

EMS and Eco-design of product – Case study of a lighting industry

António Jorge Baptista David

Instituto Superior Técnico, Lisbon, Portugal

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Abstract

A challenge in the environmental management in the industries is the identification of the environmental aspects connected with the product along his complete cycle of life, to determine which could have significant impacts on the environment. In this article the process of identification and evaluation of environmental impacts is analysed from a case of study of an industry in the branch of the lighting, for which opportunities of improvement are showing up to through a proposal of method that aims for integrating the product in the process. Some models of evaluation of environmental impacts were studied, looking for the best adaptation to the specificities of the activity in focus. There was still analysed a product of the enterprise, inserting concepts of eco-design and trying to integrate the same concepts in the EMS. In spite of the model of environmental management ISO 14001 have this requisite, the implemented EMS's have a tendency to be centred in the straight impacts, neglecting products in the prime and post production phases. Most of the environmental impacts of the products are concentrated in its phase of use, thus is essential that these aspects are fitted in EMS's. The use of eco-design tools allows to prevent impacts from the phase of development to the end of life, contributing to more ecological products.

Keywords: Environmental Management System; Environmental Aspects; Environmental Impacts; Product; Eco-design.

1. Framing - EMS

From the decade of 1970, that the most industrialized organizations adopted practices of environmental protection. Along the decade of 90, the environmental problems became a social preoccupation and a strategic question for countless business, enterprises and industries, when there is this fact connected with the contemporarily of the EMS's (Boiral *et al.* 1998). The most used directions for implementation of EMS's, and for its certification, are the international standard ISO 14001 and to European standard EMAS.

The first step to give for an enterprise to systematize his environmental preoccupations passes because of carrying out a revision of the current situation. This revision includes an inventory of the regulations and applicable legal requisites and the identification of the environmental aspects inherent in the enterprise and the evaluation of its impacts. The process of identification of the environmental aspects, it passes because of identifying the products, services and activities that will be able to have, in some way, impact in the environment. The organization values then these aspects of way to determine which can have a significant impact in the environment, finding of pursuance

methods to control these aspects and to minimize his impacts. This stage turns out to be crucial so, more to the front, the environmental aspects fulfill a basic paper in the definition of the environmental politics, in the establishment of objectives and environmental marks and in the form of the program of environmental management. The environmental significant impacts, they determine also the activities that must be controlled by instructions and documented proceedings, as well as the people who will have to have environmental specific formation. In this way, we can consider this process like the base of all the system of environmental management (Zobel et al. 2002, Are able, 2006 and Kausek, 2006).

The implementation of environmental demands in the development of product is important both of an environmental perspective and of business. The organizations (and also the final users) can reduce his expenses, increase the quality of the product, stimulate the innovation and obey better to the environmental legislation, as well as with the clients' demand. (International organization of Normalization, 2005).

The inclusion of the product in regulating actions, predicts a movement towards more green products and they do more and more from the product an object of the environmental aspects. In this sense, several concepts were born like systematic methodologies that incorporate the environmental considerations in the development of products. The Eco-design makes a decision like an approach to the drawing where there are considered all the environmental impacts along his cycle of life (Lind, 2007). The eco-design considers environmental aspects in all the stages of the process of development of the product, making an effort so that the products have the least environmental possible impact in all the parts of his cycle of life.

The integration of environmental considerations in the first phases of the process of development of the product is the most efficient way of introducing modifications and improvements that affect all the stages of the cycle of life.

The electric and electronic sector is subject to a growing number of environmental pressures connected with the product (residues, raw material and consumption of electricity). In 1988, the quantity of electronic equipment that reached the end of life was 6 million tons and it is waited to double in 2010. This means that approximately 20 % of the useless municipal current will be connected with REEE (Residues of Electric and Electronic Equipment). For rule, the most significant environmental impact of these products of a perspective of cycle of the life is associated to the consumption of energy during his use. Other environmental problems of EEE include the impact of the materials used in production and residues of product in the end of the useful life of the item. A vast number of materials in these products they are interdicted. The manufacturers of EEE are also below the growing pressure of regulating bodies for the world to take the responsibility for these products when they are useless. The strategies of reducing residues include the increase of the durability of the product and the drawing of the separation and the recycling. The legal demands and the standards are one of the most important vectors of the consideration of environmental aspects in products. The REEE, RoHS, Directives of EuP complemented with the national laws of " responsibility of the producer " in Europe, highlight the necessity of the organizations to develop strategies of management "take-back" and eco-design.

In synthesis the environmental aspects are the base of the EMS though its identification and evaluation is for times effectuated in ad-hoc way and, in a systematic way, without taking into account the environmental indirect aspects namely in the product (Pine, 2008).

Soon, it is important to analyse what the situation is in the concrete cases. Thus, and having Schröder Iluminação SA proposed a traineeship for the author who contributed to his implementation, this thesis effectuates a critical analysis and present possibilities of improvement.

2. Objective and Program of Works

Objective

With the realization of this work, it intends to analyse the integration of the products in the EMS implemented in Schröder Iluminação SA, as well as the identification and evaluation of his environmental aspects and respective impacts, and the introduction of eco-design us. This proposal of method settles in the event of what it is possible to improve the process of identification and evaluation of the environmental aspects if it includes the products developed by the enterprise. It intends still to discuss the integration of the products and of the eco-design in the EMS.

Methodology

The adopted methodology suits the analysis of cases of study when they were put into practice by other organizations, with activities in different areas, as well as in the revision of methods proposed by several authors with vast experience in this area. One resorted still to the analysis of a case of study of an enterprise in the area of the lighting, in which the author participated in the implementation of the EMS, of way carrying out a critical analysis and detecting the points of improvement. From this case of study, it is also tried to analyse the best methodology, for identification and evaluation of the environmental aspects, to applying to this type of industries and to his products.

3. Approach Environmental Aspects of the EMS and Products - Revision of Literature

The organizations must identify the environmental aspects that are fitted in the context of his system of environmental management, taking into account the entries and exits associated to his activities, products and current and past services that are relevant, to the developments planned or new developments, or to the activities, products and services, new or modified. (International organization of Normalization, 2005).

Many organizations have difficulties in interpreting the definition of environmental aspect of the ISO 14001, what affirms an environmental aspect is a "element of an activity, process or service of an organization that interacts with the environment" (International Organization of Normalization, 2005). An environmental aspect is confused very often with the activity connected with the aspect (Zobel and Burman, 2004)

Some authors defend what is difficult to do the distinction between what it constitutes an aspect and an activity, pointing out, however, that there are not certain or wrong definitions (Woodside *et al.* 1998). Others, they have a not much different approach, in which they divide an environmental specific aspect in several "circumstances", which include activities, operations, products and services that can cause environmental impacts (Brorson and Larsson,

1999). It is, however, of the general opinion, that the environmental aspects are one of the most important elements of a EMS, when there is even the one who goes more far and affirms that there are the most important element of the Standard (Whitelaw, 2004).

Methods of identification of the environmental aspects

The methods used in the identification and evaluation of the environmental aspects vary considerably of organization for organization (Zobel and Burman, 2004). Different methods for identification of environmental aspects correspond to different types of obtained information and to the detection of different questions to board.

The Life Cycle Analysis (LCA) is considered a recurrent method of identification and evaluation of environmental impacts that take place along the whole cycle of life of the product, process or activity. The LCA is a model of study that it allows to analyse the cycle of life through simulations and tests to determine the environmental consequences of the activities of the management, serving of support to the decision in the adoption of the actions that will contribute to an environmental improvement

Most of the authors tell like one of the simplest methods and efficiently for identification of environmental aspects, the Method of Diagram of Flows. This process, divides the organization in activities or sub processes (small fragments) for which is possible, in the more appropriate way, to identify the environmental aspects, outlining all the processes and activities of support in a diagram of flows. Subsequently, each process is analysed individually, when there are identified all the aspects associated to the same thing. The process generally carried out by a team previously defined with elements of several areas of the organization, begins with the realization of a lifting of all the processes that take place inside the organization and in his relations with other organizations. (Block, 1999, Kausek, 2006 and Zobel and Burman, 2004).

Methods of evaluation of the environmental impacts

The difficulties in the evaluation of the environmental aspects are due essentially to the absence of comparative criteria for evaluation of the different impacts. As soon as this criterion does not exist, a great subjectivity is associated to this process, doing so that the result of this process depends a great deal of the person who carried out it, and leading to a vast variety of methods used for the realization of this process (Whitelaw, 2004 and Zobel and Burman, 2004).

The commonest tool used in the evaluation of the environmental impacts is a matrix model, in which values of scale are established to the criteria previously definite. For each aspect, there is attributed a value of the scale of each criterion, when there are added up in the end the values of all the criteria. The aspects which sum should be more elevated, are considered significant. Another variant of this process, it is in the values attributed to each criterion multiply, for each aspect, doing to him in the end the sum as in the first case. In some organizations, there is defined previously a value threshold from which the aspects are considered significant. The popularity of this method is,

certainly, associated to the fact of being recommended by advisers and by authors of literature contextualized with this situation (Zobel and Burman, 2004).

Most of the used methods point only to the environmental aspects which the organization comes across in day by day in the performance of his activities. However, the aspects connected with the products go very much further of what those connected with his production: the residues of packing, the transport, the used materials, consumes and emissions of the product along its use and its final destiny are also relevant aspects for an analysis of the environmental aspects of the same products. There are, even so, several methods that aim to identify and to value the environmental aspects connected with the products along his cycle of life.

Methods of identification and evaluation of the environmental aspects of the product

The method more consensual and scientific for the identification and evaluation of the aspects and environmental impacts of the product it is the Life Cycle Analysis (LCA) of the product, method already described previously. However, it turns clear that to drive an appropriate and complete LCA is an expensive task and that it demands much time. In spite of the development of several "software" and of generic data bases, to carry out an LCA demands specialized knowledge and a significant quantity of specific data on the product, which it does so that this methodology is always adapted to the necessities of the drawing of the product. This reality, it led to the development of several tools that aim at the "translation" of the information obtained through the LCA of the most practical way.

MET Matrix is one of the most ancient tools to help the evaluation of environmental impacts in products is the called Matrix Material-Energy-Toxicity (MET).

The principle of this method consists in filling out a matrix, which lines represent principal phases of the cycle of life of the product and which lines it represent three environmental elements previously above-mentioned. (Brady, 2005)

Eco-indicator was developed, through a use more sophisticated of the LCA knowledge. These indicators are the answer to the problem that appears when several environmental impacts produced by the same material or process, have to be compared between them in order that a balanced perspective been obtained of same. The Indicative-eco they deal with this situation doing the choice of the materials for the draftsman, presenting it in a unit indicator that can be easily compared with other materials. (Brady, 2005)

The eco-compass created by Claude Fussler, is a tool for analysis of means of improvement of a product, and that also can be used to compare new options of products with the original versions or even to compare products between you{him; her; them}. This method consists in representing the principal environmental aspects connected with product through the apexes of a hexagon. The hexagon is constituted by 5 levels that represent the different dimensions of the product that can be worked. The respected aspects are the next ones: Conservation of natural resources, Extension of services, Risks for the health and the environment, Intensity of material, Energetic intensity and Reincrease in value.

Environmental information of the product

More and more the society and the market demand information detailed on the marketed products. In this way, it intends to secure not only that the products fill out all the legal requisites, for example of security, but also to endow the client of the biggest quantity of possible information, who helps to choose it which product he{she} must buy. Between the information that can be supplied, they gain, in the times that run, bigger preponderance the relative information to the environmental aspects of the products. The markets themselves demand more and more the filling out of environmental requisites.

Is in this context that appears several ways of presenting the whole information of environmental nature of the marketed products. The information presented in any one of the methods is based on an analysis of the cycle of life of the product. The certified environmental products declarations (EPD's) begin to be used like an instrument to communicate the environmental information obtained through the LCA. The EPD's is based on the ISO/TR 14025 and they were made operational in several countries.

4. Analysis of Case of Study - Schröder Iluminação SA

Schröder Iluminação SA, has a vast scale of products of exterior and inner lighting. The enterprise stands out in sectors of activity like the urbane lighting, like public areas, tunnels, athletic enclosures, monuments and bridges, industrial lighting and several special applications.

The EMS implemented in Schröder Iluminação SA was developed by the Quality and Environment Management having initiated in 2006 and it had the certification in 2007. The remaining departments of the enterprise, besides the developed actions of formation, were wrapped punctually in the availability of data and documents, and also in the alteration of some operational and organisational proceedings. The implementation of the EMS counted still with the help of an extern advisor. The EMS was developed in several complementary stages that aimed at an improvement of the environmental performance of the enterprise.

The responsibility of this proceeding fell for whole to the Quality and Environment Manager. This stage, began with the realization of an overview of the environmental existent aspects in all the activities of the enterprise. This proceeding, took into account not only the aspects connected with the legal revised requisites previously, but also any other aspects that could exist in the activities of the enterprise. They were considered in the process, the aspects that take place straightly of the activities, processes and services carried out in the installations of Schröder Iluminação SA and that the organization can control or influence.

The criteria used in the evaluation of the impacts went to Gravity and the Frequency. The classification of the Gravity of the environmental impacts is effectuated in accordance with his magnitude and gravity. The Frequency consists of the classification of the incident of the aspect of situations of normal or abnormal operation. Each one of the terms of evaluation takes a scale as a base from 1 to 5, being this growing in both evaluated parameters.

The formula for the evaluation consisted of the multiplication of the values attributed in each criterion of evaluation. There were considered significant the aspects that should obtain a classification equal or superior to 12, around half

of the very possible classification. For the realization of the evaluation individual of each aspect, one resorted to a matrix in which there are represented all the possible levels of classification of an environmental aspect. The environmental aspects were analysed individually and valued regarding the criteria previously established. As final result of the previous proceedings, there resulted the preparation of the "Matrix of Evaluation of the Environmental Impacts".

Global balance

After analysis taken care of the process of identification and evaluation of the environmental aspects, surpasses the fact of this one to include the aspects inherent in the activities carried out in the installations of the organization and any aspects connected with subcontracted works and with semi-finished products used in the activities of the enterprise, however, aspects connected with the final products of the enterprise are not predicted in the EMS.

On the contrary of the parameter "Frequency", which scale of classification of the impacts is described in detail, the levels of classification of the parameter "Gravity" are not defined as for the damages, and dimension of same, what includes each level of the scale. This parameter is valued only regarding the magnitude of the impact, if it is great or serious somewhat, without distinguishing what is considered serious or not, leaving this decision to whose{which} criterion carries out the activity, giving him an elevated degree of subjectivity.

5. Analysis of the means of improvement

System of Environmental Management, Product and Eco-Design

The integration of the eco-design of products in the EMS passes essentially by a bigger interconnection between the different intervenient ones in the whole process of development of products and in his production. The EMS must create lines of direction and proceedings that they secure that all the intervenient ones in the above-mentioned processes, like Management of the Quality and Environment, Supplies / purchases, Commercial, Development, Production, etc., contribute and carry out determined environmental requisites. These lines advisors and proceedings will be able to be presented through Instructions of Work that determine the responsibilities of each department in the newspaper commentaries phase of the product. In the phase of development, the resource to lists of checking, bases of data of the materials, lamps, electronic components, between others, based on studies of LCA, might provide more ecological choices. To make the environmental performance of a comparable enterprise along the time, key indicators can be developed on basis of some "unity of production", such as energy consume by the products (type and quantity of used energy), use of more ecological materials (to take into account process of extraction, abundance in the nature and end of life), specific consumption of chemists, recycle/reuse totally or partially of products in end of life, between others. In the form to improve these key indicators, marks can be established inside the system itself of environmental management, in the Program of Environmental Management. This is also a first step in the search of improvements at the level of the product and of the resource to the eco-design

Identification of the Environmental Aspects

Definition of the program of works and definition of responsibilities

This stage played the lead role by the Quality and Environment Manager and by the General Direction, consists of the definition of the program of the works carrying out and in the nomination of the elements of several departments that will be going to participate in the process. Areas like the Production, Purchases, Commercial and Development have important papers in this process due to the fact of working straightly with the products and used materials, having therefore a bigger knowledge of the relative impacts to the products.

Definition of the technical criteria

Severity (G):

Duration of impact (T)			
Level	1	2	3
Duration period of the impact	Instantaneous (1 day maximum)	Medium period (1 week maximum)	Long period (more than a week)
Damage's Severity (S)			
Level	1	2	3
Damage's intensity	None / insignificant	Serious	Very serious
Reversibility of damage (R)			
Level	1	2	3
Damage recovery	Totally recoverable	Partially recoverable	Totally unrecoverable
Dimension of impact (D)			
Level	1	2	3
Level of affected area	Local area	Regional	Global (National dimension)

$$G=T \cdot R \cdot D \cdot S$$

Damage's Severity (S)											
		1			2			3			
Dimension of impact (D)	1	1	2	3	2	4	6	3	6	9	1
		2	4	6	4	8	12	6	12	18	2
		3	6	9	6	12	18	9	18	27	3
	2	2	4	6	4	8	12	6	12	18	1
		4	8	12	8	16	24	12	24	36	2
		6	12	18	12	24	36	18	36	54	3
	3	3	6	9	6	12	18	9	18	27	1
		6	12	18	12	24	36	18	36	54	2
		9	18	27	18	36	54	27	54	81	3
		1	2	3	1	2	3	1	2	3	
Duration of impact (T)											

Intensity level:

Green – 1 (Low)

Yellow – 2 (Medium)

Red – 3 (High)

Probability (P):

$$P = F \cdot PO$$

Activity frequency (F)			
Level	1	2	3
Periodicity of the activity	Anually	Weekly	Continous or several times a day
Impact incident periodicity (PO)			
Level	1	2	3
Number of incidents	Once a month or less	Once a week untill once a month	Once a day untill once a week

Activity frequency (F)				
	1	2	3	
Impact incident periodicity (PO)		1	2	3
	1	1	2	3
	2	2	4	6
	3	3	6	9

Probability level:

Green – 1 (Low)

Yellow – 2 (Medium)

Red – 3 (High)

Socio-economical criteria:

Control level (NC)			
Level	1	2	3
Control level	Documented control practices	Existing but not documented control practices	No control practices
Legal requirements (RL)			
Level	1	2	3
Legal Requisites	Not integrated in legal requirements	Integrated in Standards or in the enterprise policy	Integrated in legal requirements

$$\text{Impact Significancy} = G \cdot P \cdot NC \cdot RL$$

Legal requirements											
		1			2			3			
Severity	1	1	2	3	2	4	6	3	6	9	1
		2	4	6	4	8	12	6	12	18	2
		3	6	9	6	12	18	9	18	27	3
	2	2	4	6	4	8	12	6	12	18	1
		4	8	12	8	16	24	12	24	36	2
		6	12	18	12	24	36	18	36	54	3
	3	3	6	9	6	12	18	9	18	27	1
		6	12	18	12	24	36	18	36	54	2
		9	18	27	18	36	54	27	54	81	3
		1	2	3	1	2	3	1	2	3	
Probability											

Significancy level:

Red – High significant impacts (I)

Yellow – Medium significant impacts (II)

Green – Low significant impacts (III)

Significancy level	Standard demands
I	Annual control, Instruction of Work required specific training and high priority in the Environmental Management Program.
II	Control required only in case of process changes; Instruction of Work required and mentioned in training.
III	Control required only in case of process changes and minimum priority in Environmental Management Program.

Identify the aspects and impacts of the organization

This proceeding must begin with the preparation of a diagram with the general activities of the enterprise and, for each activity, do relative flow charts to each process wrapped in same. The general diagram will have to be carried out by all the elements wrapped in the process of identification and evaluation of the aspects and environmental impacts, defined in the Stage I.

Inlet	Process	Outlet	Environmental Aspects	Environmental Impacts
Natural resources	Process			
Energy		Product		
Air		Wastewater		
Water		Emissions to atmosphere		
Material		Waste		
Other products				

What concerns the environmental aspects connected with the products of the enterprise, they must be identified through the filling out of the relative fields to the "Inventory" in the "Matrix of Analysis of Environmental Effects" (Appendix 1).

To value the aspects and environmental impacts

The objective of this stage is to value and to quantify the environmental relative impacts to the activity of the enterprise, and subsequently to order the environmental aspects, for levels of signification. The evaluation is done through the filling out of the " Matrix of Evaluation of the Environmental Impacts " or, in case of the products, the relative fields to the "Evaluation" and " Proposals of Actions " of the " Matrix of Analysis of Environmental Effects ", and in accordance with the criteria and classifications when II were defined in the Stage. This proceeding is carried out individually by the elements of each department detached for the effect in the Stage.

Preparation of the Program of Environmental Management

The objective of this stage aims to establish objectives and marks for reduction of the impacts associated to the environmental aspects, as well as the preparation of proceedings of periodic evaluation of the environmental aspects and the proceeding / Instruction for the development of new products of way when IV to minimize the impacts identified in the Stage. In this phase, it is written equally by the Quality and Environment Manager and set an allusive report to the whole process.

Environmental aspects, Product and Eco-design

The environmental aspects of the products must be considered in his several forms. As such, we think that there must be considered the next aspects:

- Analysis of the primary, secondary and tertiary packages of the products in the search of opportunities of reduction of the number of these packages and of his dimensions.
- To do an Life Cycle Analysis of the products, and of the materials that are used, in way to establish criteria of selection of materials taking into account his abundance in the nature and the impacts of his extraction, production and treatment in end of life.
- To use beginnings of Eco-design in the development of products, from which it will be possible to develop more ecological and more efficient products. The Eco-design will be able still{even} to lead to lines of products with bigger number of independent pieces that make possible his reuse in end of life.
- The Eco-design applied in the products and his environmental performance, as well as his improvements of environmental performance, can be used by them in the commercial activity of the enterprise and presented together with the product. For that, they can resort to Environmental Products Declarations of the products. This one can be used equally to present advantages of the product regarding other models.
- To establish a method of gathering of products in end of life of way to make possible the reuse of materials or his recycling.
- Use of lamps of steam of sodium and substitution of the existent lamps of steam of mercury.

Analysis of product

There were analysed three versions different from the model of lamp when it was above presented. Eco 3 lamp corresponds to the original product. The other two lamps were changed versions from the original. The remainder two products represent some alterations effectuated to the original product in terms of used materials, lamps, reuse of materials, etc.

In the definition of the products considered in the analysis there were taken into account some of the next criteria for comparison of the products' performance.

- Reuse of the metal camera, glass and plastic
- More ecological paint

- More efficient lamps
- Products with bigger number of independent pieces, of way to be able to be substituted individually, and with easy accesses for maintenance.
- Packing

For the data analysis was used a worksheet from the “Project LOT 9: street lighting” for the European Union. This worksheet was already prepared for input the product data and it output all data about the energy consumes, emissions, material depletion, among others. In the end we suggested to make a new model of that lamp with some changes which would improve the environmental performance of the lamp.

6 Discussion

The analysis effectuated to the EMS implemented in Schröder Iluminação SA happened majority on the process of identification of the environmental aspects, the evaluation of his impacts and the inclusion of the products of the enterprise in the EMS himself. Relatively to the EMS and to the process of identification and evaluation of environmental impacts, the approach was straight, from the analysis of the documents supplied by the enterprise, and having{tend} been made easy by the participation of the author in the same thing. From the model of EMS implemented in the enterprise, it was possible to develop some suggestions of alterations in the process of identification and evaluation of the environmental aspects, of way to include the product.

The alterations inserted in the proposal of method for the process in cause, happen essentially in a bigger involvement of all the departments of the enterprise, as well as in the inclusion of the products, without predicting so great obstacles to his possible implementation. Even so, it would be interesting base develops objective lines of direction for the implementation of a EMS turned for the product.

The analysis to the product and to the application of measures of eco-design, appeared through the resource to a leaf of calculation, the Design Guide. The effectuated analysis sinned for the lack of some elements made a request in the leaf of calculation, but that were not possible of obtaining next to the enterprise due to his complexity or for lack of data.

In this analysis it tried to compare the original product with other versions of the same product but I subject to some alterations. The product in yes was not allowing many alterations since it was the question of a recent product with good materials, good accesses for maintenance and good proposals of use of lamps.

The application of the measures of eco-design there is, for times, dependent of type of product what the client claims, of the type of pretended lighting and of the economical viability of same.

The lack of practical tools for the draftsmen, added of his natural technical ignorance about the environmental questions of the products along the cycle of life, makes difficult enough the application of eco-design in the phase of development of products. In this way, it is{would be} important to develop checklists of support to the decision, when others were still based on analyses of cycle of life of materials, lamps, electric accessories, between, and technical

recommendations. In the continuation of the checklists, there might appear the creation of a leaf of calculation that it was allowing to the draftsmen to compare, in the moment and easily, materials, energetic consumes, production of residues, bright intensity, recycle/reuse of materials, etc.

7. Conclusions

Along the effectuated inquiry, it surpassed the inclination of the implemented EMS's, and of the methods of identification and evaluation of the environmental aspects, in order that they were centered essentially in the environmental relative aspects to the processes developed in his installations, being superficial in his approach to the products. In this way, are neglected all possible environmental impacts inherent in his products the amount and downstream from the phase of production.

It would be important to integrate all the products of the enterprise in the EMS, inserting them in the process of identification and evaluation of environmental impacts. It is in this sense that the proposed method appears, trying to provide a bigger participation for all the departments that, straight or indirectly, deal with the environmental aspects of the enterprise. The creation of indicators, inserted in the EMS, connected with the product, might bring equally benefits at the level of the control both of environmental aspects and of economical aspects.

The analysis effectuated to the product ECO 3 allows to conclude that it would be important for designers to work with worksheets as the one we used, because it would give them all the possible impacts of all the possible scenarios. It is very important for the designers to have tools to help them to take the best decision for the environment.

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