

INTRODUCTION TO THE INTEGRATED ENVIRONMENTAL MANAGEMENT: A CASE STUDY AT THE FEDERAL OFFICE OF BRAZILIAN RESEARCH

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ABSTRACT

The globalization process establishment has been a major impulse for profound transformations as to environmental issues in the social, political and economic scenario of both industrialized and developing countries. Within this scope, the concern with climate changes, global warming, biodiversity, population growth and public health have promoted the dissemination of environmental values and the induction to a community participative culture. Notwithstanding, a growing demand by the society related to the environment and social issues has been evidenced, converging the environmental theme to a holistic approach and, also, to the life quality concern. Therefore, private and public organizations have given more attention to issues involving their internal and external clients and/or users, in view of their products or services and social aspects, including those covering their workers and collaborators health and safety: with this overall purpose, an Integrated Management System (IMS) for Quality, Environment, Health and Safety was created. This management policy has been, commonly, employed in the private sector, even though a small, but yet expressive part of it refers to the public area. In face of this scenario, it may be foreseen that the motivations for adopting such management tool and the methods used for this goal may differ, according to the economic context. Under this point of view, this work had the target of analyzing, qualitatively, the process of setting the IMS in a federal. Eventually, a targeted result was to identify advantages and disadvantages for a public institution.

1. INTRODUCTION

Managing an organization in order to obtain the best results is certainly the goal of any manager. However, excellence in management has never been an easy task, considering the different aspects related to the internal and external environment of the business world.

The studies that have been developed, throughout time, on the best ways to manage this living organism, "business organizations", seek, to indicate the best ways to be followed by their managers.

One of the issues that call the author attention and that has led to this article production is the challenge of managing in an integrated manner, taking into account variables other than economic-financial. In this sense, the trajectory of the Administration science already points to an evolution. Back to the industrial revolution and the emergence of formal organizations, there has been various forms of management, such as the scientific management, participatory management and, finally, environmental management.

Given the complexity of dealing with the environmental management, it was necessary to establish a thematic focus for this article. Thus, to explore the environmental variable, emphasizing the behavioral aspects was aimed.

1.1. The Institution and the Problem of Research

This study was developed in a Public Institution for Research and Development whose activities are related to nuclear energy and its correlates. IPEN - Institute of Energy and Nuclear Research is an autonomous institution, linked to the Department of Science, Technology and Economic Development of the State of São Paulo since 1979 and affiliated with the University of Sao Paulo, in its educational purpose. Since 1982, it has started to be managed, technically and administratively, by CNEN - National Commission of Nuclear Energy and, consequently, to be linked to the MCT - Ministry of Science and Technology.

This is a research institution that offers products and services concerning nuclear and related areas. Its first Nuclear Reactor Power - IEA-R1, at the time the only southern hemisphere nuclear reactor, was purchased in 1956, for the production of radiopharmaceuticals and research, demanding high energy: it reached its criticality in 1958.

In 1982, IPEN created the first Nuclear Power Reactor Zero, with national technology, focusing only on theoretical research. In 1996, the institute bought a new particle accelerator – CICLOTRON, for research, development and production of radioisotopes.

According to Law 4118 of 07/27/1962, nuclear activities in the country are the Union monopoly. This regime is exerted by CNEN. IPEN receives its budget values from the Ministry of Science and Technology - MCT, partnerships and funding agencies. Its mission is to improve the population quality of life, producing scientific knowledge, generating products and services and training human resources in the nuclear and related areas.

In addition to other services, IPEN is annually producing radiopharmaceuticals for about 250 hospitals and clinics, thus allowing annual service over 2 million patients spread throughout the national territory. Owing to the constitutional monopoly, the production and marketing of these products are made by the institution solely.

IPEN is starting work both in its Centre of Chemistry and Environment - CQMA as in its Sector for Coordination of Quality, Environment and Safety - CQAS, with the aim of implementing an integrated management system for its 12 research units, as shown in this work Attachments. This system consists of three pillars: quality, safety and environment. Currently, IPEN environmental program comprises two sub-programs: Diagnosis and Environmental monitoring and Waste treatment.

Only units that deal directly with the products and services connected to nuclear energy have high engagement with environmental related issues (expressed through many environmental certifications). The other units have occasional and not significant initiatives towards this question, pointing to the need for a greater alignment. It is in this context that the demand for a previous mapping of IPEN, as to environmental issues, is identified, towards the introduction of an integrated environmental management.

Given the context and the discrepancy presented in the previous section, the following question for the research was formulated: how is the environmental variable administered by a Federal Institution - Public Institute of Research and Development, whose activities cover nuclear research and its correlates, as well as the production of items derived from this type of power?

The general aim of this study is to develop a frame of reference about the introduction of the environmental management in a public institution for research and development.

As specific objectives, we sought to identify the nature of the motivation for the implementation of an integrated system that addresses the environment; to identify the profile of a leader involved in environmental management; to identify the type of commitment of the top management and managers.

1.2. Theme Rationale

One of SEBRAE publications entitled Environmental Management - Waste yesterday and Profit today [1], providing guidance to prospective entrepreneurs, mentions that in the last 30 years environmental values evolved from a marginal interest to the top of consumer concerns. Apprehensive with the situation of the planet, people decided to interact with their suppliers, opting for products considered environmentally friendly and rejecting those that do not offer this guarantee.

As to the preference of customers for products and / or services that are environmentally correct, Donaire [2] refers to the need to evaluate the organization's current products (including packaging, usage, the employment of not recycled paper, and others), as well as the possibility of products targeting the so-called "green market".

As for the legal aspects, "the Public Civil Action aims at repairing economic and moral damage caused to: the environment, the consumer, the assets and rights of artistic, aesthetic, historical, tourist and landscape values, called diffuse interests." Almeida [3] - (emphasis added).

Almeida [3] also mentions that it is common that several companies co-participate in the pollution generation and with respect to this the Supreme Court stated that: "The solidarity among companies that are located in the polluted area, in the charge that aims to preserve the environment, should be the nature itself of the charge. For the correction of the environment, companies are jointly and severally liable, each of them, and all together, responsible for the participation in the misconduct." Hence, the society requests for organizations active participation in environmental issues has intensified.

1.3. Labor Rationale

Nuclear research, by its public knowledge through worldwide publications over the years, shows the good fruit provided by this type of energy to humanity: among them we can mention the production of radiopharmaceuticals, widely used for diagnosis and therapy of cancer. However, there is still unawareness by part of the population of the nuclear energy potential. People just

tend to associate it with one of the most terrible incidents of humanity: the bombing of Hiroshima and Nagasaki. Regarding nuclear energy and its peaceful use, however, there are also major environmental accidents such as Chernobyl and Three Mile Islands. In this sense, a study focused on environmental issues in a research institution that deals directly with nuclear power is justified, by the insight into how environmental management is configured and how it is administered.

2. THEORETICAL REFERENCE - ENVIRONMENTAL MANAGEMENT

- The term environmental management is very comprehensive and is often used to designate environmental actions in certain geographic areas, such as the environmental management of: watersheds, parks and forest reserves, protected areas, biosphere reserves and others [4].
- According to Schmidhery, *in* [5], in Japanese and American companies, the overall responsibility for environmental management is entrusted to teams consisting of members from different divisions or functions and chaired by a member of the board. The main objective of these teams, according to the author, is to introduce environmental management in all divisions of the organization. This argument suggests an integrated environmental management.
- The term **business integrated environmental management** is primarily focused on organizations, i.e., companies, firms, enterprises or institutions and it may be defined as a set of policies, administrative and operational programs and practices that take into account the health and safety of people and the protection of the environment by eliminating or minimizing impacts and environmental damage resulting from the planning, implementation, operation, expansion or decommissioning projects or activities, including all phases of the life cycle of a product from cradle to grave. [4]
- In environmental management, it is also worth mentioning the importance of the social question awareness, which according to Donaire [6] refers to the ability of an organization to meet the expectations and pressures of the society, as well as the concept of social responsibility, measured by the moral values of obedience to the precepts of the law.
- According to Drucker, in [6], the social responsibility imposes the obligation by the senior management to direct essential actions in the social field: social actions which should originate from the top of organizations.
- In Brazil, according to Aguiar [7], direct governmental institutions that have implemented ISO 14001 environmental management systems were not located. However, there are numerous examples of companies controlled by the government that have certified environmental management systems.
- The ISO 14001 published in Brazil by the ABNT - Brazilian Association of Technical Standards [8] proposes a management model that aims to be environmentally responsible;

in compliance with the legislation and committed with the continual improvement and prevention of pollution; based on the continuous improvement cycle (PRCA - plan - run - check and act).

- Under the manager of the Chemistry and Environment Center of IPEN, to address environmental issues in a public or private organization is a matter of education. It should be noted that the Centre has as one of its tasks the development of research focused on environmental monitoring and prevention and that these studies, in the State of São Paulo, are developed in partnership with the companies: Cetesb and SABESP.
- In accordance with Leonardi [9], the awareness that there is no possibility of a single science to explain the complexity of nature (the need for interdisciplinary understanding), should make us more humble and willing to dialogue effectively, without supremacy and arrogance, since all the knowledge is needed to study the environment. Different professionals should work together. "Scholars of physical areas need to learn to work with those of the biological and human areas, and vice versa, without prejudice." [9] Also, according to Leonardi [9], it is a very recent idea that nature is an asset to be preserved, because it also ends, and that man has the right (and duty) to preserve it.
- Citing Hunt & Auster [10], the guidance coming from management consultants, environmental groups and industry associations for companies to improve their environmental performance, suggests ways by which the organizations can implement strategic changes to move beyond compliance with the regulations, assuming responsibility for the environmental impacts of their products and gaining credibility.
- In agreement with to Hunt & Auster [10], environmental strategies are implemented more efficiently when they are consistent with the organization characteristics and the context of the organization operation.
- With respect to the diversity in culture and in the operational context that interfere in the implementation of environmental strategies in the organization, Hunt & Auster [10] suggest the creation of a management system that accommodates these differences. They also mention that disparities in the environment encourage the organization to differentiate its structure, creating "pockets" to deal with the different aspects of the environment
- According to Corazza [5], there are two ways to integrate the environmental management in the company: timely integration of the environmental management - characterized by the creation of the position (or positions) and / or an environmental department. "The creation of environmental departments is a common phenomenon, at least in what refers to large companies." [5].
- The matrix integration of the environmental management – results from the own ISO 14000 matrix structure. "The environmental management covers [...] all sectors in the organization necessary for the planning, implementation, review and development of the organization's environmental policy." Dyllick et al, cited in [5].

- Corazza [5] also mentions some forms of integration of environmental management matrix, reported in the literature: The integration of the environmental management in management activities, according to Donaire [2] is the assessment of the external environment to identify: ecological issues, opportunities and risks in environmental legislation; awareness of consumers and society as a whole; behavior of competitors; and technological advance in this field. Regarding the integration of the environmental management in innovation activities, Porter et al., in [5], propose that efforts to integrate the environmental variable can result in a type of innovation that, according to the authors, offers the dual possibilities of: reducing entry costs, in conformity with the regulations; and/or constructing decisive advantages over other organizations.
- The integration of environmental management in production activities, an area that, as mentioned by Corazza [5], for its transformative nature of resources produces the largest environmental impact, brings, consequently, a more explicit environmental involvement.
- The integration of environmental management in human resources activities: according to Donaire [2], the environmental area should develop, together with the area of Human Resources, an intense awareness program, since the activity of the environment starts and is accomplished by changing the behavior of people belonging to it (emphasis added).

- **Leadership**

- Leadership is an interdisciplinary topic. Despite being studied in behavioral sciences, relates to different areas of knowledge. Robbins [11] opinion supports this view, since the "ability to influence a group toward the achievement of goals" occurs in different spheres of life, including at work.
- There are many definitions of leadership in the literature. One of them was selected as a reference for this work by its contemporary criterion and focus on management. Thus, leadership is understood as "a process in which the leader seeks, under the influence and acceptance of his/her own group, the achievement of goals and objectives through mobilization, motivation, information and communication, conflict management and resolution, strategies setup and policies definition" [12].
- Leader is defined as the person who can make the job done in the best way or that, at least, can help organize things in such a way that the task is carried out in the best way possible. To be led refers to people who have internalized goals, guidelines or objectives to solve a problematic situation and identify with them so much that they want to accomplish them in the best possible way [13]
- Leadership can also be understood from the standpoint of theories. The first theory proposed to explain the theme was the traits theory, which assumes that leaders possess personality traits expressed through physical factors, personal skills and aspects. One criticism of this approach is the exacerbated determinism, because there is no belief in human potential development.

- Opposed to the trait theory, the theory of leadership styles has as main feature the idea that people can be prepared to exercise the role of leaders. Theories of situational or contingency approach, in turn, understand leadership as a phenomenon that depends jointly on the followers' leader and the situation: these theories defend the idea that a particular pattern of behavior style is effective in some circumstances but not in others [12].
- In the sequence, the latest theories on leadership will be presented, according to the classification proposed by Robbins [11], specifically the charismatic, the transactional and the transformational leadership theories. According to the theory of charismatic leadership, followers make attributions of heroic or extraordinary abilities to leaders, when they observe certain behaviors.
- The last stream of research on leadership was interested in differentiating transformational leadership from transactional leadership. Because it is a more comprehensive approach in comparison to previous theories (transformational leaders are also characterized by charisma, in the theory of charismatic leadership, for example), this current was the reference used in the field research.
- The transactional leaders direct their followers toward pre-established targets, clarifying the role and task demands [11]. Their process is understood as the occurrence of mutually rewarding transactions between leaders and followers, in a given situational context [12].
- On the other hand, transformational leaders inspire the followers to transcend their own interests, for the sake of the organization, and are able to cause a deep effect on their followers, since they pay attention to the concerns and needs of each of them, individually. They change their followers' consciousness of issues, helping them to face old problems in a new manner; these leaders may stimulate and inspire their followers to do their best and reach the group goals. Figure 1 is the synthesis of the characteristics of transactional and transformational leaders:

<ul style="list-style-type: none"> • Transactional leader 	<ul style="list-style-type: none"> • Contingency reward: hires exchanging rewards for effort, promises rewards for good performance, recognizes accomplishments. • Management by exception (active): observes and searches deviations of rules and standards, takes corrective action. • Management by exception (passive): intervenes only if standards are not met. • Abdicates responsibility, avoids making decisions.
<ul style="list-style-type: none"> • Transformational Leader 	<ul style="list-style-type: none"> • Charisma: Provides vision and sense of mission, instills pride, gains respect and trust. • Inspiration: communicates high expectations, uses symbols to focus efforts, and expresses important purposes in simple ways. • Intellectual stimulation: promotes intelligence, rationality and careful solution of problems. • Intellectual stimulation: promotes intelligence, rationality and careful solution of problems. • Individualized consideration: gives personal attention, treats each employee individually, trains personally, advises.

- **Figure 1: Transactional leader versus Transformational leader. Source: (adapted from Robbins[11])**

- Finally, Robbins [11], states that the two approaches should not be seen as opposite. Transformational leadership is a step beyond, to be built over transactional leadership. In view of the management, transformational leadership is the most appropriate for the highest correlation with turnover rates, productivity and employee satisfaction.

- **Motivation**

- According to Bergamini [14], people already bring with them, somehow, their own motivations and it is important to consider the existence of individual and cultural differences when referring to motivation. From this premise, motivation for a particular job will depend on the meaning that each worker assigns to that activity. As the same, Archer [15] comprehends motivation as consisting of a "penchant for action coming from an individual motive (need)".

- By analyzing the two definitions presented above, it is clear that both have in common the consideration of the intrinsic character of motivation. In this sense, a person may not motivate someone else, but only stimulate.

- Motivation can also be understood as the willingness to use high levels of effort toward organizational goals.[11] Thus, the importance of studying motivation in organizations focus on its manifestation - such as the manager involvement and commitment - what may be noticed as a differential in the environmental management.

- The manager's role, according to Marred [16], will be to identify the guidelines of their subordinates' behavior, assuming the intrinsic nature of the individual motivation and managing the direction of the inner energy that each person naturally holds. At the same time, the manager should ensure that this energy may be in accordance with the objectives of the organization and the growth of each member in the workgroup.
 - **Commitment**
- The word commitment is defined in the Aurelio New Dictionary of the Portuguese Language [17] as: action or fact committed. However, it should be noted that in the organizational field, according to previous studies, the concept of commitment is still under construction, as mentioned by Medeiros [18].
- Meyer & Allen [19] were the creators of an organizational and occupational commitment measurement instrument, which has been validated in several European countries as well as in the United States, Canada and Brazil. These authors treat the commitment construct as complex and in their publications mention the need of further investigation and study, to reach an ideal definition.
- Meyer & Allen [19] also mention that the latest efforts to better clarify the meaning of commitment take two different directions: first - the commitment may take different forms, i.e., the nature of the commitment that defines the relationship between an employee and any other entity (an organization, for example) may vary, and second - this direction involves efforts to distinguish entities to which an employee becomes compromised.
- To better understand these two approaches, the distinction between behavioral and attitudinal commitment is necessary to be mentioned. To Mowday et al. [20], the attitudinal commitment focuses on the process by which people reflect on their relationship with the organization. "In many ways, it can be thought of as a mental state in which individuals consider the extent to which their own values and goals are congruent with those of the organization." Mowday et al. [20]. On the other hand, behavioral commitment is related to the process by which people become locked into a certain organization and how they deal with this problem.
- For the preparation of this instrument to measure organizational commitment, called the Three Component Model of Commitment, Meyer & Allen [21] based on the common observation appearing in several existing definitions of organizational commitment, with the view that commitment is a psychological state that characterizes the employee's relationship with the organization, presenting implications with the decision to continue a member of the organization.
- The three components mentioned above are described by the authors as: affective, of continuation and normative.

- For Meyer & Allen [21] employees with strong affective commitment remain employed in the organization because they want to; employees whose main connection to the organization is based on continuance commitment remain because they need the jobs and employees with a high level of normative commitment feel that they should (have a moral obligation) to stay with the organization.
- In view of the items presented in this theoretical framework, the introduction of the integrated environmental management requires an interdisciplinary approach that transcends the areas of an organization, regardless of its nature. It requires, above all, technical and behavioral complementary issues, which add and confer meaning to the people involved in this process. Any action connected to the environment, whether structured or not, involves people who, in their daily efforts, will help to make this action happen, contributing to the integration of the environment with the other organizational issues.

3. METHODOLOGY

A qualitative exploratory study was conducted in order to increase the knowledge and clarity of the phenomenon studied. Selltiz *et al.* [22]. The option for the exploratory research for this study is justified since the main objective of this work was the improvement of ideas or the discovery of intuitions. GIL [23].

In order to achieve the proposed objectives, the study was divided into three stages: literature review, research of secondary and primary data - a thorough case study of the integrated management system in a Public Institution for Research and Development, IPEN.

The use of a case study proved to be suitable for this work, under the view of Yin [24], who associated different survey strategies for different situations, as illustrated in Figure 2.

Research strategy	Type of research question	Requires control over behavioral events?	Focuses on contemporary events?
Experiment	How, why	Yes	Yes
<i>Survey</i>	Who, what, where, how	No	Yes
Documental analysis	Who, what, where, how much, how many	No	Yes/No
Historical	How, Why,	No	No

analysis			
Case study	How, Why	No	Yes

Figure 2: Strategic Association and Behavioral Events (adapted from Yin [24]).

This study included key stakeholders in the introduction of environmental management at IPEN: the senior management, represented by the Superintendent, the board of Research and Development, Administration officers, as well as the Advisor of Quality, Environment and Safety.

As to the procedure of collecting primary data, individual and face to face interviews were conducted with the professionals mentioned above, following a previously prepared list of questions (see Appendix Item). The construction of the screenplay was based on theoretical references and IPEN documentation. The secondary data, in turn, were obtained from the literature.

3.1. Presentation and Analysis of Results

The reports of the interviews were transcribed for qualitative analysis aimed at associations in the light of the theoretical references and secondary data. In order to achieve greater clarity, the analysis was structured according to the sub-items raised in the theoretical framework: environmental management and behavioral aspects.

With regard to the introduction of the environmental management, IPEN as a whole already has a manual containing integrated environmental management requirements and licensing. It was observed, however, that there is no specific manual for environmental management, for each research unit, and the existing environmental certifications refer to nuclear power merely.

Currently, environmental management activities, which had been projected in the business plan of the research units, have already been developed. Under the nuclear energy scope, these activities are carried out in all the units of IPEN (via radioprotection planning); for other products and services, the activities are limited to the compliance with IBAMA requirements, via Term of Adjustments of Conduct (TAC). According to the managers interviewed, such requirements relate, in large part, to effluents.

Managers were asked whether they had, in their respective department, a formally designated representative to act together with the Coordination of Quality, Environment and Safety, for issues covering the implementation of environmental requirements, within the integrated management system of IPEN. It was informed that there is already such a person, who is in charge of those environmental issues that are subject to the Coordination of Quality, Environment and Safety.

The importance that senior management places on the environmental variable is significant and it seems to disseminate to hierarchical levels, according to the managers: "it is so ingrained (in the

people), because of the nuclear energy, that we do not even notice, it is part of our daily life!": "there is even a group of studies on chemistry and the environment".

Leadership was described being heterogeneous. Although leaders have different academic backgrounds, they "commune of the same vision and ideas of the top management," in the words of one of the managers. This view applies to various spheres, including the environmental issue.

The answers to the question how leadership should be exercised, for the purposes of environmental management, were different in a more immediate analysis. One of the respondent managers said that leadership in environmental issues should be exercised "top down". It would be a determination from legal acts and should be supported by a group of facilitators.

Another respondent stated that he would maintain the current form of leading at IPEN. Through participatory management, the committee formed by representatives of each research unit indicates the managers who will constitute the steering group. Finally, the third manager said that the leadership should be exercised by a group effectively committed to "solve the problem", dealing with "strategies, dimensions, range of possibilities and opportunities."

These responses, however, have common and subject to analysis topics. By comparing the responses of the managers with the two leadership theories presented in the theoretical framework, it is clear that they see the leadership granted by senior management as being transformational, one whose nature more suitably fits the environmental management. This parallel relates to the features already presented in the theoretical section, such as the individualized consideration detected in the responses from the managers interviewed.

Nevertheless, the leadership effectively exercised showed to be the transformational type, with focus on the results. The Superintendent's own words confirms this classification: "The big challenge (of leadership) is to demonstrate, continuously, to collaborators (staff, students, and others) and further stakeholders, commitment to the implementation, maintenance and improvement of environmental management practices, within the Integrated Management System."

It is noteworthy that the word commitment was used several times by managers to describe the profile of the leaders involved in the environmental management of IPEN. This reflects the interdisciplinary approach and the complementarity of behavioral aspects (among one another and in relation to the environmental management).

Another topic addressed in the interviews with managers was the motivation of the top management for introducing the environmental management. The answers showed that the senior management is very appreciative towards the environment, with the Superintendent revealing high motivation with respect to environmental issues. Only one of the managers rated this positive behavior as motivation but not as a result of extrinsic pressure. Pressures were exemplified by "external inputs" (inspection agencies) which **"have compelled the senior management towards the environmental question and the implementation of the integrated management."**

As to the motivation of managers, the responses followed the same pattern, for example: "What drives me is my willing to resolve and improve. I want to build something, something that gives me pleasure - to contribute to a better world that respects the environment is something that gives me pleasure."

The motivation of researchers, according to a manager interviewed, comes from the fact that they bring information and even proposals for research focused on the environment. Managers of IPEN are also advisors of dissertations and/or theses on this theme. One example, given by the same manager, who is counseling a thesis on waste treatment in a chemical company, reveals the potential of partnerships between the environment, academy and business organizations.

However, not all researchers have the awareness, sensitivity and own initiatives targeting environmental issues as a whole, independently from the nuclear energy question, according to some managers.

Most researchers are motivated and only a minority has no motivation to address environmental issues. This approach is in accordance with one of the answers given previously (on leadership analysis). One of the managers referred to the need, by means of determination from legal norms, of solving the lack of motivation of those researchers.

As for the **commitment** of senior management to environmental issues, respondents mentioned, firstly, that the commitment to nuclear power is high for cultural reasons. To other aspects, this commitment is also high. However, some obstacles can be confused with lack of commitment: budget constraints, lack of people to structure and make the necessary improvements, besides the time horizon it takes to implement changes in the environmental area.

Despite these obstacles, the board recognizes the demand and is very appreciative for the introduction of the environmental management, in view of the existence of sponsorship coming from the top management. In accordance with the Superintendent, to be committed to environmental issues means acting in a proactive manner and ensuring, preventively, that the various activities of IPEN do not result in significant impacts to the environment."

Finally, this same superintendent noted, as important aspects in IPEN environmental management, the encouragement and promotion to consolidate this policy implementation, searching for external financial and human resources, including the participation in conferences, technical visits and any other type of events that can enhance the institution capacity in the implementation and maintenance of environmental management actions.

4. CONCLUSIONS AND FINAL CONSIDERATIONS

Given the analysis of the results presented, it appears that there is a strong concern of IPEN with the environment, already consolidated, only, in what refers to its products and services for the nuclear power. Hence, to address the environment in all its aspects and in an integrated way, in the diverse units, is the challenge IPEN faces.

It may be concluded that this concern with the environment is predominantly intrinsic and is rooted in the leaders and employees. The cycle ends with a high commitment to environmental management by the senior management, managers and researchers (reported to managers).

Under these solid foundations, the introduction of environmental management, expressed through the adoption of the integrated management system (quality, safety and environment) tends to be a mere consequence of initiatives that IPEN has demonstrated all over its history.

Due to the fact that the implementation of IPEN integrated management system is in its early stage, with respect to the environmental management, it was not possible to include an analysis of its advantages and constraints, in this paper. This aspect was considered a limitation of the present study.

One possibility for future studies would be to extend this work to other research institutions that have environmental management, should they be public or private, in order to compare, analyze and formulate research hypotheses.

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