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ISO 14001 Environmental Standard: Process Approach and Identification of Environmental Aspects and Impacts

By Hanane El Fadel, Mohammed Merzouki & Mohamed Benlemlih

University of Sidi Mohamed Ben Abdella

Abstract- Environmental management is the management of activities that may have an impact on the environment [1]. It aims to limit polluting emissions and risks to the environment and to save natural resources [2]. Often unsuspected and therefore without us always realizing it, all economic activities can have a considerable impact on the environment [3]. Indeed, the manufacture of products requires the extraction of raw materials and the use of water and energy [4]. Similarly, activities associated with the manufacturing process, such as maintenance, transportation; all have environmental impacts [5]. The environmental management system is a progress tool that integrates the environmental dimension into an organization's strategy, leading it to set objectives, achieve and maintain performance through effective management and promotes anticipation (the forecast).

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ISO 14001 Environmental Standard: Process Approach and Identification of Environmental Aspects and Impacts

Hanane El Fadel [α], Mohammed Merzouki [σ] & Mohamed Benlemlih [ρ]

Abstract- Environmental management is the management of activities that may have an impact on the environment [1]. It aims to limit polluting emissions and risks to the environment and to save natural resources [2]. Often unsuspected and therefore without us always realizing it, all economic activities can have a considerable impact on the environment [3]. Indeed, the manufacture of products requires the extraction of raw materials and the use of water and energy [4]. Similarly, activities associated with the manufacturing process, such as maintenance, transportation; all have environmental impacts [5]. The environmental management system is a progress tool that integrates the environmental dimension into an organization's strategy, leading it to set objectives, achieve and maintain performance through effective management and promotes anticipation (the forecast).

There is a multitude of guides allowing self-diagnosis by the organization and which make it possible to make an environmental assessment. ISO 14001 is the environmental management standard created by the international organization for standardization [6]. It defines the requirements of a global environmental management system for self-reporting or certification purposes [7]. It is organized in 17 points modeled on quality management, well known for 34 years in the industry. The standard does not establish any absolute requirement for environmental performance, other than a commitment to environmental policy, to comply with legislation and the principle of continuous improvement [8].

Pollution prevention through the identification of the various significant environmental aspects and impacts, which accounted for 70% of the requirements of ISO 14001, is the main environmental improvement point [9]. In addition, since these environmental aspects and impacts can only be identified from the activities, products and services associated with them, this article represents a working method that allows expressing good environmental practices, present in the form of environmental performance indicators that inform in a concentrated and precise manner on the different activities with environmental relevance.

I. Working Methodology

a) General Requirements

The organization must establish and maintain an environmental management system whose requirements are described as follows:

Author α σ ρ: Laboratory of Environmental Biotechnology, Faculty of Sciences Dhar el Mahraz, University of Sidi Mohamed Ben Abdellah, Fez, Morocco. e-mail: elfadelha@gmail.com

i. *Environmental Policy*

Management at the highest level must define their organization's environmental policy.

ii. *Panning*

Environmental Aspects:

The organization must maintain procedures for identifying the environmental aspects of the various activities

General Requirements and other:

The organization must maintain a procedure for identifying the legal and other requirements applied to the environmental aspects of the activities.

Objectives and Targets:

The organization must establish and maintain environmental objectives and targets.

Environnemental Management Program:

To achieve these objectives, the organization must establish and maintain one or more programs.

b) Implementation and Operation

i. *Structure and Responsibility*

The environmental management system requirements are established, implemented and maintained in accordance with this international standard.

ii. *Training, Awareness and Competency*

The staff should be made aware of:

- The importance of compliance with environmental policy and environmental management system requirements;
- With significant environmental impacts;
- Their roles and responsibilities to achieve compliance with environmental policy and requirements;
- Potential consequences of deviations from specified operating procedures.

iii. *Communication*

The organization shall establish and maintain procedures for:

- Ensure internal communication between the different levels and functions of the organization;
- Receive, document and respond to relevant requests from external stakeholders.

iv. *Environmental Management System Documentation*

The organization must establish and maintain paper or electronic information and maintain procedures to control all documents required by the standard:

Operational Proficiency

The organization must identify those of its operations and activities that are associated with significant environmental aspects

Emergency Prevention and Responsiveness

The organization must identify potential accidents and emergency situations and be able to react to reduce the associated environmental impacts.

v. *Control and Corrective Action*

Monitoring and Measurement

The organization must regularly monitor and measure activities that may have a significant environmental impact.

Non-compliance, corrective action and preventive action

The organization must define the responsibilities for the analysis of non-conformities, the taking of measures to reduce potential impacts, as well as to commit and carry out corrective and preventive and corrective actions.

Recordings

The organization must establish and maintain one or more programs and procedures for periodic audits of the environmental management system

vi. *Management Review*

The organization's management must review the environmental management system to ensure that it is still appropriate, sufficient and effective, as well as any changes to elements of the environmental management system.

II. Perform Self-Diagnosis

a) Identification of the Most Significant Environmental Aspects and Impacts of the Various Activities:

Environmental aspect: An element of an organization's activities, products or services that may interact with the environment. An aspect is therefore synonymous with impact factor, the aspect is the source of impacts [10].

Environmental impact: Any change in the environment, negative or beneficial, resulting wholly or partially from the activities, products or services of an organization [11].

From the identified activities, products and services, it is still necessary to identify environmental aspects and the impacts associated with them: It is a question of breaking down the activity to identify any operation that may generate nuisances (processes, equipment that has been part of, raw materials, outgoing products, waste or waste generated, resources, fluids and energy used, maintenance and cleaning work of equipment applied to process equipment, etc.).

The decomposition can be done on different levels, from the most general to the most detailed (workshop, manufacturing process, particular equipment) depending on the need to access or not very precise information. For to be more exhaustive, we can, for each activity, study each environment/ area or each nuisance.

The identification of environmental aspects and impacts is made taking into account the situation of the mode of operation (Table 1): Normal (N) as the situation of transitional operation (T) or the Incident operation (I)

Table 1: Situations of Operating Modes

Note	Normal Operation(N)	Transitional March(T)	Incident Operation(I)
1	The event takes place continuously	The event takes place several times a day	The event takes place several times on the site
2	The event takes place at least 50% of the time	The event takes place at least once a week	The event has already happened once on the site
3	The event takes place between 25 and 50% of the time	The event takes place at least once a month	The event has already occurred on similar sites
4	Event takes place at least 25% of the time	The event takes place at least once a month	The event has no known history

The identification of environmental aspects and impacts allows us to see environmental indicators and propose approaches for each indicator that will help us better understand environmental problems, material flows, personal perception and other environmental data.

b) Assessment of Environmental Aspects and Impacts

The process approach and the identification of Environmental Aspects and Impacts allows us to identify:

- Any operation which may generate nuisances (processes, equipment forming part of them, liquid, solid or gaseous discharges, etc.);
- Sensitive points;
- Type of action to be implemented;
- Skills and information required to master processes.

i. *Assessment of Significant Environmental Impacts*

The assessment of environmental impacts is carried out by taking into account three factors (Table 2): «Gravity», «Frequency of occurrence» and «Sensitivity of the receiving environment» and it has 4 stages:

1. *Intrinsic gravity assessment (G):* This involves determining the severity of the environmental impact. For this, it is important to define beforehand the criteria that will be taken into account in order to carry out this evaluation. Criteria such as: toxicity of products, amount of water or energy consumed… what helps to determine the order of magnitude of impacts, either critical, major, limited or minor;
2. *Frequency of occurrence assessment (F):* this involves determining the frequency of occurrence of the Environmental Impact;
3. *The evaluation of the Sensitivity (S):* the sensitivity of the receiving medium is also determined by characterizing the receiving medium (floor tightness for example);

Table 2: Environmental Impact Assessment

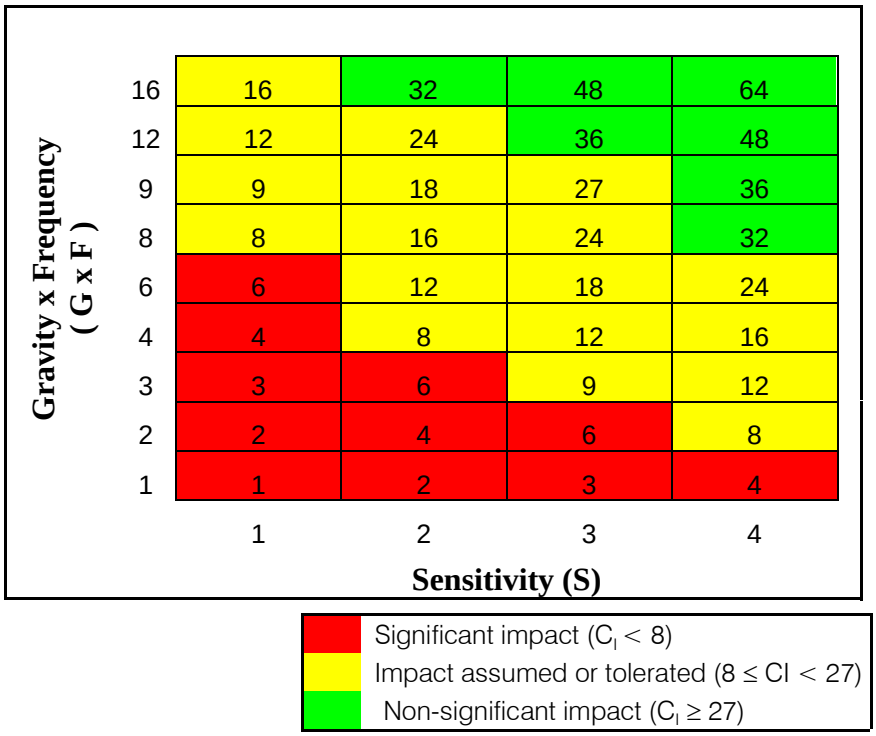
Score/Criterion	Gravity (G)	Frequency (F)	Sensitivity (S)
1	Irreversible damage to living beings (humans, fauna and flora) whether they are internal or external to the organism (critical)	Permanent	Critical
2	Irreversible damage to the environment (major)	Frequent	Important
3	Reversible harm to environment (limited)	occasional	Limited
4	Gene for staff (minor)	Rare	Low

4. Determining the criticality of the environmental impact: Taking into account the previous criteria. This score is obtained by multiplying the elementary scores for each criterion:

$$C_I = G \times F \times S$$

The Table 3 below represents the criticality matrix and determines the significance of the environmental impact:

Table 3: Matrix of Environmental Impact Criticality



ii. *Assessment of Significant Environmental Aspects:*

This part consists of 3 steps, this is to identify 2 other criteria related to the identified environmental aspects:

1. Study of regulatory compliance (C): any aspect not satisfying regulatory constraints and necessarily significant

0	Non-compliant
1	Compliant or non-regulatory

2. Environmental Control Level Assessment (M): Control level is technical, human and organizational. The evaluation must take in to account the principles of prevention

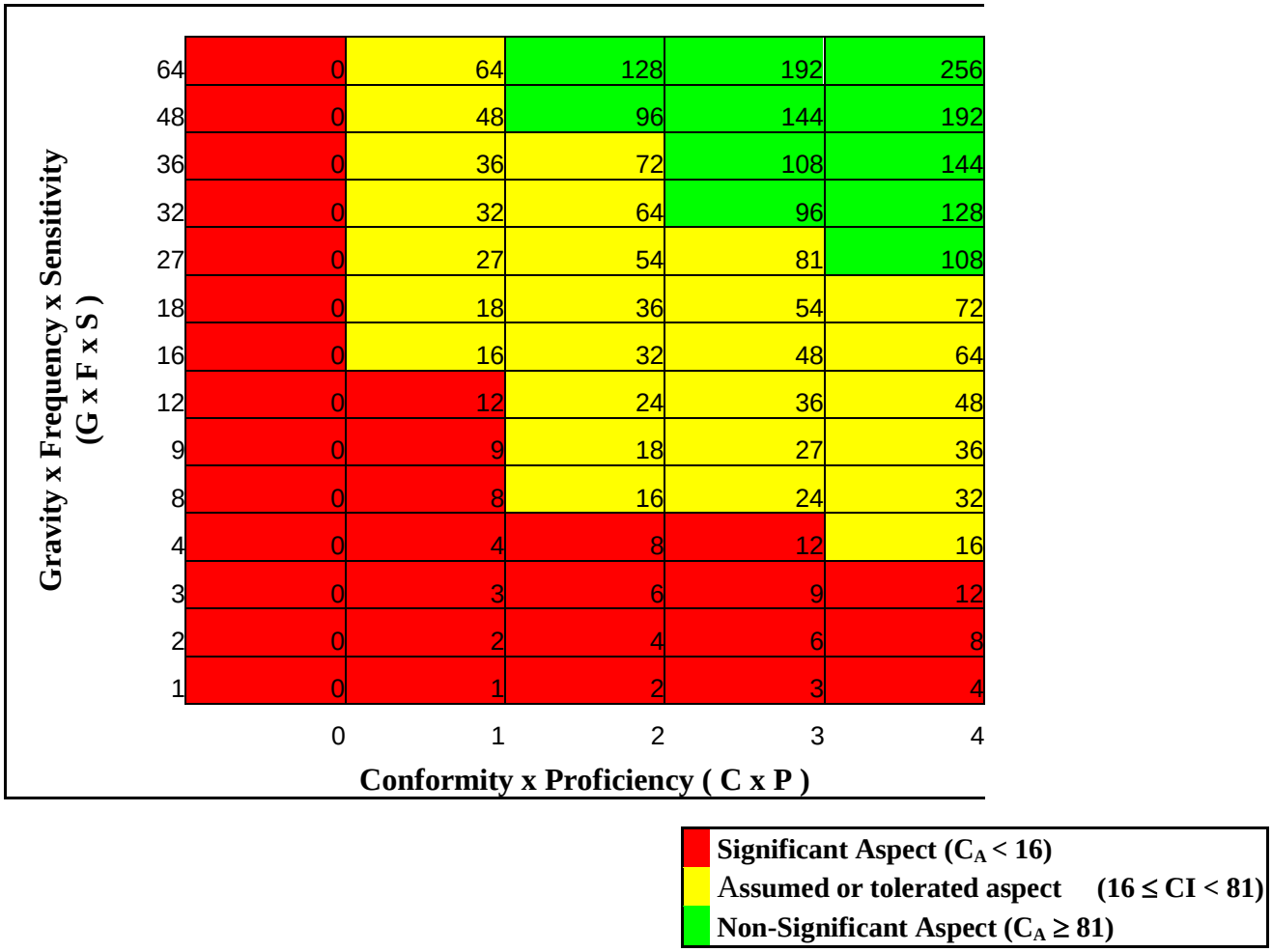
1	Non-existent
2	Low
3	Good
4	maximum

3. Determination of the criticality of the environmental aspect:

$$C_A = C_I \times C \times M$$

The Table 4 represents the criticality matrix and determines the significance of the environmental aspect:

Table 4: Matrix of Environmental Criticality



III. Conclusion

The ISO 14001 standard is the most suitable and appropriate environmental management system for its application, given its commitments and its proactive aspect that does not require an environmental declaration.

In practice, there is a wide variety of methodologies that make it possible to achieve the environmental objective, some of which are limited to a purely formal approach, while others integrate consultation or worker participation.

The methodology proposed in this work allows an improvement of environmental performance in order to achieve a clearly defined goal, the management and protection of the environment in which the activities take place.

References Références Referencias

1. Sophia Su, Kevin Baird and Thanh Phan. The association between ethical leadership and environmental activity management: The mediating role of employee environmental empowerment. Advances in Accounting. August 2023.
2. Aoxiang Zhang, Rongrong Deng and Yunfeng Wu. Does the green credit policy reduce the carbon emission intensity of heavily polluting industries? - Evidence from China's industrial sectors. Journal of Environmental Management. Volume 311, 1 June 2022.
3. Julian Clifton, Eslam O. Osman, David J. Suggett and David J. Smith. Resolving conservation and development tensions in a small island state: A governance analysis of Curieuse Marine National Park, Seychelles. Marine Policy. Volume 127, May 2021.
4. Lorenzo Rinaldi, Matteo Vincenzo Rocco, Emanuela Colombo. Assessing critical materials demand in global energy transition scenarios based on the Dynamic Extraction and Recycling Input-Output framework (DYNERIO). Resources, Conservation and Recycling. Volume 191, April 2023.
5. Uğur Karadurmuş and Levent Bilgili. Environmental impacts of synthetic fishing nets from manufacturing to disposal: A case study of Türkiye in life cycle perspective. Marine Pollution Bulletin. Volume 198, January 2024.
6. Jesus Valero-Gil a, Jordi A. Surroca b, Josep A. Tribo c, Leopoldo Gutierrez d, Ivan Montiel. Innovation vs. standardization: The conjoint effects of eco-innovation and environmental management systems on environmental performance. Research Policy. Volume 52, Issue 4, May 2023.
7. Hsin-Ju Lin and Hwong-wen Ma. Analysis of green certification standards related to recycled materials involving textiles based on life cycle thinking. Sustainable Production and Consumption Volume 41, October 2023.
8. Joel A. Tickner and Ken Geiser. The precautionary principle stimulus for solutions- and Iternatives-based environmental policy. Environmental Impact Assessment Review. Volume 24, Issues 7–8, October–November 2004.
9. Martí Casadesús, Frederic Marimon, Iñaki Heras. ISO 14001 diffusion after the success of the ISO 9001 model. Journal of Cleaner Production. Volume 16, Issue 16, November 2008.
10. Ahm Shamsuzzoha, Anna-Miia Suihkonen, Camilla Wahlberg, Bojan Jovanovski and Sujan Piya. Development of value proposition to promote green innovation for sustainable organizational development. Cleaner Engineering and Technology. Volume 15, August 2023.
11. Henri Jalo and Henri Pirkkalainen. Effect of user resistance on the organizational adoption of extended reality technologies: A mixed methods study. International Journal of Information Management. Volume 75, April 2024.