaboration and implementation of environmental management system is not an easy task and many enterprises treat even as a kind of a challenge. In fact, it is a very time-consuming process and to be effective, it needs to stream from the deep conviction of the top management about the purposefulness of the

decision and the involvement of the company's employees. However, the worst fears concern the financial costs incurred by the enterprise, which is particularly harmful for small firms that do not have high capital. Unfortunately, these fears are fully justified. Beside the great dedication of the management and staff, the implementation of the environmental management system requires spending on: trainings, hiring the procurator/proxy (costs of salary, insurance, social benefits), introductory environmental review, preparing the documentation (copying, printing), conducting internal audits, informational activity (publications of announcements, communicates, leaflets, brochures, etc), certification, proecological spending (new construction investments, purchases of machines, devices, licenses, modernization of production line), costs of construction adjustments, exploitation of the machines, changes in work organization (annexes to work contracts, change of identification cards, business cards, purchase of additional computer equipment with software, etc), payments for business exploitation of the environment (Matuszak, Flejszman, 2000, p.54).

Obviously, the above mentioned costs will not be equal for all companies. Much will depend on the branch within which the firm operates, its size or the real involvement of the staff in system's implementation. The most commonly stated difficulties stated by the companies with reference to Environmental management System's implementation are inter alia:

- general reluctance of companies to apply for certification which result from the perception of certification as another bill to pay
- perceptions of own company as harmless to the environment, or preference of less restrictive, more tangible and visible action that quickly improve the environment,
- the inability of management to assess different types of benefits arising from the implementation of EMS certification, or the fact that the benefits are not obvious,
- perceptions of the management and staff costs associated with the implementation and certification of EMS as very high,
- inability to cope with change as a result of "too small" number of employees, who can not meet their new tasks and responsibilities,
- No evidence of environmental protection in the company and the resulting problems associated with meeting regulatory requirements or the requirements of external auditors,
- deep conviction that the system documentation is complex, cumbersome and not very accessible, and that the time required to obtain a certificate may be too long,
- lack of external support (Dąbrowska, 2010, p.37).

The benefits of the introduction of an environmental management system (except for those purely *ecological* connected with the reduction of pollutants, reducing the risk of accidents or not realizing environmental objectives) can be internal - that is directly affecting the company - and external which affect the company's surrounding. The former may include *economic / financial benefits* that from the point of view of entrepreneurs are always of primary importance. Among them one may include revenues derived from the reduced fees for environmental and recycling of secondary raw materials, and the savings generated primarily due to lower consumption of natural resources. Apart from economic, a firm benefit from various social gains which do not have a financial value, such as: more effective management, compliance with legislative regulations, constant improvement, supervision over production processes, good relations with the society and ecological organizations, improvement of company's image which can lead to new costumers' acquisition, gaining society's trust, higher competitiveness (and as a consequence a better market position), the opportunity to offer better conditions for potential investors, cooperation with environmental protection authorities, growth of responsibility and employees' job satisfaction, the possibility to higher qualifications and permanent human capital improvement, stronger participation of the staff in decision making process. Furthermore, the most important external benefits include the motivation aspect for other companies, con-

tractors or suppliers to undertake pro-ecological initiatives, the improvement of the state of natural environment, faster way to get the allowances and decisions concerning the company's operation and market activity (Ejdys, 2007, p.295).

SUMMARY

The ISO 14001 Standard is somehow a model of environmental management that supports the most the enterprises striving to carry out actions aimed at environmental protection. It has been elaborated in a universal manner, which can be applied in countries on various social-economic development level. It assumes that setting and operating of the environmental management system can (but do not have to) contribute to the instant environmentally beneficial effects and requires only the parties' commitment to conducting environmental policy (Gajdzik, Wyciślik, 2007, p.108). Moreover, it is a motivational tool for constant improvement of the outcomes of environmental protection measures and more importantly, thanks to its integration with strategic decisions concerning the future of the company and its everyday management, the Standard can bring concrete financial gains (long-term decrease of products' prices) and in the end the growth of competitiveness (Ejdys, Lulewicz, Kobylińska, 2006, p.254).

The EMS implementation can (should- as it is in firm's interest) be finished with formal certification which involves a formal assessment of the system's compliance with the ISO 14001 Standard and is proved by issuing the certificate. Certification can be done by accredited units possessing formal acknowledgment and recognition of competence to carry out the above certification (Lisowska-Mieszkowska, 2007, pp. 5-24).

The certification itself is not a proof for the effectiveness of the system, but merely confirms its implementation in the company, which is confirmed by numerous studies. One of these studies are studies by Polish Forum ISO 14001 in 2004 carried out with postal questionnaire sent out to 450 organizations with ISO 14001, which was at that time about half of all organizations obtaining this certificate[1]. Replies were received from less than 13% of companies in the study group, which indicates a low openness and willingness of these organizations to dialogue with stakeholders. In addition, studies have shown that the effectiveness of implementation of environmental objectives and targets is low, and half of those surveyed did not achieve any results.

It is difficult to assess what is the ultimate balance of benefits and risks of introducing environmental management systems. Everything will depend on the attitude represented by the evaluator. Will it be an entrepreneur set for a quick profit "here and now", and the strategy will be considered solely instrumental as to obtain the certificate, or whether it be a person of high environmental awareness for who a certain value, which in this case is the protection of natural resources, can not be "measured" or otherwise converted into money.

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