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

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ABSTRACT : Environmental management is the management of activities that may have an impact on the environment. It aims to limit polluting emissions and risks to the environment and to save natural resources. Often unsuspected and therefore without us always realizing it, all economic activities can have a considerable impact on the environment. Indeed, the manufacture of products requires the extraction of raw materials and the use of water and energy. Similarly, activities associated with the manufacturing process, such as maintenance, transportation; all have environmental impacts. 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 (EMS) created by the international organization for standardization. It defines the requirements of a global environmental management system for self-reporting or certification purposes. 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.

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. 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.

KEYWORDS: ISO 14001, Environmental impact, Pollution, Environmental aspect, EMS.

I. INTRODUCTION

The environmental management system is a progress tool that integrates the environmental dimension into an organization's strategy, leading it to set objectives to achieve and maintain performance through effective management and promotes anticipation (the forecast) **[1]**.

There are a multitude of guides for self-diagnosis by the body that make it possible to make an environmental assessment.

The official standards for environmental management are ISO 14001 and EMAS (Environmental Management and Audit System, known as «Eco-audit») **[2]**.

The main objective of ISO 14001 is to help any type of organization achieve its environmental objectives by providing the elements of an effective environmental management system **[3-6]**. It reconciles a voluntary approach with continuous improvement **[7]**. The other standard, EMAS, was drawn up by the European Community: Regulation of 29 June 1993, and is based on the voluntary participation of bodies. These two standards are similar in their requirements but different, however:

- One is international, the other is limited to the European community **[8]**;
- ISO 14001 is for any "organization", EMAS is limited to industrial enterprises **[9]**;
- The main difference is the requirement to publish a statement of environmental performance in the European regulation **[10]**, not to mention differences in vocabulary; certification for one, registration for the other for example.

An environmental approach, which in addition, is sanctioned by an ISO 14001 certification, improves the company's image and its relations with the public **[11]**. This even becomes a necessary element to attack certain markets. Indeed, ethics and ecological awareness are increasingly developing among consumers and industrial customers. This can jeopardize the future of firms or products deemed to be environmentally unfriendly **[12]**.

The environmental analysis highlights the risks of environmental accidents. Better identified, they will be better controlled, especially since the ISO 14001 standard requires the study of responses associated with emergency situations **[13-15]**. Even improved field practices or investments aimed at preventing the risk of accidents or reducing the consequences encourage insurance companies to reduce the cost of policies with equal coverage **[16-19]**. On the other hand, controlling risk leads to reducing the number of accidents and their severity: the economic consequences for the company can be considerable **[20]**.

II. MATERIALS AND METHODS

This part consists of making an « inventory» at the level of all the activities within an organization present (whether they work or not) within the scope of application. For each activity, it is necessary to analyze or research the steps that can act on such or such field of the environment (water, air, waste, noise, energies, soil and basement, visual aspect, fauna and flora, smells, special radiation).

The identification of environmental aspects and the assessment of associated impacts constituted 70% of the requirements of the ISO 1400 standard, it is a dynamic process that determines the past, present and potential environmental impacts (whether beneficial or negative) the activities of an organization. This process also involves taking into account the potential regulatory, legal and economic constraints affecting the organization. It may also include the identification of impacts on the health and safety of persons, as well as the assessment of risks to the environment.

This identification should be completed in a comprehensive manner and in varying degrees of detail in the following four steps:

Step 1: Choosing an activity, product or service

The chosen activity, product or service should cover a field sufficiently large for its examination to be eloquent, but not too complex to be easily understood;

Step 2: Identification of environmental aspects of the activity, product or service

This involves identifying the greatest number of environmental aspects associated with the chosen activity, product or service;

Step 3: Identification of environmental impacts

Identify as many of the environmental impacts, real and potential, beneficial and negative, associated with each identified aspect;

Step 4: Assessment of the importance of impacts

The significance of each of the identified environmental impacts may vary from one organization to another. Quantification can facilitate assessment.

III. RESULTS AND DISCUSSION

III.1. Identification of the most significant environmental aspects and impacts of the various activities: 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.

III.2. 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.

III.2.1. 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

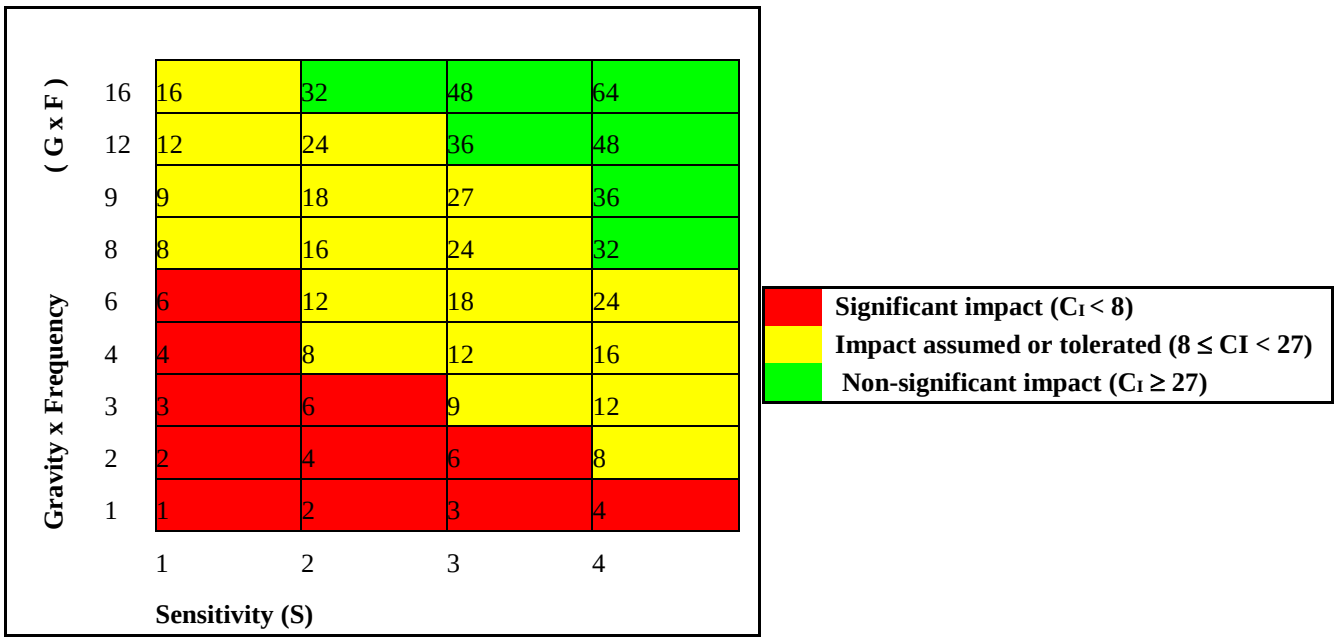
Score/Criterion	Gravity (G)	Frequency (F)	Sensitivity (S)
1	Irreversible damage to living beings (humans, fauna and flora) whether they are internal or external to the organism (critical)	Permanent	Critical
2	Irreversible damage to the environment (major)	Frequent	Important
3	Reversible harm to environment (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.2.2. 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 into 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

Gravity x Frequency x Sensitivity (G x F x S)	0	1	2	3	4
64	0	64	128	192	256
48	0	48	96	144	192
36	0	36	72	108	144
32	0	32	64	96	128
27	0	27	54	81	108
18	0	18	36	54	72
16	0	16	32	48	64
12	0	12	24	36	48
9	0	9	18	27	36
8	0	8	16	24	32
4	0	4	8	12	16
3	0	3	6	9	12
2	0	2	4	6	8
1	0	1	2	3	4
	0	1	2	3	4

Conformity x Proficiency (C x P)

	Significant Aspect (C_A < 16)
	Assumed or tolerated aspect (16 ≤ CI < 81)
	Non-Significant Aspect (C_A ≥ 81)

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.

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