



Developing Innovative and Attractive CVET programmes
in industrial shoe production

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Train-the-Trainer Manual Environmental Management

IO 3

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1 Introduction

1.1 Aims of the DIA-CVET Project

The aims of the Erasmus+ project «Developing Innovative and Attractive CVET programmes in industrial shoe production» are

- to develop, pilot and implement comprehensive courses for the Spheres of Activity (SoA) of foremen in industrial shoe production on European level; available in English (EN) as well as in DE, RO and PT,
- and to develop a sector qualification framework level 5 and 6 and to reference existing or newly drafted national qualifications from Germany, Portugal and Romania.

1.2 Manuals to Guide Tutors and Trainers

The purpose of the manuals is to prepare designated trainers for their role and to provide content and support. Due to the nature of the SoA of foremen, they do not include specific forms of training; but we suggest a blended approach. Successful Continuous Vocational Education and Training (CVET) programmes combine theoretical lessons with application of the acquired Knowledge, Skills and Competences (KSC) in real work environments. The tasks of a trainer are to

- impart SoA-specific KSC,
- demonstrate operations which the learners are expected to learn to perform,
- introduce the learners to each new task and supervise them during their first approaches,
- organise and supervise blended activities (i. e. projects),
- guide them towards an independent performance of the tasks of the respective SoA.

The manuals are not meant to replace a textbook. They are meant to provide support to the trainers to plan and execute their teaching. The trainers are invited to gather more information from other sources.

1.3 Refer your training to the business process of industrial shoe production

Industrial production is a complex process, where the Sphere of Activity, described in this manual, is embedded in the business process. Before you start the training on a specific SoA, please make sure that the learners are familiar with the other SoA of industrial foremen in shoe production.

For example, the learners should be introduced to the types of products the company manufactures and their intended use, the different customer segments, the distribution channels etc. They should be aware of the product creation and manufacturing processes, i.e. product design, pattern making, purchasing department, production planning, and all production departments to warehouse and logistics.

The production process (not part of DIA-CVET, for insights see: <http://icsas-project.eu/>) is in the core of the business process; the SoA of DIA-CVET play a preparatory, supporting or accompanying role (see Fig. 1).

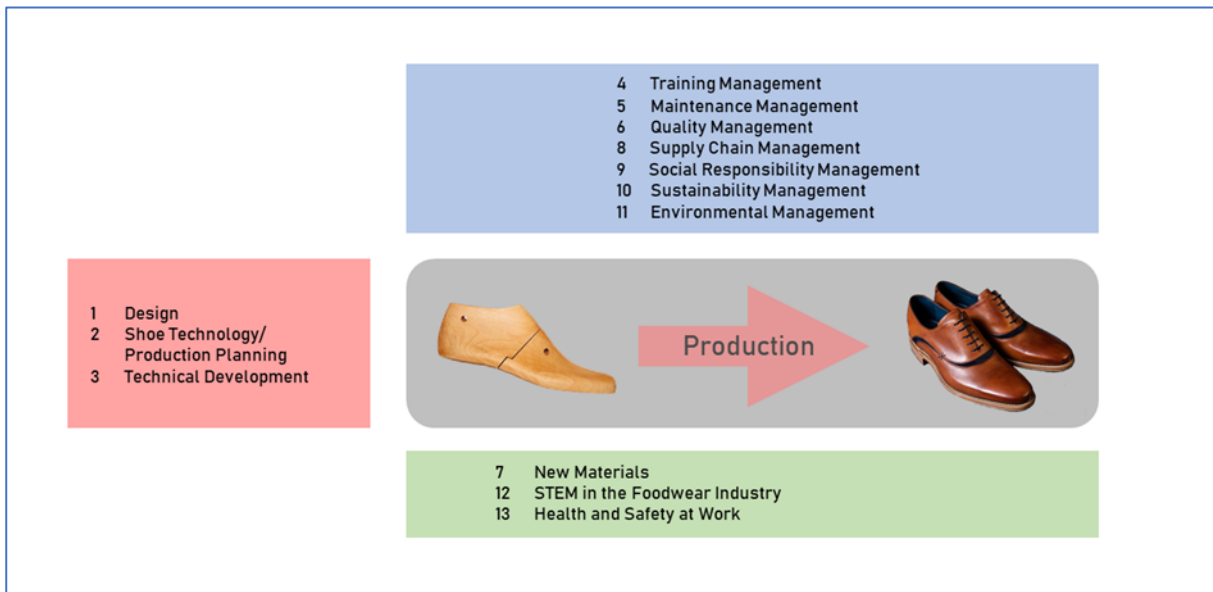


Fig. 1: Spheres of Activity of DIA-CVET and their relation to the production process.

2 Environmental Management

2.1 Introduction

Environmental issues are an active part of the organizational environment. The effects of different environmental regulations can be observed in the pressure exerted on organizations to change their business philosophy and adopt environmental practices. However, the environment is no longer just a factor that limits the operations of organizations. It is part of everything they do, and instead of being a threat, it is becoming more and more an opportunity. The challenge for organizations is to use these opportunities to try to improve their competitiveness and become stronger. So, it is necessary to develop an approach to how these problems can be managed in different ways and how different solutions/decisions can be identified to solve the problems they raise. (Moisio and Tuominen, 2003)

In the sense given by environmental law, environmental protection is the set of actions for protecting and improving the environment and for protecting and managing natural resources. The correlation of economic and environmental protection aspects with social, cultural and traditional ones and the development of production mechanisms based on renewable natural resources lead to a model of sustainable development. So environmental management aims at the responsible use of natural, economic and human resources so that the environment is protected and improved. (Lupu, 2014; Herghiligiu and Lupu, 2020)

To achieve sustainable development, organizations must rethink the decision-making process based on ecological principles (Pislaru et al., 2019). The implementation of such organizational principles could be achieved through a real integration of an environmental management system (EMS). As Esty and Cort (2017) mentioned, "environmental responsibility is good for business", therefore, organizations will improve their awareness and environmental responsibility (Pislaru et al., 2019; Herghiligiu et al., 2019).

3 Institutional framework specific to environmental protection and nature conservation

3.1 Worldwide representative institutions

There are several environmental bodies are set up under the auspices of the United Nations (Lupu, 2014; Herghiligiu and Lupu, 2020):

I. United Nations Commission on Sustainable Development (UNCED):

The Commission's role is to monitor global progress in implementing the goals of Agenda 21, a strategic document summarizing the main objectives in various fields that must be achieved for transition to sustainable development.

II. United Nations Environment Program (UNEP):

UNEP aims to promote mainly environmental projects designed to support developing countries.

III. United Nations Development Program (UNDP):

Although this program is not directly dedicated to environmental issues, it still gives priority to environmental issues in the context of economic activities.

IV. United Nations Industrial Development Organization (UNIDO)

The organization is interested in facilitating technology transfer, creating regional centres to facilitate technology transfer, etc.

V. Secretariats of International Environmental Agreements:

All the international conventions in the field of the environment have permanent technical secretariats, which have the role of correlating all the actions undertaken by the different countries within the obligation incumbent on the signing and ratification of these conventions by the respective countries.

VI. Global Environment Fund (GEF)

It is managed by the World Bank and consists of donations from international organizations to provide non-reimbursable funds to countries that promote environmental projects that fall within the sphere of concern of GEF.

3.2 European institutions in the field of environmental protection

At the European level, the following important bodies can be distinguished (Lupu, 2014; Herghiligiu and Lupu, 2020):

I. Commission of the European Union:

The European Union Commission is responsible for the environment through the Directorate-General of the Environment, Nuclear Safety and Civil Protection (DGXI). Along with DGXI, in the promotion of external assistance projects, including those on environmental protection (PHARE, LIFE, etc.), the General Directorate I, which coordinates the Union's foreign policy, is also involved.

II. Copenhagen European Environment Agency:

This body was created in 1995 with the role of ensuring environmental cooperation between EU countries. especially in the field of environmental monitoring.

III. Council of Europe:

Together with the Commission of the European Union, the Council of Europe has responsibilities in the field of environment strictly related to nature conservation, protected areas, biodiversity, organization of the European network of protected areas, etc.

IV. United Nations Economic Commission for Europe (UNECE):

This body, whose initial concerns were economic, has increasingly focused on addressing environmental issues through the Committee on Environmental Policy. UNECE has been particularly involved in actions related to the "Environment for Europe" process and the correlation of actions related to the promotion of international Conventions (Convention on the Access of People to Environmental Information).

4 Environmental management standards

4.1 BS 7750 standard

The BS 7750 is the first standard in the world to address environmental management. It was developed and published in 1992 by the British Institute for Standardization (BIS) and has a very similar approach to today's quality management standards (SR EN ISO 9000 Series).

4.2 BS 7750 standard

Eco-Management and Audit Scheme - EMAS represents Regulation no. 1836/1993 of the European Commission which is also known as the Eco-Audit Regulation. This environmental management and audit system voluntarily allows industry organizations to participate in the Community eco-management and audit scheme. In 2001, the European Commission, through Regulation 761/2001, replaced the EMAS version with a modified version known as EMAS II. This new version of EMAS brings several new elements, including alignment with global environmental policies, broadening the scope of EMAS II, assimilating the requirements of ISO 14001 as a basis for the implementation of the Environmental Management System and a higher level of addressing organizations.

4.3 ISO 14001 standard and ISO 14000 series

4.3.1 ISO 14000 series of standards

The Technical Committee of the Organization for Standardization 207 (ISO / TC 207) prepares the international standards of environmental management and has the working group composed of personalities of the national committees. ISO has developed a set of environmental standards and guidelines that are collectively known as the ISO 14000 series of standards. ISO14001 is the only certifiable standard, the rest being supportive guidelines. Currently, the most advanced of the series standards and guidelines are:

- ISO 14001 Environmental Management Systems - Specifications and User Guide.
- ISO 14004 Environmental Management Systems - Guidance on principles, systems and application techniques.
- ISO 14040 – Environmental Management. Life Cycle Assessment – Principles and frameworks
- ISO 14044 – Environmental Management. Life Cycle Assessment – Requirements and Guidelines

The ISO 14000 family of environmental management standards, according to the current plan, includes about 20 individual standards, guidelines and technical reports related to environmental management within a company's environmental management system (EMS).

4.3.2 ISO 14001 standard

Standard SR EN 14001 - Environmental management system is the basic component of ISO 14000 series of standards.

This standard is designed to provide an internationally recognized framework for environmental management, measurement, assessment and auditing. It provides organizations with a tool to

assess and control the environmental impact of developed activities (Robert, 2000; Glavic and Lukman, 2007; Oliveira et al., 2010)" (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

The standard addresses at its level the following principles: environmental audit, environmental labelling, environmental performance assessment, environmental management and life cycle assessment (Oliveira et al., 2010) (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

This standard provides general instructions for developing and operating an Environmental Management System. At the same time, it should be noted that ISO 14001 does not present at its level-specific instructions on how certain routines specific to the Environmental Management System should be developed, implemented, managed or adapted at the level of organizations assessment (Oliveira et al., 2010) (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

In addition to the ISO 14001 Standard, several standards have been developed that refer to environmental protection; the most representative of these is the ISO 14004 Standard: "Environmental management systems - Guide on principles, systems and application techniques, given its connection with the implementation of the Environmental Management System (Ionescu, 2005)" (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

5 Introductory aspects regarding the environmental management system (EMS)

An environmental management system consists of a series of concrete actions that aim to achieve a goal: environmental protection in which the organization operates. By applying EMS, the company operates in such a way as not to disturb people and the environment. (Lupu, 2014; Herghiligiu and Lupu, 2020).

EMS stages: (i) initial analysis of the environmental impacts associated with the company's activity and their ranking, (ii) system planning, (iii) action program to achieve the proposed goals, (iv) training and awareness-raising of all staff, (v) implementation of the system, (vi) inventory of relevant legislation, (vii) control of the system within the enterprise, (viii) internal and external audit, (ix) internal and external communication.

The operation of the whole system must guarantee the continuous improvement of the environmental performance and the EMS. At the same time, it is necessary to remember that there is a multitude of methods that can be used to achieve eco-conscious management, some of which are simpler and more complicated: (Lupu, 2014; Herghiligiu and Lupu, 2020).

- Systematic: ISO 14031 (performance indicators);
- Integrated: ISO 14001 (international EMS standard);
- Performance: EMAS (European Union regulation);
- Economically advantageous: identifying the possibilities of saving through EMS.

These methods already play an important role in the domestic and international market. Currently, the use of environmental management systems and other methods is voluntary. In the future, they are likely to be mandatory. (Lupu, 2014; Herghiligiu and Lupu, 2020).

5.1 Notions and terms specific to an environmental management system

The specific notions and terms of an environmental management system can be seen in Table 1.

Continuous improvement	Development process, an extension of the environmental management system to obtain the improvement of the global performance in the field of environment, following the environmental policy of the organization.
Environment	The environment in which an organization operates, includes air, water, land, natural resources, flora, fauna, human beings and the relationships between them.
Environmental aspect	Element of organization activities, products or services that can interact with the environment. A significant environmental aspect is that environmental aspect that can have a significant impact on the environment.
Environmental impact	Any change in the environment, whether harmful or beneficial, in whole or in part, resulting from the activities, products or services of an organization.
Environmental management system (Planning)	A component of the general management system that includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources necessary for the elaboration, implementation, implementation, analysis and maintenance of the environmental policy.
Environmental management system (Analysis)	The systematic and documented verification process to obtain and evaluate the objective evidence necessary to highlight whether the environmental management system of an organization is under the criteria of the environmental management system established by this organization including the communication of the results of this process.
Environmental objective	The general environmental goal, resulting from the environmental policy, which an organization aims to achieve and which is quantified where possible.
Environmental performance	Measurable results of the environmental management system, related to the control of the organization over its environmental aspects, based on its policy, objectives and environmental targets.
Environmental policy	The totality of intentions and principles declared by the organization regarding global environmental performance. Constitutes the framework for action and the establishment of the environmental objectives and targets of the respective organization.
Environmental target	The detailed performance requirement, quantified, if possible, applicable to the whole or a part of the organization, which results from the environmental objectives and must be established and fulfilled to achieve these objectives.
Stakeholder	An individual or group that is concerned or affected by the environmental performance of an organization.
Organization	The company, commercial company, firm, enterprise, authority or institution, part or combination thereof, public or private, with limited liability or any other legal status, with its own functional and administrative structure.
Pollution prevention	The use of processes, practices, materials or products that prevent, reduce or control pollution, which may include recycling, treatment, process modification, control mechanisms, efficient use of resources and replacement of materials.

Tab. 1: EMS specific notions and terms.

Source: Lupu, 2014; Herghiligiu and Lupu, 2020

5.2 Advantages and disadvantages of implementing an Environmental Management System

The implementation and integration of an Environmental Management System at the level of an organization involve the development of various practices specific to environmental management, which may have, over time, multiple beneficial results for companies (Tari et al., 2012; Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

The benefits, in particular, resulting from ISO 14001 certification, are extremely important for organizations, which is why various specialists have paid special attention to this direction of research because it expresses the tangible result of the integration of the Environmental Management System (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

Essentially the advantages or benefits obtained from ISO 14001 certification, as suggested by the same standard, can be grouped into two major groups, namely: internal benefits, and external benefits. Internal benefits are related to improving the financial performance of an organization and improvements in the production process, etc., and external benefits characterize the attitude of stakeholders (customers, employees, management, suppliers, local community, etc.) - essentially the image of the organization determined by its orientation towards environmental protection (Gavronski et al., 2008; Oliveira et al., 2010)" (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

The most important benefits generated by the implementation of an Environmental Management System are summarized in Table 2.

	EMS benefits
1.	Market share
2.	Exports
3.	Increase sales
4.	profitability
5.	Improving competitive position / competitive advantage
6.	Improving the organization's management (improved documentation, working procedures, improved responsibilities)
7.	Efficiency (productivity, cost reduction, shorter lead time, improved managerial control, etc.)
8.	Improving product/service quality
9.	Image enhancement
10.	Improving employee outcomes (motivation, satisfaction, teams, communication, knowledge)
11.	Increasing customer satisfaction (reducing complaints, etc.)
12.	Improving relationships with suppliers
13.	Improving relations with authorities and other stakeholders
14.	Improving environmental performance

*Tab. 2: Benefits of implementing and operating an Environmental Management System (EMS).
Source: Tari et al., 2012; Herghiligiu and Lupu, 2020*

Although the implementation of an Environmental Management System generates benefits for organizations, as can be seen from Table 2, it is necessary to specify that this process can also create certain disadvantages, classified in Table 3. (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

	Level	Possible disadvantages
1.	Management	The possibility of contradicting existing programs and procedures / the possibility of difficulties in using several standards at the same time, etc.;
2.	Costs	Implementation and integration involve significant resources/amortization of investment made by organizations through implementation and integration of EMS is not always done in a quantifiable manner / the existence of costs of operation, maintenance, overhaul, continuous improvement, certification renewal, etc.;
3.	Monitoring	Modification of existing programs and procedures/possibility of confusion, difficulties in the use of equipment, processing and misinterpretation of data and information, etc.;
4.	Human resource training	Involves costs at the level of training programs and professional training in environmental issues / may lead to staff restructuring / may involve decommissioning of human resources involved in environmental training programs;
5.	Other levels	It may involve the generation of resistance to change in human resources.

Tab. 3: Possible disadvantages resulting from the implementation and operation of an Environmental Management System.

Source: Ionescu, 2000; Herghiligiu and Lupu, 2020

6 Environmental Management System - ISO14001

6.1 Environmental management system - general approach

An environmental management system can be described as a methodology by which organizations operate in a structured way to ensure environmental protection. They define the impact of their activities and then propose actions to reduce them. Therefore, the goal of an EMS is to continuously monitor and reduce these effects (Teodosiu, 2005, Rowland-Jones and Cresser, 2005; Herghiligiu and Lupu, 2020).

An EMS is part of the organizational management system used to design, implement and manage environmental policy. It includes interdependent elements, such as organizational structure, sharing of responsibilities and planning practices, procedures and resources needed to determine and achieve its stated environmental policy objectives (Melnyk et al., 2002, Fortunski, 2008; Herghiligiu and Lupu, 2020).

Environmental tools need to be used to mitigate the environmental impact of an organization's work at this stage in each phase. To achieve such a goal, the environmental management to be performed must be following a well-structured EMS. The implementation of an EMS allows continuous reassessment of the production process, the search for procedures, mechanisms and rules of behaviour, which are less harmful to the environment (Perotto et al., 2009; Herghiligiu and Lupu, 2020).

For an EMS to be effectively useful for the development of the company and to manage sustainable development, it is necessary to include specific objectives, planning, activities and values, which are frequently encountered in an ISO 14001 based system (ISO 14001, 2004, Robert et al., 2002; Herghiligiu and Lupu, 2020).

Any organization wishing to implement an EMS - following ISO 14001: 2004, must comply with two essential requirements (Teodosiu, 2005; (Herghiligiu, 2013; Herghiligiu and Lupu, 2020):

- comply with the implementation steps,
- comply with the vision of ISO 14001 which states that the Environmental Management System is not an addition to the management of the organization, but an integral part of it.

According to ISO 14001, any organization wishing to implement an EMS must meet the following general requirements set out in Table 4. (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

Chapter of ISO 14001	Structural requirement
5.2.	Environmental policy
6.	Plan
6.1.2	Environmental issues
6.1.3	Legal regulations
6.2.1.	Objectives and targets
6.2.2	Environmental management program
7.	Implementation and operation
7.1	Structure and responsibility
7.2	Training, awareness and competence
7.4	Communication
7.5.1	Documentation of the environmental management system
7.5.3	Document Control
8.1	Operational control
8.2.	Emergency prevention
9	Verification and corrective action
9.1	Monitoring and measurement
9.1.2	Compliance evaluation
9.2	Audit of the environmental management system
10.2.	Non-compliance, corrective action
9.3	Management analysis

Tab. 4: The main structural requirements of an Environmental Management System following ISO 14001

An effective EMS architecture developed by Welford and Gouldson, taking into account quality management, and adapted by Tinsley and Pillai to be in line with ISO 14001, is shown in Figure 2. (Herghiligiu, 2013; Herghiligiu and Lupu, 2020).

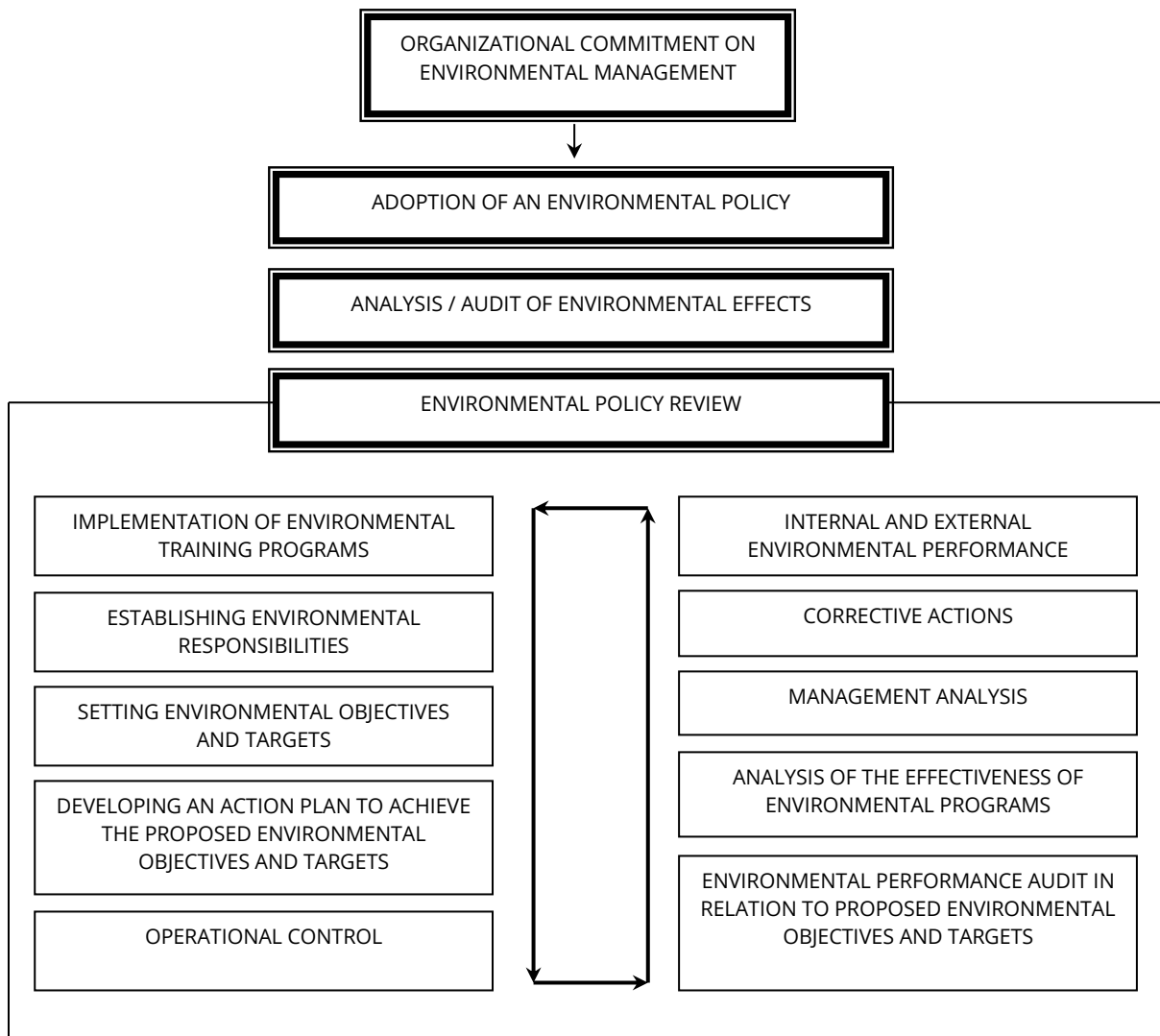


Fig. 2: EMS structure (architecture).

Source: Tinsley and Pillai, 2006; Herghiligiu, 2013; Herghiligiu and Lupu, 2020.

6.2 Basic principles and elements of the environmental management system

The model envisaged for the environmental management system is based on a conception of an organization that wishes to subscribe to the following basic principles (Lupu, 2014; Herghiligiu and Lupu, 2020):

- Principle 1 - Commitment and policy;
- Principle 2 - Planning;
- Principle 3 - Implementation (Implementation);
- Principle 4 - Measurement and evaluation;
- Principle 5 - Analysis and improvement.

In this context, the EMS is seen as an organizational structure that must be continuously monitored and periodically analysed to effectively conduct the environmental activities of an organization in response to changes in internal and external factors that influence the organization (Lupu, 2014; Herghiligiu and Lupu, 2020).

6.2.1 Principle 1 - Commitment and policy

According to this first principle, it is recommended that the organization define its environmental policy and undertake to introduce its own EMS.

COMMITMENT OF MANAGEMENT AND EXERCISE OF MANAGEMENT

The commitment of the organization's management and its permanent commitment in the exercise of environmental management is essential for the success of the introduction of an EMS. This means that for each stage of the development or improvement of an EMS it is necessary to involve the top management of the organization (Lupu, 2014; Herghiligiu and Lupu, 2020).

Here are some examples of commitments that can be included in environmental policy in addition to specific environmental regulations (Lupu, 2014; Herghiligiu and Lupu, 2020):

- Reducing any significant negative environmental impact of new activities by using integrated environmental management and planning procedures;
- setting up procedures for assessing environmental performance and associated indicators;
- concretization of the concept regarding the life cycle;
- creating products to reduce their impact on the environment in production, use and disposal;
- preventing pollution, reducing waste and consuming resources (materials, fuels and energy) and engaging, where possible, in recovery and recycling rather than disposal;
- education and training;
- sharing the experience gained in the field of the environment;
- involving stakeholders and establishing good communication with them;
- work for sustainable development;
- encouraging suppliers and contractors to adopt an EMS

INITIAL ENVIRONMENTAL ANALYSIS

The current situation of an organization in terms of environmental protection can be established through an initial analysis that may include (Lupu, 2014; Herghiligiu and Lupu, 2020):

- identification of legal requirements and various regulations;
- identifying the environmental aspects of one's activities, products or services to determine those that have or may have a significant impact on the environment and that involve responsibilities;
- performance evaluation compared to relevant criteria, internal or external, with regulations, codes of good practice, principles and guidelines;
- existing practices and procedures in the field of environmental management. identifying existing policies and procedures in procurement and contracting activities;
- the reaction following the investigation of previous incidents related to non-conformities;
- opportunities to improve competitiveness;
- the points of view of the interested parties;
- functions or activities of other organizational systems that may improve or impede environmental performance.

Some common techniques for performing an analysis include (Lupu, 2014): (i) questionnaires; (ii) interviews; (iii) checklists; (iv) direct measurements and examinations; (v) analysis of records; (vi) reports.

ENVIRONMENTAL POLICY - Development of environmental policy

ISO 14001 definition: "Environmental policy is the declaration by the organization of its intentions and principles regarding global environmental performance, which provides the framework for action and the establishment of its general and specific environmental objectives" (Lupu, 2014; Herghiligiu and Lupu, 2020).

According to ISO 14001, the requirements of the environmental policy are:

- A. Mandatory requirements regarding the content of the environmental policy
 - Compliance with environmental regulations
 - Continuous improvement
 - Pollution prevention
- B. Requirements regarding the adaptation of the environmental policy to the specifics of the organization
 - The nature and dimensions of the organization
 - Environmental impact of activities, products and services
 - General objectives and specific objectives
- C. Requirements regarding the implementation of the environmental policy
 - Documentation
 - Publication and communication to staff
 - Availability to the public

6.2.2 Principle 2 - Planning

The elements of an environmental management system related to planning include (Lupu, 2014; Herghiligiu and Lupu, 2020):

- identifying environmental aspects and assessing the associated impacts;
- legal requirements;
- environmental policy;
- internal performance criteria;
- environmental objectives and targets;
- environmental plans and management program.

IDENTIFYING ENVIRONMENTAL ASPECTS AND ENVIRONMENTAL IMPACT ASSESSMENT

This process includes (Lupu, 2014; Herghiligiu and Lupu, 2020):

- identifying the conditions imposed by regulations, legislation and the business that influences the organization.
- identifying the impact on human health and safety, as well as assessing the risks to the environment.

Identifying environmental issues and assessing the environmental impacts associated with these issues is a process that can be addressed in four stages, as follows:

Stage I: Choosing an activity, product or service.

It is made based on the organization's operational flow chart presented in Figure 3.

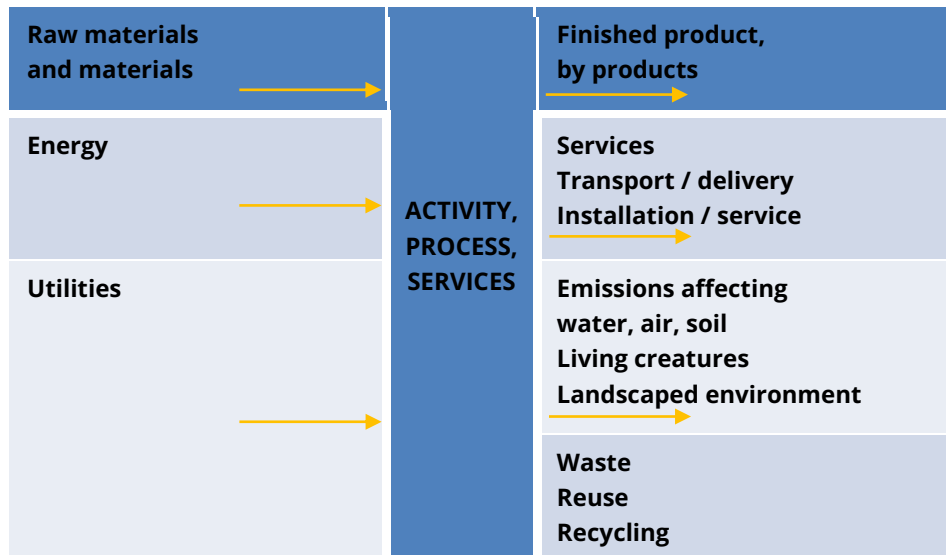


Fig. 3: Organization's operational flow chart.

Source: Tinsley and Pillai, 2006; Herghiligiu, 2013; Herghiligiu and Lupu, 2020.

Stage II: Identifying the environmental aspects of the activity, product or service

a. Identifying and analysing environmental aspects:

- Emissions to water and air
- Soil and groundwater pollution
- Storage, handling, transport of ordinary and hazardous waste
- Use and consumption of raw materials, materials and energy
- Location and intensity of radiation sources
- Elements regarding the safety and health of employees
- Local environmental issues, their influence on the community, potential dangers

b. Analysis of the previous or planned activity in the future:

- Documentation for the environmental agreement/authorization
- Results of environmental inspections
- Environmental costs of previous actions
- Processes, services and products planned by the organization for the future and their possible consequences
- Procedures, internal regulations, pollution prevention plans and programs
- Analysis sheets, measurements, systematic and occasional records

c. Analysis of the functioning of the organization in normal/abnormal operating conditions or emergency/calamities situations:

- Processes carried out under normal operating conditions
- Processes in abnormal operating conditions
- Stops for emergencies or disasters.

Stage III: Identifying environmental impacts

Types of pollutants and environmental impact

Activity, product or service	Environmental aspect	Pollutants	Impact	Impact Description
...

Stage IV: Impact assessment (according to ISO 14004)

Environmental considerations:

- Impact size
- Severity of impact
- Probability of occurrence
- Duration of the impact

Business considerations:

- Existence of legal provisions and regulations
- The difficulty of changing the impact
- The cost of changing the impact
- The effect of the change on other activities and processes
- Stakeholder concerns
- The effect on the public image of the organization

LEGAL PROVISIONS AND OTHER REQUIREMENTS

It is recommended that the organization establish, apply and maintain procedures for identifying, accessing and knowing the legal and other requirements to which it has subscribed and which directly relate to the environmental aspects of its activities, products or services (Lupu, 2014; Herghiligiu and Lupu, 2020).

The ISO 14001 standard requires "the organization to establish and maintain a procedure for identifying and accessing legal provisions and other requirements that have been adopted by the organization."

Types of regulations:

- Specific regulations of the organization
- Specific regulations for the organization's products and services
- Specific regulations specific to the industry to which the organization belongs
- Environmental laws
- Licensing authorizations and premises

Typical legal requirements:

- Operating authorization and compliance plan
- Planning, construction authorization
- Water management permit
- Environmental protection law
- Regulations on air pollutant emissions and air quality protection
- Regulations regarding the management of toxic and hazardous waste and substances.

ENVIRONMENTAL OBJECTIVES AND TARGETS

To achieve the environmental policy of an organization, it is recommended to set a series of objectives. According to ISO 14001 standard, the main aspects targeted by the objectives are (Lupu, 2014; Herghiligiu and Lupu, 2020):

- Legal provisions and other requirements
- Significant environmental aspects
- Technological options
- Financial, operational and commercial requirements
- Stakeholders' views.

The environmental objectives represent the general goals and the level of performance regarding the environment that the organization has proposed in its environmental policy. Environmental targets can be detailed and set to achieve these goals, along with the expected time frame. (Lupu, 2014; Herghiligiu and Lupu, 2020).

The format of the document that will include environmental objectives and targets can be seen in the following (Lupu, 2014; Herghiligiu and Lupu, 2020):

No.	Field / activity	Objectives	Specific objectives / Environmental targets	Deadline
...

Or

No.	Environmental policy article	General environmental objective	Environmental target
...

After setting goals and objectives, it is recommended that the organization establish measurable indicators of environmental performance. These indicators can be used as a basis for an environmental performance assessment system and can provide information on operational and environmental management systems (Lupu, 2014; Herghiligiu and Lupu, 2020).

Environmental goals and targets can generally be applied to all sectors of an organization, or they can be limited to specific places or activities. It is recommended that the objectives and targets be defined by appropriate levels of leadership. Objectives and targets should be analysed and reviewed periodically taking into account the considerations made by different stakeholders (Lupu, 2014; Herghiligiu and Lupu, 2020).

Progress in achieving a goal can be measured in general, using environmental performance indicators such as (Lupu, 2014; Herghiligiu and Lupu, 2020):

- the amount of raw materials or energy used;
- the amount of emissions, such as CO₂;
- the quantity of waste produced, related to the quantity of finished product;
- efficient use of materials and energy;
- the number of environmental incidents (for example, deviations from the limits);
- number of environmental accidents (for example, unintentional releases);
- percentage of recycled waste;
- percentage of recycled materials used in packaging;
- number of kilometres travelled by vehicles, per production unit;
- quantities of specific pollutants;
- investing in environmental protection;
- number of complaints;
- the land area transformed into natural habitat.

ENVIRONMENTAL MANAGEMENT PROGRAM

As part of the planning action, it is recommended that the organization develop an environmental management program that includes all its environmental objectives. Environmental management programs must establish graphics, resources and responsibilities for achieving the environmental objectives and targets of the organization (Lupu, 2014; Herghiligiu and Lupu, 2020).

The format of the document that will include the environmental management program can be seen in the following (Lupu, 2014; Herghiligiu and Lupu, 2020):

Environmental policy	Environmental factor	Objectives	Targets	Programme	Actions	Responsibilities	Resources	Deadline
...

6.2.3 Principle 3 - Putting into practice (implementation)

For the effective implementation of the environmental management system, it is recommended that the organization develop the capabilities and support mechanisms necessary to meet its environmental policy, objectives and targets (Lupu, 2014; Herghiligiu and Lupu, 2020).

MEANS INSURANCE

Human, material and financial resources

It is good to consider some issues regarding human, material and financial resources (Lupu, 2014; Herghiligiu and Lupu, 2020): How to identify and allocate the organization the human, material and financial resources necessary to achieve its environmental goals and objectives, including for new projects? How does the organization track the costs and benefits of environmental activities?

INTEGRATION AND HARMONIZATION OF EMS INTO THE EXISTING MANAGEMENT SYSTEM

Elements of the general management system that may be subject to EMS harmonization and integration (Lupu, 2014; Herghiligiu and Lupu, 2020):

- organization policies;
- resource allocation;
- operational control and documentation;
- support and information systems;
- training and development;
- organization and structure of responsibilities;
- appreciation and reward systems;
- measurement and monitoring systems;
- communication and reporting.

LIABILITIES AND RESPONSIBILITIES

Operational management must clearly define responsibilities and in turn, assume responsibility and accountability for the effective implementation of the EMS and the achievement of the desired environmental performance. Employees at all levels are responsible for fulfilling their responsibilities in achieving environmental performance and supporting the overall environmental management system (Lupu, 2014; Herghiligiu and Lupu, 2020).

ENVIRONMENTAL AWARENESS AND MOTIVATION

Leadership at the highest level has a key role in achieving employee awareness and motivation, by explaining environmental values and transmitting, communicating to all staff their commitment to environmental policy (Lupu, 2014; Herghiligiu and Lupu, 2020).

KNOWLEDGE, COMPETENCE AND TRAINING

The knowledge and skills necessary to achieve environmental objectives should be identified and highlighted. Appropriate training, appropriate to the implementation of environmental policies, objectives and targets, should be provided for all staff in the organization (Lupu, 2014; Herghiligiu and Lupu, 2020).

SUPPORT ACTIONS FOR THE IMPLEMENTATION OF AN EMS

Communication and reporting

Communication involves establishing internal and external reporting processes on the organization's environmental activities. The results of EMS monitoring, audits and analyses performed by management must be brought to the attention of those responsible for achieving a certain performance on environmental protection. (Lupu, 2014; Herghiligiu and Lupu, 2020)

DOCUMENTATION ACTIVITY AND DOCUMENT EVIDENCE

It is recommended that the operational processes and procedures be defined and have the appropriate documentation and when necessary updated. Such a summary document can serve as a reference for the implementation and maintenance of the organization's environmental management system. All documentation should be dated (including revision data), easily identifiable, organized and kept for a specified period. (Lupu, 2014; Herghiligiu and Lupu, 2020).

CONTROL OF ACTIVITIES AND OPERATIONS CARRIED OUT WITHIN EMS

Putting EMS into practice involves establishing and maintaining control procedures to ensure that environmental policy, objectives and targets are met (Lupu, 2014; Herghiligiu and Lupu, 2020).

Document Control

This paragraph of the standard provides procedures for the control of all SMM documents. Particular attention is paid to updating and revising documents, withdrawing those documents that are no longer in force, and managing them properly to protect them against unintended use (Lupu, 2014; Herghiligiu and Lupu, 2020).

Operational control

It refers to those operations and activities that are associated with significant environmental issues. Carrying out this type of control reduces the significant impacts at the source; the provisions of this paragraph refer only to the processes that produce significant impacts and not to all the activities of the organization (Lupu, 2014; Herghiligiu and Lupu, 2020).

EMERGENCY PREPARATION AND RESPONSE CAPACITY

In this regard, the organization must develop and maintain procedures to address environmental incidents and possible emergencies (Lupu, 2014; Herghiligiu and Lupu, 2020).

6.2.4 Principle 4 - Measurement and evaluation

VERIFICATION AND CORRECTIVE ACTION

It is recommended that the organization monitor and evaluate its environmental performance (Lupu, 2014; Herghiligiu and Lupu, 2020).

MONITORING AND MEASUREMENT

It refers to the monitoring of environmental aspects with significant impact, namely the measurement and monitoring of the main characteristics of these aspects. The main characteristics are often understood only by the process parameters. The information obtained through monitoring and measurement must be able to follow the evolution of the environmental performance of the organization. The assessment, which is based on the information provided following the monitoring and measurement operations, is a component of the process of continuous improvement to which the organization has committed itself through the declared environmental policy. (Lupu, 2014; Herghiligiu and Lupu, 2020)

In this sense, at least two procedures are required (Lupu, 2014; Herghiligiu and Lupu, 2020):

1. A procedure for regular monitoring and measurement of the main features of operations and activities that may have a significant impact on the environment. This procedure will have to answer at least three basic questions:
 - Who performs the monitoring and measurements?
 - How, using what methods, devices, instruments and criteria?
 - How often?

2. A procedure for the periodic assessment of compliance with applicable environmental regulations and legislation.

This procedure will need to ensure that:

- The legislative framework is complete and up to date
- All aspects of compliance with this framework are taken into account.

There is also a reference of the paragraph which refers to the calibration and maintenance of the monitoring equipment, the keeping of records of this process following the procedures of the organization (no procedure required). ISO 14031 "Environmental performance assessment - guidelines" and ISO 14032 "Environmental performance assessment - studies based on the use of ISO 14031" will provide the necessary elements and clarifications for the objective monitoring of the environmental performance of the organization. (Lupu, 2014; Herghiligiu and Lupu, 2020)

NON-COMPLIANCE, CORRECTIVE ACTION AND PREVENTIVE ACTION

Nonconformities can be identified by: periodic evaluations, system audits, following the analysis performed by management, following the analysis of the consequences of accidents or emergencies or the consequences of changes in EMS (Lupu, 2014; Herghiligiu and Lupu, 2020).

The following types of procedures will be prepared (Lupu, 2014; Herghiligiu and Lupu, 2020):

1. In this respect, a procedure should specify the responsibilities and authority for such situations.
2. Another procedure must also provide for:
 - How the non-conformities found will be treated and analysed;
 - Take the necessary measures to reduce the impacts produced.
3. Procedure for corrective and preventive action.

Non-compliances are not only of a legislative nature, they can also be physical (uncontrolled leakage from pipes), operational (exceeding the frequency, flow rates, temperatures established by internal operating rules) or due to incorrect management of documents. The extent of corrective actions must be dimensioned according to the impact on the environment produced by the significant aspect considered (Lupu, 2014; Herghiligiu and Lupu, 2020).

RECORDS

Procedures for the identification, preservation and destruction of environmental records will be established and maintained. A distinction must be made between (i) keeping information-recording on paper or computer the results obtained from monitoring, (ii) keeping records-keeping files or files so as not to be lost or physically damaged. (Lupu, 2014; Herghiligiu and Lupu, 2020).

EMS AUDITS

Environmental audits must be planned and carried out with the support of the ISO 19011 Standard - Guidelines for carrying out Audits.

The audit program must include concrete elements regarding the audits to be performed: planning these activities and areas, specifying the auditors who are responsible for carrying them out, the period of these audits. The audit procedure will have to describe the audit method used, the qualification required of the auditors, the manner of communicating the results of the audits to

the management, etc. It is recommended that SMM audits be performed periodically to determine if the system is in line with planned measures and is properly implemented and maintained. SMM audits can be performed by members of the organization's staff and/or by external participants chosen by the organization. In all cases, it is recommended that the person (s) conducting the audit be able to do so objectively and impartially and have the appropriate training. The frequency of audits is determined by the nature of the activities, depending on the aspects and the potential impact on the environment. (Lupu, 2014; Herghiligiu and Lupu, 2020).

6.2.5 Principle 5 - Analysis and continuous improvement

ANALYSIS OF THE ENVIRONMENTAL MANAGEMENT SYSTEM

The organization's management analyses the EMS to ensure its continuous adaptation and efficiency (Lupu, 2014).

The EMS analysis must include (Lupu, 2014; Herghiligiu and Lupu, 2020):

- analysis of objectives, targets and environmental performance;
- SMM audit findings;
- evaluation of its efficiency;
- evaluation of the opportunity of the environmental policy and the necessity of the changes within it, taking into account the changes that appeared at the level of the specific legislation;
- changing the expectations and requirements of stakeholders;
- changes in the organization's products or activities;
- discoveries in science and technology;
- lessons learned from environmental incidents;
- market preferences;
- reporting and communication.

CONTINUOUS IMPROVEMENT

The concept of continuous improvement consists of a continuous assessment of the environmental performance of EMS concerning environmental policies, objectives and targets to identify opportunities for improvement (Lupu, 2014; Herghiligiu and Lupu, 2020).

The process of continuous improvement must include the following actions (Lupu, 2014):

- identifying the areas in which the environmental management system can be improved leading to the improvement of the environmental performance;
- determining the cause or underlying causes of nonconformities or deficiencies;
- elaboration and implementation of plans for preventive and corrective actions to respond to these causes;
- checking the efficiency of preventive and corrective actions;
- providing the necessary documentation for any action to improve the EMS;
- making a permanent comparison with environmental objectives and targets.

7 References

- Asociația de Standardizare din România – ASRO, (2005a), Sisteme de management de mediu. Cerințe cu ghid de utilizare, SR EN ISO 14001: 2005.
- Asociația de Standardizare din România – ASRO, (2005b) Sisteme de management de mediu. Linii directoare referitoare la principii, sisteme and tehnici de aplicare, SR EN ISO 14004: 2005.
- Ball, J., (2002), Can ISO 14000 and eco-labelling turn the construction industry green?, *Building and Environment*, 37 (4), 421-428.
- Bolis I., Morioka S.N., Sznelwar L.I., (2017), Are we making decisions in a sustainable way? A comprehensive literature review about rationalities for sustainable development, *J. Clean. Prod.*, 145, 310-322.
- Esty D.C., Cort T. (2017), *Corporate Sustainability Metrics: What Investors Need and Don't Get*. Yale University. Available online: <https://corporatesustainability.org/wp-content/uploads/Corporate-Sustainability-Metrics.pdf>
- Fortunski, B., (2008), Does the environmental management standard ISO 14001 stimulate sustainable development? An example from the energy sector in Poland, *Management of Environmental Quality: An International Journal*, 19 (2), 204-212
- Gavronski, I., Ferrer, G., Paiva, E., (2008), ISO 14001 certification in Brazil: motivations and benefits, *Journal of Cleaner Production*, 16, 87-94.
- Glavic, P., Lukman, R., (2007), Review of sustainability terms and their definitions, *Journal of Cleaner Production*, 15, (18), 1875-1885.
- González, P., Sarkis, J., Adenso-Díaz, B., (2008), Environmental management system certification and its influence on corporate practices: evidence from the automotive industry, *International Journal of Operations & Production Management*, 28 (11), 1021-1041
- Herghiligiu I.V., Lupu L.M., (2020), Managementul mediului – note de curs, Universitatea Tehnică „Gheorghe Asachi” din Iaand, domeniul de licență – Inginerie and management, 2020. Available online: https://edu.tuiasi.ro/pluginfile.php/86798/mod_resource/content/1/Curs_disciplina%20Managementul%20mediului%20-%20note%20de%20curs_Herghiligiu%20I.V.%20si%20Lupu%20M.L_2020.pdf
- Herghiligiu IV, Robu I-B, Pislaru M, Vilcu A, Asandului AL, Avasilcăi S, Balan C., (2019), Sustainable Environmental Management System Integration and Business Performance: A Balance Assessment Approach Using Fuzzy Logic. *Sustainability*, 11(19):5311. <https://doi.org/10.3390/su11195311>
- Herghiligiu, I.V., (2013), Cercetari privind sistemul de management de mediu ca proces complex la nivelul organizatiilor, Teza de Doctorat, Universitatea Tehnica „Gheorghe Asachi” din Iasi.
- Ionescu, C., (2000), Cum să construim and să implementăm un sistem de management de mediu în conformitate cu ISO 14001, Editura Economică, București, România.
- ISO. ISO 14001:2015. International standard: environmental management systems – requirements with guidance for use. Geneva, Switzerland: International Organization for Standardization; 2004.
- Lupu, L.M., (2014), Ingineria and managementul mediului, curs universitar, Universitatea Tehnică „Gheorghe Asachi” din Iaand.

- Melnyk, S.A., Sroufe, R.P., Calantone, R., (2002), Assessing the impact of environmental management systems on corporate and environmental performance, *Journal of Operations Management*, 21 (3), 329-351
- Moisio J., Tuominen K., (2003), *Environmental Management System. ISO 14001*, Benchmarking Ltd.
- Oliveira, O.J., Serra, J.R., Salgado, M.H., (2010), Does ISO 14001 work in Brazil?, *Journal of Cleaner Production*, 18. 1797-1806.
- Perotto, E., Canziani, R., Marchesi, R., Butelli, P., (2009), Environmental performance, indicators and measurement uncertainty in EMS context: a case study, *Journal of Cleaner Production*, 16 (4), 517-530
- Pislaru M., Herghiligiu I.V., Robu I.B., (2019), Corporate sustainable performance assessment based on fuzzy logic. *J. Clean. Prod.*, 223, 998-1013.
- Reyes, D., Wright, T., (2001), A design for the environment methodology to support an environmental management system, *Integrated Manufacturing Systems*, 12 (5), 323-332
- Robert, K.H., (2000), Tools and concepts for sustainable development, how do they relate to a general framework for sustainable development, and to each other?, *Journal of Cleaner Production*, 8 (3), 243-254.
- Robert, K.H., et al., (2002), Strategic sustainable development: selection, design and synergies of applied tools, *Journal of Cleaner Production* 10 (3), 197-214
- Rowland-Jones, R., Cresser, M., (2005), An evaluation of current environmental management systems as indicators of environmental performance, *Management of Environmental Quality: An International Journal*, 16 (3), 211-219
- Sala, S., (2020), *Biofuels for a More Sustainable Future. Life Cycle Sustainability Assessment and Multi-Criteria Decision Making*, Chapter 3 - Triple bottom line, sustainability and sustainability assessment, an overview, Elsevier.
- Tari J.J., Molina-Azorin J.F., Heras I., (2012), Benefits of the ISO 9001 and ISO 14001 standards: A literature review, *Journal of Industrial Engineering and Management*, 5 (2), 297-322.
- Teodosiu, C., (2005), *Management integrat al mediului*, Editia a II-a, Editura Ecozone, Iaand, România.
- Tinsley, S., Pillai I., (2006), *Environmental Management Systems. Understanding Organizational Drivers and Barriers*, Editura Earthscan, U.K..
- Zutshi, A., Sohal, A.S., (2004), Adoption and maintenance of environmental management systems: critical success factors, *Management of Environmental Quality: An International Journal*, 15 (4), 399-419.

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