

# Selected aspects of integrated environmental management

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## Abstract

Current trends in environmental care are characterised by the principles of comprehensiveness, integration, interdisciplinarity and transregionality. It is in this spirit that the methodological, legislative and economic instruments develop, and this whole trend is referred to using the term 'environmental management'. Environmental management constitutes a set of technical instruments and methods for managing the environment, based upon an identification of the environmental aspects of products, activities and services of any type of organisation, with the aim to adopt and implement effective proactive measures to reduce their negative impact on the environment. These measures, along with their level, relate to an organisation's possibilities, the market's pressure on it, and primarily with the organisation's management's awareness, maturity and ability to anticipate the introduction of stricter requirements. Environmental management, in the industrial production and service sectors, is one of the the most effective instruments for achieving the priority goal, which is to minimise the negative impact of production activities on the individual elements of the environment as part of the global trend of reducing the negative impact of human activity on the environment. The objective of this article is to indicate possibilities to improve the environment through the basic principles and techniques of integrated environmental management.

## Key words

environment, environmental management, agriculture, life cycle assessment, industry, sustainability, social factors

## INTRODUCTION

Under public pressure, environmental protection has become a part of economic policy, and a separate area of environmental policy has arisen. There is an apparent direct connection between the economic system and the environment [1], and an apparent basic impact and possibilities of environmental policy on the process of its acting upon the economic system [2]. Environmental management constitutes a set of technical instruments and methods for managing the environment, based on an identification of the environmental aspects of products, activities and services of any type of organisation, with the aim of adopting and implementing effective proactive measures to reduce their negative impact on the environment [3, 4]. These measures, along with their level, relate to an organisation's possibilities, the market's pressure on it, and primarily with the organisation's management's awareness, maturity and ability to anticipate the introduction of stricter requirements [5]. Timely decision-making, based on continual environmental improvement, allows organisations to adapt more easily to the conditions and requirements implied by the goals and measures of environmental policy, whether at the national or international level [6–8]. One of the cornerstones of integrated management in the field of environment is environmental management, which, by virtue of its strategic management of environmental impact, contributes to a better quality of life [9].

### Basic environmental management principles by Sujová [10].

The rapid global expansion of industrial production on the one hand, and public pressure to protect the environment on the other, has resulted in the adoption and gradual introduction of numerous environmental activities that have led from defining a global environmental strategy to carrying out environmental audits in various production and others sectors [11–12].

**Environmental management.** This is a company management system focused on environmental protection and creation within the interactions of permanently sustainable development at global, regional and local level [13, 14]. It stems from the need to carry out the EU's Sixth Framework Programme for the environment in the field of training experts for implementing environmental principles and environmental policy [15, 16]. Environmental management seeks to find a solution as to how to manage business activities in order that they do not cause environmental degradation [17]. Through purposeful improvement in individual processes, a business can contribute not only to a better environment, but also to reducing its business costs (by reducing its waste, energy, water and gas consumption, or emissions), which will be positively reflected in its profits [18, 19].

**Environmental policy.** A set of concepts, strategies and tactics, as well as specific methods and ways to solve environmental problems. At the time of its creation, environmental policy only focused on environmental protection and the protection of certain natural resources, and did not turn its attention to the wider context of human activities until later [20].

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Presently, the permanently sustainable development strategy, also called the 'Prevention Strategy', is the foundation of environmental policy. The goal of this strategy is the maximum possible prevention at the place of origin, of the formation of substances and occurrences with a negative environmental impact. By Suová [10] environmental policy is also based on these three principles:

- *prevention*: prevention of the formation of pollution is cheaper than elimination of effects;
- *integration*: impact and measures ought to be examined in an integrated way at all levels of implementation;
- *cautiousness*: it is necessary to monitor and check effects over the long term and take into account the cumulative effect showing later.

Promotion, implementation and realisation of environmental policy is the subject and the main task of environmental management [10].

**Environmental management instruments.** A whole host of environmental management instruments arose during the period of environmental management development, e.g. environmental audits, environmental management systems, environmental assessment and product labelling, ecobalances, environmental product profile, etc. These instruments arose mainly as voluntary internal initiatives within businesses and organisations. They now influence policy and product regulation in European Union countries and other countries in the world [10]. Among the basic environmental instruments are:

- product-oriented instruments;
- process-oriented instruments.

### Product-oriented instruments

*Environmental product labelling (ECO Labelling).* Governed in the Slovak Republic by Act No. 469/2002 on Environmental Product Labelling. The purpose of an environmental label is to promote production development and product consumption with lesser adverse environmental effects during the entire lifetime of a product [21, 22]. The main advantages of an environmental label are: positive information for consumers, credibility, clarity, public involvement and full compliance with the law and technical standards.

*Environmental product life cycle assessment* examines the environmental aspects and environmental impact of a product during its entire lifetime, i.e. from the time of obtaining raw materials, through production, use and consumption, to disposal of waste from the product [23, 24]. The overall level of product quality is then characterised in terms of optimisation of raw material consumption, reduction in energy intensity, minimisation of waste generation, harmlessness to consumer health, reuse of waste from products, safety during product disposal, etc [25–27]. This instrument is closely linked to the available environmental technologies which ensure the effectiveness of production environmentalization.

*Integrated product policy* focuses on products and services and their environmental aspects. The goal of integrated product policy is to achieve permanently sustainable development focused on reducing the environmental impact of production and products [28, 29]. The integrated perspective focuses on various aspects, include:

- *lifetime cycle*: focuses on environmental burdens during the entire life cycle of a product or service;
- *environmental elements*: focuses on all elements of the environment;
- *instruments*: traces the various stages in the life cycles of products and services, and uses various instruments to attain this level;
- *areas*: exploits various policy areas in which a multitude of factors influence environmental issues.

**Process-oriented instruments.** Process-oriented instruments express environment quality by changing the approach to managing those individual processes within a business that greatly burden the environment [33, 34]. A systematic approach to environment protection must be the subject of any business strategy. The following instruments are process-oriented:

*Environmental Management System (EMS), and the Eco-Management and Audit Scheme (EMAS),* are systems based on the principles of continuous improvement of businesses' relationship with the environment, environmental burden reduction and environment enhancement. This system is built around ISO standards of the 14000 series [22, 35]. This voluntary instrument allows businesses the possibility to be competitive and improve their overall public image.

*Environmental auditing* is an integral part of an environmental management system, based on a comprehensive assessment of a business' environmental concept implementation [29]. It is an instrument for monitoring and checking the functioning of an environmental management system which allows discovering deficiencies in the system and proposing remedial measures to remove deficiencies [36].

*Environmental management accounting* is a system of records of all environmental costs expended in the field of environment [37, 38]. This system allows detailed monitoring of costs related to environmental pollution.

*Environmental profile evaluation* is a business management instrument which is to assist in the process of environmental profile improvement. An environmental profile consists of a businesses' environmental management system's measurable results in terms of its control of its environmental aspects, based on the business' environmental policy, goals and target values [37]. An environmental profile evaluation is a process, planned and implemented using suitable environmental indicators that allow measuring, analysing and determining an environmental profile in relation to prescribed criteria [38].

*Clean production* is continuous application of an integral preventive environmental protection strategy to processes, products and services with the aim to increase their efficiency and reduce risks to humans and the environment [39]. In the case of production processes, it means a more efficient use of raw materials and energy, exclusion of toxic and hazardous materials, prevention of waste generation and pollution at the source [40]. In the case of products (products and services), a clean production strategy focuses on reducing environmental impact within their life cycle from development to use.

Using these voluntary environmental instruments, it is possible to achieve positive environmental and

economic results [41, 42]. In terms of the efficiency and cost-effectiveness of production system management, and by using these voluntary instruments, we can present the results of those production companies which have achieved considerable success in the field of environment. Among the most significant indicators of effective use of environmental instruments are [43]:

- reduction in material and energy intensity,
- reduction in pollutants,
- reduction in a business' environmental costs.

**Legislative and systemic security of environmental management.** Environmental policy has become an integral part of the legislative system in recent years. In addition to laws to protect the environment, it is imposed by various regulations and directives, while use of internal business environmentally-oriented measures is also gradually growing [10, 44]. Implementation of environmentally-oriented management systems is closely linked to quality management systems according to ISO standards [45]. In the early 1990s, the International Organization for Standardisation (ISO) created environmental management system schemes (EMS) containing elements which any EMS must satisfy [35]. Models of these schemes are widely applicable to all types of business and organisation. In 1993, ISO recognised the need to standardise environmental management instruments and formed a standardisation committee which produces standards (so-called ISO) for individual environmental management instruments. The effectiveness of EMS could thereby be evaluated on the basis of compliance with an accepted directive [35, 43, 47].

*International ISO 14000 standards* specify the basic requirements of environmental management. They do not define specific criteria for the environment, instead, they require an organisation to form its environmental policy and goals and take into account its significant environmental impact. The standards focus on those aspects which the organisation can itself control and which it can influence through its activities. The standards focus of the basic elements of a management system, instruments, methods a procedures based on a dynamic and cyclic process – plan, performance, control, evaluation. The environmental management system created according to ISO is called ISO 14 001 [47, 48].

## ENVIRONMENTAL MANAGEMENT STRUCTURE AND MAIN PRICIPLES

**Principle 1) Commitment and policy.** *Environmental policy* is a statement by an organisation on its intentions and principles regarding overall environmental conduct, providing a framework for activities and for setting out long-term and short-term environmental goals [49]. A decision made by top management on introducing environmental management systems, and on subsequent acceptance of an official obligation and its declaration, is a complex and serious process requiring an assessment of the business' overall situation. An assessment of a business' internal situation is a comprehensive review of its situation, on the basis of which the top management gains information allowing it, while taking all external factors into consideration, to issue

a declaration stating that it undertakes to continuously improve its environmental profile [50]. The basic procedure in such an assessment of the internal situation a business with an anticipated result is based on judging the following aspects [51]:

- the actual state of the business-environment relationship and on fulfilment of the government environmental policy;
- the activities, production or products that may affect the environment;
- chemical, physical and biological factors that may or do affect the environment;
- contribution to causing environmental problems (local, regional or global);
- possibilities to take remedial measures.

Various methods of assessment, such as EPE, ESAP, or an analysis of the state of the environment, can be used to obtain an assessment of the relationship between a business and the environment. An analysis must be thoroughly prepared and proceeded with, in accordance with a specified schedule which is targeted and to the point. An analysis is performed by a team of experts in various specialisations so that the individual professions are all represented, while the team is led by a person appointed by top management. This leader is given an authorisation and responsibilities, and reports directly to the top leadership. Also, he typically manages the process of EMS implementation and the environment unit. By formulating its environmental policy, a business explains its strategy, intentions and principles underlying its environmental activities which are based on the principles of permanently sustainable development in the context of the government environmental policy [52].

**Principle 2) Planning.** Environmentally-oriented planning is a conscious management activity which consists in specifying and defining environmental goals, and in determining tasks and methods required to fulfil the declared environmental policy [10]. In order to carry out planning, it is necessary to take into account the internal and external environment and its impact on an organisation's activities, and to identify all environmental aspects and environmental impact.

*An environmental aspect* is defined as an element of an organisation's activity, products or services which may affect the environment [53].

*Environmental impact* is defined as an adverse or a favourable change in the environment that is entirely or partially implied by an organisation's activities, products or services [53].

The relationship between an environmental aspect and an environmental impact is practically that of cause and effect. The procedure of identifying aspects and impact can be divided into four basic steps. Based on their recognition, long-term and short-term environmental goals to be achieved by a business in a certain period of time are determined [54].

*A long-term environmental goal* is an overall and, if possible, quantifiable environmental goal implied by environmental policy, which the organisation itself specifies and wishes to achieve.

*A short-term environmental goal* is a detailed and, if possible, quantifiable requirement for conduct applicable by an

organisation or its part, implied by long-term environmental goals, which is to be set out and fulfilled so that these long-term environmental goals are achieved [55]. Environmental goals can be orientated towards [10, 37]:

- reduction in waste and in exhaustion of resources;
- reduction in/elimination of the release of pollutants into the environment [56];
- product design so as to minimise its impact on the environment during production, use and disposal;
- operational management of raw materials' environmental impact;
- minimisation of significant adverse environmental impact of new projects;
- raising environmental awareness among employees and the public.

In their specification, we may characterise, for instance:

- the amount of consumed raw materials/energy;
- the amount of emissions, such as CO<sub>2</sub>;
- the amount of particular pollutants, such as nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), hydrocarbons (HC), lead (Pb) or hydrofluorocarbons (HFCs) [57, 58];
- the percentage of recycled waste;
- the percentage of recycled material used for packaging;
- generated waste per number of finished products.

Incorporating a solution to environmental problems characterised by the impact assessment criterion into short-term or long-term environmental goals depends on several factors, i.e. economic, technical, technological and organisational, but the extent and degree of a threat to biotic systems should, however, be crucial [59–62]. The final outcome is a formulation of the Environmental Management System Programme.

**The Environmental Management Programme.** This can refer to a system securing responsible workers' activities towards achieving long-term and short-term environmental goals [63]. First and foremost, it includes a determination of specific responsibilities for every important organisational position and level along with the means and the time frame [64]. It is a document which clearly and specifically defines an organisation's environmental goals, and describes, for all elements of the business, in a manner that is targeted and to the point, the tasks and responsibilities of all workers involved together with the obligations of all workers, as well as the resources for ensuring comprehensive implementation [65].

**Principle 3) Implementation.** Judging by practical experience, winning employees for realising top management's intention or commitment to implement and realise EMS, convincing them of the necessity of this step and training them to adopt new habits and responsibilities, is a basic precondition for success. This requirement is fulfilled in the form of training of all employees at all levels of management and non-management staff. The structure, content and scope is usually delivered by the HR Department at the request of the director or the head of the unit through an internal or an external trainer. The system and content of the training is specified according to the level of management and its professional profile, and then separately for other staff. A comprehensive system of employee preparation is connected

with professional and qualification requirements and requirements needed to implement best production practice.

The overall process of implementing EMS is a complex one and requires a proactive approach from all management workers along with employee engagement [66]. Good managers at all levels, competence, communication skills, ability to acquire and share information at the right time from and to the right addressee in a suitable form all play an important role in the process. A good company information system should serve this purpose [67,68]. During implementation, it is important to consider not only the internal structure and problems of a business, but also all internal and external factors which may positively affect this process, not least because implementation of the system is expensive [68].

## CONCLUSIONS

The topic of this article is highly relevant, especially due to the continuing efforts to reduce negative impact on the environment in all aspects of social life and production activities. The subject of this article was a summary of the basic aspects of environmental management by means of which it is possible to reduce negative impact on the environment.

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