

PROPOSITION OF THE FILTER OF SIGNIFICANCE IN THE EVALUATION OF ENVIRONMENTAL IMPACTS IN ACCORDANCE WITH THE ENTERPRISE LOCATION

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ABSTRACT

The identification of environmental aspects and impacts is part of the preconditions to environmental documents, like licensing, and it can be considered the beginning of the implementation of Environmental Management Systems, according to ISO 14001. One of the definitions for the terms of aspects and impacts can be found in the Brazilian Standard ABNT NBR ISO 14001: 2004 Environmental Management Systems, where "environmental aspect is any element of activities, products or services from an organization that can interact with the environment" and "impact is any change to the environment, whether adverse or beneficial, resulting, in whole or in just a part, on environmental aspects of the organization". The impacts can be characterized as normal or fortuitous, classified as beneficial or adverse, whether the impact is direct or indirect and whether it is a past, present or future impact. It is important to evaluate the intensity, scope, frequency and probability of the impact. At the end of this evaluation, it is possible to apply the "filters of significance" that correspond to the use of special requirements, giving more importance to those previously determined. These filters may be legal requirements, technical standards and the company's environmental policy. This paper proposes the "filter of significance" to ponder the impacts according to the location of the project, demonstrating that this filter application allows environmental impacts to be prioritized comparatively, among organizations which have headquarters and branches or a matrix and experimental centers in different locations and, consequently, distinct ecosystems.

1. INTRODUCTION

In recent years the concern with the environment has grown noticeably, especially the release of CO₂ into the atmosphere and the consequent global warming, acid rain, deforestation and desertification, coastal and marine degradation. The predictions made by various sectors about the environmental conditions in a few decades make all segments of society to rethink their habits.

The discovery and use of different sources to obtain energy is perhaps the way to reduce global warming, but this will not remove the consequences of these emissions. We can say that the main sources of energy production today are hydroelectric and thermal power plants; less expressively energy can be obtained by means of biomass, wind, the solar photovoltaic and nuclear power plants. According to Reis, 2005, "although nuclear energy is not renewable, it does not generate direct emissions and will have a very important role in the future of humanity" [1].

Sustainability is the word that stands for the way we have to live from now on, i.e. being sustainable, having the ability to use natural resources and, somehow, returning them to the planet through practices or techniques developed for this purpose. Sustainability is only possible if each productive sector has full knowledge of its development processes, making it feasible to restructure the production in order to reduce the impact from the acquisition of raw materials to their emissions.

Management systems is a set of interrelated or interactive elements, aimed to establish the policy and environmental objectives of the company, as well as the achievement of these goals [2]. An Environmental Management System (EMS) is defined as a set of procedures that will help the organization to understand, control and reduce the environmental impacts of its activities, products and/or services [3].

In 1996, it was published worldwide the ISO 14000 series of standards aimed at the creation of an Environmental Management System to help organizations meet their commitments to the natural environment, seeking a balance of environmental protection and pollution prevention with socioeconomic needs. In Brazil, the ISO 14000 series of standards maintain the same numeration, preceded by the designator ABNT – Associação Brasileira de Normas Técnicas [3].

These standards establish guidance to set up an environmental management system, namely: environmental diagnosis, survey of environmental aspects, legal requirements, significant environmental aspects, environmental policies, objectives and goals, procedures, training and awareness, internal audit, critical analysis and certification.

1.2 Environmental management systems

ISO 14000 is based on a methodology known as PDCA, also known as the Deming Cycle, consisting of four phases: Plan, Do, Check and Act, which is a tool for the management of a process, task, and others [4].

1.2.1 ABNT NBR ISO 14001:2004 – Environmental management systems - Requirements with guidance for use

In Annex A of this Standard, in item A3 about planning, it is mentioned that "once an organization can have many environmental aspects and associated impacts, it is recommended to establish criteria and a method to determine those impacts that will be considered significant". And in this same item it is clear that there is not one single method for establishment of significant environmental aspects. It is only recommended "that the method provides consistent results and include the establishment and application of evaluation criteria, such as those related to environmental issues, legal issues and concerns of internal and external stakeholders."

It is also worth pointing out that "the identification and evaluation of environmental aspects to take into account the location of activities, cost and time to perform the analysis plus the availability of reliable data."

1.2.2 ABNT NBR ISO 14004:2005 - Environmental management systems – General guidelines on principles, systems and support techniques

In section 4.3.1.4 (Understanding of environmental impacts) there is a list with the identification of significant aspects "to be able to recognize:

- a) positive environmental impacts (beneficial) and negative (adverse);
- b) actual and potential environmental impacts;
- c) environment that can be affected, such as air, water, soil, flora, fauna, cultural heritage, and so on;
- d) the characteristics of location that can affect the impact, such as local weather, high water table, soil types, and others;
- e) the nature of the environmental change (such as global issues vs. local time period in which the impact occurs, potential for accumulation of the impact intensity over the time).

Another important aspect is treated in section 4.3.1.5 (Determination of Significant Environmental Aspects). Significance is a relative concept: it can not be defined in absolute terms. What is significant for an organization may not be significant to another. To assess the significance involves application of both technical analysis and judgement by the organization. The use of criteria should help an organization to establish which environmental aspects and associated impacts are considered significant. It is necessary to establish and apply such criteria to provide consistency and reproducibility in the evaluation of significance. In establishing criteria for significance, it is recommended that an organization should consider the following:

- a) environmental criteria (such as scale, severity and duration of impact, or type, size and frequency of an environmental aspect);
- b) legal requirements (such as emission limits and new developments in regulations or permits and so on);
- c) the concerns of stakeholders, both internal and external (such as those related to the organization values, its public image, noise, odor or visual degradation).

The impacts can be characterized as normal or possible, classified as beneficial or adverse, if the impact is direct or indirect, whether it is an impact of past, present or future. The severity, scope, frequency and probability of the impacts should also be evaluated.

At the end of this evaluation it is still possible to apply "filters of significance" that correspond to the use of special requirements, considered important in order to value, with greater weight, requirements of specific criteria. These filters may be legal requirements, technical standards and the company environmental policy.

This work suggests that institutions/organizations which have matrix and branches or headquarters and experimental centers, identify the environmental impacts taking into consideration the enterprise location.

1.1 WORK OBJECTIVES

The current paper proposes the creation of a filter of significance to be used in the evaluation of ecological impacts, according to the location of the project.

2. METHODOLOGY

This filter may be used for the evaluation of significant impacts in private companies, public institutions and others, which have a matrix and branches and are inserted in distinct ecosystems.

To achieve the target of this work, a Research Institution, Centro Tecnológico da Marinha, in São Paulo was chosen and a group of standards, ISO 14001 and 14004 were applied, for a filter

of significance application.

2.1 Centro Tecnológico da Marinha in São Paulo - CTMSP

The CTMSP is located in the capital of São Paulo, within the University of São Paulo. It is a military organization comprise by the Brazilian Nuclear Program, working in research and development of nuclear and energetic power to be applied in the propulsion of ships, with the ultimate purpose of preserving the maritime interests of Brazil. This Center also develops a Unit of Production of Uranium Hexafluoride – USEXA.

Centro Experimental Aramar (CEA) is part of CTMSP and is situated in the city of Iperó, in an area of a National Forest called Ipanema National Forest, in the state of São Paulo: this area is characterized by the transition from cerrado and atlantic forest remnants. Besides the environmental importance of the National Forest of Ipanema, it also has great historical and cultural importance. CEA includes two well-defined areas of work: the nuclear fuel cycle and nuclear propulsion.

In the CTMSP, design activities are performed, as part of the CEA experimental activities, with specialized workshops, laboratories and test stands, demonstration of industrial nuclear fuel cycle pilot units and infrastructure support for facilities [6].

2.2 Spreadsheet of Evaluation of Environmental Impacts

A subsequent phase in the survey of environmental aspects and impacts is to prioritize those which are the most relevant for the environment, using an evaluation spreadsheet on environmental impacts, ranking the data according to significant factors.

There are several models of Spreadsheet for Environmental Impact Assessment. Figure 1 presents a model suggested by [8] and contains the characterization of the impact (status, incidence, temporality) to assess the impact (severity, scope, frequency or probability) and filter those which bring significant partial results, items such as legal requirements and stakeholders.

Spreadsheet of Evaluation of Environment Impacts													
Departament./ Sector:			Local:						Date:				
PROCESS:			Activity:						Identification:				
IDENTIFICATION		CHARACTERIZATION			EVALUATION			FILTER OF SIGNIFICANCE			COMMENTS		
ASPECT	IMPACT	Status	Incidence	Temporality	Severity	Scope	Frequency or probability	Partial Result	Legal Requirements	Stakeholders	Evaluation Results	Incidence importance	
Responsible:						Sign:							

Figure 1. Model of a Spreadsheet of Environmental Impact Assessment [8]

4. RESULTS

4.1 Proposition of an Environmental Impact Evaluation Spreadsheet

The following chart suggests a Spreadsheet of Environmental Impact Assessment that adds, in the filter of significance, the item "location" of the enterprise (Figure 2) to be scored in the evaluation of environmental impacts. The suggestion was developed from the model presented in Figure 1.

Spreadsheet of Evaluation of Environment Impacts														
Department./ Sector:			Local:								Date:			
PROCESS:			Activity:								Identification:			
IDENTIFICATION		CHARACTERIZATION			EVALUATION			FILTER OF SIGNIFICANCE			COMMENTS			
ASPECT	IMPACT	Status	Incidence	Temporality	Severity	Scope	Frequency or probability	Partial Result	Legal Requirements	Stakeholders	Location	Evaluation Results	Incidence importance	
Responsible:						Sign:								

Figure 2. Model of a Spreadsheet for the Evaluation of Environmental Impacts added to the enterprise location

The spreadsheet model presented in Figure 2 allows the differentiation of scores on the impact assessment of enterprises with a unique environmental management system, appropriated for different locations, namely the organization headquarters, which has primacy in the leadership and subordinate units called affiliates, branches or agencies.

For example, the CEA is located in a rural region, while the headquarters are in an urban region. The river crossing the CEA is Class 2.

The allocation of points to the location of the project can follow a scoring scale shown in Table 1, according to the class of the river where liquid effluent is discharged, for example [9]:

Table 1. Score differentiated according to class of rivers

Classification	Ponctuation
Special	5
Class 1	4
Class 2	3
Class 3	2
Class 4	1

The differentiation of score points of these impacts in the Spreadsheet for Evaluation of Environmental Impacts indicates, for the company, the prioritization of the necessary corrective actions using different approaches in each of its units, subsidiaries, or others: therefore, the inclusion of the column "location" will increase the score. It is worth noting that the monitoring of outputs and the compliance with standards established by the laws is the next step after planning and surveying the impacts.

This score by location may refer to various aspects of location: for example, whether it is an urban or rural area, according to environmental zoning addressed in Law n° 6938, 1981 [10], according to the National System of Units Nature Conservation - SNUC mentioned in Decree n° 4340, 2002 [11], and others.

Other criteria determined as relevant may be used to differentiate the enterprise location.

4. FINAL CONSIDERATIONS

The CTMSP has started to implement an Environmental Management System - EMS since 2002, without making a distinction between impacts generated by the Headquarters or the CEA. As the EMS follows the PDCA cycle [4] that is dynamic, the new environmental impact assessments will receive different scores for those identified at by the headquarters of those identified in the CEA.

The proposition of the EMS for USEXA - Production Unit of uranium hexafluoride – will include this differentiation in the Spreadsheet of Environmental Impact Assessment [4].

Such a change in the Spreadsheet of Evaluation of Environmental Impacts, adopting more stringent criteria for scoring ecological impacts, will be important to the demonstration of environmental concern by any type of institutions or organizations.

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