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Analysis of Environmental Management Company acting on the State of Pernambuco-Brazil

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***Abstract*—** *This paper presents an analysis of environmental management of companies operating in the state of Pernambuco, considering the concepts and models for adoption of practices that lead to eco-efficiency as a way of estimating the legacy for future generations. Data were collected with the application of a quantitative survey, completed by the managers of the companies selected for sampling. There is recognition that it's necessary a change in the conduct of business by legal force, to protect the image of the company to respond to the demands of society, in order to enable growth economic and environmental protection, but actions taken as a main point gain legal compliance, still showing up they are at early stage on track towards sustainable local development. The results showed the adoption of environmental management practices that consider employee participation as key to improving their performance, recognize the importance of environmental education and give focus to the management of waste and consumption of natural resources like water and energy.*

***Keywords*— Environment, Ecology, Business, Sustainability, Eco-efficiency, Environmental law.**

I. INTRODUCTION

According Once living in a society, being this capitalist, it is inevitable to coexist with business organizations, which, inserted in the cultural, social and natural environment cannot avoid the responsibility of living with a low negative impact, continuity of the business, satisfying the needs of society and without damage to the environment. In this context, given its importance to mankind and the capitalist world, we must consider the contribution of the thinking of the Austrian economist, administrator and professor Joseph Shumpeter and his theory of the economic cycle (Curie, 2011), according to which the reason for the economy to emerge from a state of equilibrium and to enter into a boom (expansion process) is the emergence of some innovation from an economic point of view that considerably alters the preconditions of equilibrium. Examples of innovations that change the state of equilibrium, the introduction of a new consumer goods on the market, the discovery of a new method of production or commercialization of consumer goods the conquest of new sources of raw materials or even the alteration of the structure of the current market, such as the breaking of a monopoly. These are, therefore, evidences that the companies are part of the environment and that are in constant interaction and their decisions have repercussions throughout the productive chain and outside it, like a wave, demonstrating the amplitude of this interconnection.

Historical evidence reveals that at all times of his existence man has never seen himself as part of the environment and has never relinquished his most superfluous desires in the name of nature, seeing it as an inexhaustible source of inputs for his activities (Curie 2011). What has changed over the years has not been man's posture, but the power to destroy his tools. In the midst of so many transformations, one of the few views that remains unchanged concerns natural resources. Influenced by the capitalist logic of utility, the human being reinforced the instrumentalist view with which he always looked at nature, identifying as resource only that which results in profit. In the view of environmentalists, natural resources comprise all the necessary conditions

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for life. As the name implies, the industrial revolution has profoundly modified the previous mode of production, accelerating the rate of extraction of resources. Therefore, the action of man has gained much more destructive contours after the introduction of the machines, contributing to the rapid depletion of ecosystems.

All this analysis is based on the anthropocentric Western thought, which believes "nature is at the service of man", whose way is to respect it and use it with rationality. It is to migrate from the anthropocentric model, called "shallow ecology," according to which human beings are seen above or outside nature as the source of all values, while nature is given a simply instrumental, "use" value to the so-called "deep ecology", which sees the world as a network of interconnected and interdependent phenomena. Thus, we have a new paradigm, where we must see the world as an integrated whole, and not as dissociated parts. Deep ecological perception recognizes the fundamental interdependence of all phenomena, and the fact that, as individuals and societies, they are all embedded in a cyclical process of nature, and all are dependent on this process. It would then be coherent to think of sustainable local development management. Consider the definition of sustainability, given by Lester Brown of the World watch Institute, a sustainable society is one that meets their needs without diminishing the prospects of future generations (Capra, 2006).

After all, it is urgent that our civilization realize that historical processes are not necessarily linear, so as to be able to reverse the current escalation of socioenvironmental degradation, associated with our "globalizing" Cartesian mechanistic model of development. At this dawn of the millennium, humanity is going through a singular and decisive historical moment, marked by an environmental crisis that has its origins in an economic model, conceived mainly from the 18th century, whose support tripod based on capital, labor and natural resources shows signs of exhaustion. While the first two are still far from what might be called harmonious coexistence, the last component of this tripod, natural resources, has rarely been taken into account in any relevant way (Curie, 2002). The challenge, therefore, would be to develop sustainable businesses, compatible with economic reality. So, the path is more "simple", contrary to what the defenders of nature preach, since it is not necessary to "stop the world" to preserve nature, but to change the way of seeing and relating to it, making possible thus, the continuity of life on the planet.

In the broad sense, there is a need for an environmental reeducation, based on the tripod of sustainability or triple bottom line. The term triple bottom line was created by the British thinker John Elkington in 2008, according to which it only makes sense to think about sustainable development when environmental, social and economic aspects are taken into account (Curie, 2011). This represents a challenge to the harmonious relationship between society, organizations and the environment where they are inserted, enabling social development, financial return and environmental preservation. Under the umbrella of the economic relationship between companies and the environment, it is necessary to concentrate the analysis under the concept of eco-efficiency that presupposes the efficient use of natural resources, reducing economic and environmental impacts, benefiting, besides the environment, the performance business economics (Curie 2011). Under the umbrella of the economic relationship between companies and the environment, it is necessary to concentrate the analysis under the concept of eco-efficiency that presupposes the efficient use of natural resources, reducing economic and environmental impacts, benefiting, besides the environment, the performance business economics.

The state of Pernambuco stands out in the national scenario as one of the largest centers of economic development in Brazil. This is because the state progresses having a strategic focus on decentralizing development and meeting the demands of the most vulnerable segments of the population, from the Interior to the Coast, not forgetting the economic vocations of each region. The Economic Development Agency of Pernambuco - AD-Diper, points out the implementation of 1,049 new companies in the Interior, in the period 2007/2010. Another major driving force of the state is the Port Complex of Suape, one of the largest investments in infrastructure of the State Government. In the 13,500 hectares of the complex, 120 companies are already installed, another 30 are under construction, and another 20 are due by the end of 2015. It is the main business attraction center of Northeast Brazil.

This study addresses the environmental sustainability issue as an undisputed necessity in the current business management in the state of Pernambuco. Thus, the focus of this research was the environmental management model adopted considering ecoefficiency. Thus, it was defined in the perspective studied in this research, to address issues related to legal compliance, organizational strategy and market recognition. It aimed to study the depth of the environmental issue in business management in Pernambuco, with the implementation and maintenance of environmental management and the results achieved with the current model. Therefore, within this context, the objective of this study was to identify the reason that motivated the adoption of environmental

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management practices in companies in Pernambuco; whether arising from a strategic decision, whether to meet market demand, whether to meet legal requirement or other reason to be clarified. The results showed the adoption of environmental management practices of the evaluated companies, which considered the participation of the employees as fundamental to the improvement of their performance and recognized the importance of environmental education and showed great performance in the management of waste and consumption of natural resources such as water and energy. Therefore, every enterprise, especially industrial, should consider in its model of environmental management, these four elements (water, energy and waste effluents), in order to mitigate their impacts, preventing pollution and depletion of natural resources and, achieving, as a return, the guarantee of business continuity.

II. THEORETICAL FRAMEWORK

2.1. Environmental sustainability and eco-efficiency

The term sustainability is increasingly present in everyday business activities and in the perception of society. The most widespread concept is that stated in the 1987 Brundtland Report (Azevedo 1988), that sustainable development must meet the needs of present generations without compromising the needs of future generations. From this publication, the term sustainability or sustainable development has gained global dimensions. Since then, several other derivations and definitions have emerged, keeping the central focus on the challenge of balancing economic growth, environmental protection and social development. The greater acceptance and understanding of the term sustainability have influenced the behavior of companies around the world, since they have faced not only economic but also environmental and social problems. Such problems have drawn the attention of society, the press, governments, Non-Governmental Organizations - NGOs, which result in new laws. Such changes have repercussions in the economic, political and social environment where the company operates and creates guidelines and limitations that demand changes in its management, to enable business continuity. Thus, the traditional view of the company must disappear, otherwise it will be subject to (Donaire 1999). The dissemination of sustainability in organizations occurs through the adoption of environmental management. The role of senior management is key to supporting and ensuring that initiatives towards environmental protection and change of responsibilities are implemented and maintained. New approaches have emerged for proactive companies to strengthen, through senior management, the organization's commitment to sustainability (Sanches 2000). Likewise, participatory management can influence the understanding and commitment of employees, since they are included and interfere in decision making, providing lasting results.

From the point of view of environmental management, it is also necessary to understand and meet the meaning of the term ecoefficiency, which represents the idea that both economic efficiency and environmental efficiency need to be achieved simultaneously in business management. In this sense, several studies and publications (Bergesen et al. 2009,GCP 1998, OECD 2001) have confirmed that practicing eco-efficiency, in fact improves environmental performance and can bring economic results, among which the following stand out: reducing operating costs, improving production processes, reducing vulnerability and risks, strengthening the institutional image, increasing the motivation of employees, greater possibility of generating revenue, with the possibility of conquering new markets. Among the various concepts adopted by industry, eco-efficiency is one of the most accepted, both in private and public sector. Eco-efficiency is therefore to do more with less, achieving economic and ecological gains in parallel, without one having to be sacrificed to benefit the other. For example, eco-efficiency can be achieved by improving resource and material use processes and energy efficiency, reducing risks to the environment and human health by developing products that "fit" into ecological cycles, producing products that are more easily recyclable or extending its functionality / durability. This "win-win" aspect has contributed to their acceptance by decision-makers. In 1992, the United Nations Conference on Environment and Development, held in Rio de Janeiro, known as ECO-92 or RIO-92, brought the concept of eco-efficiency as the tool to be used for companies to evaluate and improve their environmental performance, contemplating its operations, products and services (Schmidheiny 1992).

The popularity of eco-efficiency can be attributed to the ease with which it unites business objectives with value creation for environmental management. In short, there is no difference between a competitive company and an eco-efficient company, since eco-efficiency is a fundamental concept of productivity that is commonly measured outputs obtained from incoming inputs, so that it unites two types of efficiency: the economic and the environmental. Its objective is to maximize economic and environmental benefits, while minimizing risks and related costs. It is a characteristic or quality that can be used and applied to decisions regarding any kind of product, process, service and activity. The result of a decision should be an

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improvement in the production process that makes it more eco-efficient or a product or service that is more eco-efficient than the previous one. This justifies the position of eco-efficiency as a broader context of sustainable development. Recently, eco-efficiency represents better decision-making, to reduce the economic and environmental costs of human activity, providing social value with environmental and economic gains. To reach this threshold, means and ways must be found to support decision-makers through the provision of performance monitoring tools and demonstration of tangible results.

2.2. Water, common good or natural resource?

The analysis of water must be made considering that the volume of fresh water on the Earth's surface is fixed, so that as the population grows, there is less and less water available per person. Lack of water is the main barrier to development and an important reason why so many poor people in the world remain poor. Most of our water comes from the aquifers, which renew very slowly. Industry is the second largest user of water (21% of the world's total) and although demand is limited in quantity, almost everything is consumed and the result is that the water gets so polluted that it cannot be reused as easily. Industrial effluents, as one of the outputs of industrial processes, also need to be considered, since their disposal, if done improperly, will contribute greatly to the pollution of the receiving body and therefore to aggravate the situation of the resource water, where it is seen, is a finite resource. Based on the premise that the industry uses 21% of the fresh water consumed on the planet, there is the fear that industrialization aggravates the problem of water pollution. In developing countries, about 70% of industrial waste is dumped into the water without treatment, polluting both underground and surface supplies. Among the substances discharged into rivers, lakes and aquifers are organic pollutants and heavy metals such as lead and mercury and persistent organic pollutants – POPs. Such substances are discarded or penetrated into the soil, they can cross all layers and reach the aquifers (Clarker and King 2005).

Hydropower, a global source of renewable energy, produces about one-fifth of the world's electricity. It is considered clean energy because it does not produce greenhouse gases or pollutants associated with the burning of fuels and is well accepted by the population, which is not the case with others, such as with nuclear power plants. It happens that the reservoirs required by large plants waste a lot of renewable water resources due to evaporation. It happens that the reservoirs required by large plants waste a lot of renewable water resources due to evaporation. Therefore, every enterprise, especially industrial, should consider in its model of environmental management, these four elements (water, energy and waste effluents), in order to mitigate their impacts, preventing pollution and depletion of natural resources and, achieving, as a return, the guarantee of business continuity. It is estimated that Brazil concentrates between 12% and 16% of the total water resources of the planet Earth, which are not distributed homogeneously and are threatened by socioeconomic factors. In the Northeast, there is a shortage of surface water, which is aggravated by problems such as lack of basic sanitation and contamination by tropical disease transmitters (Clarker and King 2005).

The water situation in Brazil involves problems of quantity and quality, deforestation, sewage disposal, river channeling and construction of dams, erosion, and discharge of toxic substances that act to reduce aquatic biodiversity, compromise public supply, increase costs and make water management very complex. Brazil has two major challenges, namely ensuring adequate water supply in small municipalities (up to 20,000 inhabitants) and large metropolitan areas, where, in addition to scarcity, they face growing risks of contamination. Freshwater is key to sustainable development, economic growth and poverty alleviation (Clarker and King 2005).

2.3. Management aspects of solid waste

One of the main products of the human relationship with the environment and present in the various phases of the production chain and also in the post-consumption of the industrial era, in the broad sense, is the waste, more recently called waste. The industrial era intensified its generation and emission, in solid or pasty form, liquid, gas, sound, visual, giving negative contribution, with the phenomenon of the pollution. Thus, it is necessary to consider the definition of pollution, found in art. 3, item III of Law 6.938/81 of the National Environmental Policy, degradation of environmental quality resulting from activities that either indirectly affect the health, safety and well-being of the population, as well as create adverse conditions for social and economic activities , adversely affect the biota, affect the aesthetic or sanitary conditions of the environment, release materials or energy in disagreement with established environmental standards (Kruglianskas 2009). Garbage disposed of without any treatment can pollute the soil, altering its physical, chemical and biological characteristics; it can also contaminate the water through physical pollution (increased turbidity, formation of sludge banks or inert sediments, temperature gradient variations etc. (eg percolation of slurry through the mass of waste to surface or groundwater), biological (eg by the use of industrial

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wastes such as non-biodegradable detergents and toxic wastes, intensive use of herbicides, fungicides, etc.), biochemistry high coliform count and presence of residues that can influence the quality of life of the beings that inhabit the aquatic environment) and radioactive (Lima 1995).

At the heart of the environmental problems of today's world is the poor management of solid waste, which can cause not only serious environmental damage, but also health. These problems come basically from two factors: increasing amount of waste generated and discarded in the environment and quality of this waste, since substances with increasingly complex chemical chains of difficult degradation are produced (Negromonte 2002). In this sense, Lima (1995) introduced the concepts of inexhaustibility and irreversibility of the garbage, based on the origin of the same, because, the increase in the production of urban garbage is directly linked to the population increase and the intensity of the industrialization, irreversible processes, thus, the problems generated by garbage in the environment are irreversible, if we do nothing to contain them. There is no doubt that sustainable development is the way to meet the needs of the present without compromising the ability of future generations to meet their needs. This reflects a process of change in which the exploitation of natural resources, the orientation of investments, the direction of technological development and institutional change are in accordance with the current needs, not forgetting the future (Azevedo 1988).

2.4. Environmental law and public policy

From the legal point of view, one has to say that, as society began to become more conscious, it began to perceive the importance of the environment and not only of nature as a source of wealth, from which emerged environmentalist movements and the specialized media began to to exert pressure in a way that began to occur conflicts related to environmental issues, starting to demand from the legislator a focus hitherto little known, provoking the emergence of Environmental Law. The Environmental Law to be the instrument of adaptation of the policies of growth and has the task of accomplishing the common good, within the community in which give. Social, political, economic, etc. are fundamental to order the development of the various forms of social adaptation. Therefore, organizations from the point of view of environmental management need to conduct their actions in line with legal requirements. Environmental law is the instrument for adjusting growth policies. The importance of environmental law was embodied in the constitutional text of 1988 and has been exalted in the higher courts that have been deciding (Freitas 2000):

> "Everyone has the right to an ecologically balanced environment. It is a third-generation right (or a brand-new dimension) that assists every human being (RTJ 158/205-206). It is incumbent upon the State and the collectivity itself to defend and preserve, for the benefit of present and future generations, this right of collective ownership and individual trans character (RTJ 164/158-161). The fulfillment of this burden, which cannot be renounced, represents the guarantee that grave intergenerational conflicts will not be established within the community, marked by disrespect for the duty of solidarity, which is imposed on all, in the protection of this common good of the people in general. Doutrina. ECONOMIC ACTIVITY CAN NOT BE EXERCISED IN DISARMONION WITH THE PRINCIPLES INTENDED TO MAKE EFFECTIVE PROTECTION FOR THE ENVIRONMENT." (adi-mc 3540 / DF – RELATOR MINISTRO Celso de Mello, j. 01/09/2005, Pleno, DJ 03/02/2006).

The Rapporteur, Minister Celso de Mello, the importance of environmental protection and the maintenance of natural resources (Freitas2000):

> "The safety of the environment cannot be compromised by business interests or dependent on purely economic motives, especially if economic activity, considered as the constitutional discipline that governs it, is subordinated, among other general principles, to that which privileges the 'defense of the environment' (CF, art. 170, VI), which translates into a broad and comprehensive concept of the notions of the natural environment, the cultural environment, the artificial environment (urban space), and the working environment. Doctrine. The legal instruments of a legal nature and constitutional nature aim to enable the effective protection of the environment, so that they do not alter the properties and attributes inherent to them, which would cause unacceptable impairment of the health, safety, culture, work and well-being of the population, in addition to causing serious ecological damages to environmental patrimony, considered in its physical or natural aspect".

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Among the principles that govern environmental law, it is worth noting the "Principle of Sustainable Development" that includes the human, physical, economic, political, cultural and social dimensions, in harmony with environmental protection. As an indispensable requirement, all should cooperate to eradicate poverty in order to reduce disparities in living standards and better meet the needs of the majority of the world's population. The TRF from 5ª Region recognized that (Freitas 2000):

> "The Constitution of 1988, by consecrating the defense of the environment as a principle of the economic order and establishing that everyone has the right to an ecologically balanced environment, essential to the healthy quality of life and vital for present and future generations, sustainable economic development." (TRF 5ª Region, Apelação Cível nº 209609/SE, j. 20/11/2001, DJ 08/04/2002, Relator Desembargador Federal Paulo Gadelha).

The Federal Constitution of 1988, innovating, brought a specific chapter focused on the environment, defining it as the right of all and being the right of all, gives it the nature of good of common use of the people and essential to the healthy quality of life, and it is incumbent upon the public power and the community to ensure and preserve for the next generations to make good use of and freely enjoy a balanced environment. The right to life, as a fundamental right, including as a principle of environmental law, and guaranteed by the dignity of the human person, gains a significant strengthening in the right to an environmentally balanced environment. The Government of Brazil has instituted some public policies in order to materialize the protection of the environment and enable it to remain balanced, (Freitas 2000):

Law 6938/81 that instituted the National Policy of the Environment created the National System of the Environment – SISNAMA and provides, among others, the need for an environmental license for potentially polluting activities. CONAMA Resolution 237/97 defines licensing as an administrative procedure, whereby the competent environmental agency permits the location, installation, expansion and operation of enterprises and activities that use environmental resources, considered to be effective or potentially polluting, or those that, in any form, may environmental degradation, taking into account the legal and regulatory provisions and applicable technical standards.

The **Law 9433/97** instituted the National Water Resources Policy and created the National Water Resources Management System, which provides, among others, the need to grant rights to use water resources.

The **Law 9605/98** instituted the Environmental Crimes Law, whose purpose is to repress the damage effectively caused to the environment, but also to prevent it, by collaborating so that it does not occur. This law, in its art. 3, solved an old problem of criminal responsibility, which establishes punishment for the legal person, since it represents the "whole", and not only the singular, as it was before, when only the agent (employee) was punished, (Freitas 2000):

> "This law, in its art. 3, solved an old problem of criminal responsibility, which establishes punishment for the legal person, since it represents the "whole", and not only the singular, as it was before, when only the agent (employee) was punished.
>
> Single paragraph. The liability of legal entities does not exclude that of natural persons, authors, coauthors or participants of the same fact".

The Law 12,305/2010 introduced the National Solid Waste Policy to regulate the integrated management and solid waste management, making use of principles, objectives and instruments that make feasible, and assigning responsibilities to generators, public power and individuals or responsible for, directly or indirectly, the generation of solid waste and those that develop actions related to solid waste management. The law brings a modern approach and presents three important concepts, (Freitas 2000):

a) Integrated solid waste management: includes all actions aimed at finding solutions for solid waste. Integrated management involves waste from health, construction, mining, ports, airports and borders, industrial and agroforestry, shared responsibility for the product life cycle and reverse logistics. This concept brings a holistic idea.
b) Responsibility shared by the product life cycle: covers manufacturers, importers, distributors and traders, consumers and holders of public services of urban cleaning and solid waste management. Shared responsibility is related to non-generation, reduction, reuse and recycling, according to art. 9 of the said law.
c) Reverse logistics: return of products after use by the consumer, independent of the public service of urban cleaning and waste management, mandatory for pesticides, waste and packaging; Batteries; tires; lubricating oils, their residues and packaging; fluorescent lamps, sodium and mercury vapor and mixed light; electronic

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products and their components; and products sold in plastic, metal or glass packaging, and other products and packaging, considering, as a priority, the degree and extent of the impact on public health and the environment of the waste generated.

Extensive and comprehensive is the range of legal texts published in Brazil, for the study in question, we have selected the constitutional text and the laws that deal with the National Policy on the Environment, Environmental Crimes and the National Policy on Solid Waste to endorse the importance of management and the responsibility of business managers.

2.5. Environmental management and certification

A new vision of the companies in relation to the environment has been outlined over time, since it must be considered that each historical period has its particularities as to the form of production and commercialization (use of labor, raw materials, technologies , transportation and communications, etc.) and that organizations are built within a socio-historical format and these are the result of values built by a society at a given time and that serve as a reference for people's action (Vasconcelos 2003). Until the sixties, the "social paradigm of exclusion" prevailed, in the conviction that the sources of natural resources would be infinite and that the free market would maximize social welfare. Because conventional economic theory dealt only with the allocation of scarce resources, and nature was not considered a limiting factor, this paradigm considered the environment to be irrelevant to the economy (Corrêa 1998). The concept of corporate environmental management appears as the set of defined and systematized practices applied by a particular enterprise with the purpose of reducing and controlling environmental impacts (Teodoro 2002). Also, as a way to stimulate the adoption of environmental management in companies, the ISO14001 - Environmental Management System, with auditable requirements applicable to any type of organization, irrespective of the area of activity, emerges at the end of the 1980s. In Brazil, there was a great evolution in the number of certificates issued, having a peak in 2006 and a new peak from 2010 and remaining at the same level the years 2011 and 2012 (Claro 2003).

2.6. Environmental management: strategic decision or legal obligation?

The Brundtl and Report, published in 1987, stated that the company of the new millennium could not be oblivious to the social and ecological problems of the places where it operates. Characterized by responsibility, the business posture began to include monitoring the impact of its activities on the community and the planet. The British John Elkington (Curie 2011) coined the term triple bottom line, so that it only makes sense to think about sustainable development when environmental, social and economic aspects are taken into account. There is no denying that 21st century environmental awareness has changed business practices. Environmental awareness has changed the world of business. The 21st century buyer uses their power of choice. The customer is increasingly demanding, seeks to know about the manufacturer, whether the company fights child labor, adopts recycling practices or promotes reforestation. The company of the 21st century will also have to respond to the growing demands of investors and society for transparency. The new leaders must be prepared to divulge the socio-environmental effects of their activities. Aware of these requirements, several companies present sustainability reports. Finally, the corporate patrimony is no longer defined based on the evaluation of its equipment and real estate; values such as reputation, credibility and socio-environmental responsibility promise to define the success of the great companies of the 21st century. Sustainable environmental management is a decisive factor, increasing competitiveness in the new business world. Environmental management can be defined as the management arm that reduces the impact of economic activities on nature. It must be present in all the projects of an organization, from its planning and execution until its complete deactivation (Curie 2011). On November 27, 1997, the International Chamber of Commerce (ICC) defined a series of environmental management principles, recognizing that environmental protection is among the top priorities to be pursued by any type of business (Donaire 1999).

In the business environment, reputation has been preponderant for its acceptance before society, so that companies are increasingly seeking the balance between social and functional, since every business initiative has an impact on profit and the world. There is no way to ignore the new commitment of companies, which goes from an ethical, economic and market awareness. The corporate world realized that companies, as social agents are part of the society that houses and conditions their existence. Therefore, they do not exist by themselves, since they depend on the web of connections present in the markets (Kruglianskas 2009). Converting the company into a socially responsible organization is not the task of a single manager, since in addition to capital investment, it needs organizational values that support this philosophy. In order for this management model to be

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institutionalized, it is necessary to conquer the employees and share with them the new business vision for the formation of a management culture that strengthens sustainability.

Good environmental governance practices go beyond business efficiency and financial results. Environmental governance is the ultimate collective mechanism for addressing the impact of a company's activities on the environment. Thus, according to the UK environmental agency, environmental governance describes the company's management of its environmental impacts, risks, performance and opportunities. Although it is part of corporate governance, it deals with global issues, such as the environment, and has its origin recognized from the evolution of four stages: the first phase was called the "Age of Conformity", characterized simply by legal obedience; the second phase was the result of the 1984 environmental disaster in the city of Bhopal, India, with 42 tons of toxic gas leaking and the death of about 25,000 since then. This accident was the warning that changes need to happen in corporate governance practices. The third phase demands that corporate environmentalism go beyond conformity, not enough to meet but go beyond, serving as a model for the corporate world. At this stage, terms emerged, among which eco-efficiency. It is believed to be in the fourth phase, whose key word is sustainable development. And companies should not just do their "homework", but take sustainable development seriously. The principles that are applied effectively will lead the company to sustainable development can be exemplified as follows: zero residue, systemic thinking, and looking out (Kruglianskas 2009).

To become environmentally more accountable, and to face this global reality, companies need to take these "green issues" to the top management meeting, adopting a governance system focused on the environment. This is a relatively new discussion and, in fact, an efficient model of environmental governance should be mandatory for all companies from the outset. The implementation of environmental governance proved to be feasible not only for environmental issues, but also to provide financial benefits to any type of company. This may reflect in the engagement of the productive chain manufacturer, industries of all kinds, suppliers, distributors, traders, employees, customers, consumers and, why not, the whole society (Matos 2003).

It is through people, therefore, that companies can implement their actions and achieve results, and the focus of this analysis rests on the identification of the role of people in the model of environmental management adopted by companies operating in the state of Pernambuco.

2.7. Challenges of economic growth in Pernambuco

The state of Pernambuco grew two percentage points above the national average by the middle of 2012 and had lower growth at the end of 2013. Investments totaling R $ 100 billion between 2007 and 2016 are mainly concentrated in industrial projects - 67.3%, real estate projects - 14.4% and services and commerce - 67.3%. Thus, a productive profile emerges that marks a new economic cycle driven by industry, especially petrochemicals, petroleum, shipbuilding, automobile industry, pharmaco-chemistry and steel industry, as well as redefining traditional segments, expanding services and supporting production and expansion of trade and social and personal services (Cunha 2013). The state of Pernambuco has chronic water shortage. This is a major drawback in the state's industrial development. However, much of the drinking water in the state is consumed by industries. Therefore, the conscious management of this resource is a great challenge for the managers of the industries of Pernambuco.

In Pernambuco, 11 municipalities are the largest generators of waste, with only 39 industries, responsible for the generation of 79.25% of the waste generated in the State. Considering waste with destination (inside and outside the industry), that is, excluding 5.4% of waste with no defined destination, it can be highlighted (CPRH 2003):

• The main form of waste disposal is the "Use in boiler" (54.3% waste intended for), being the sugarcane bagasse responsible for 99.9% of this destination.

• For fertirrigation, 25.5% of the waste destined is sent and 100% represented by the vinasse / vinasse of sugar mills.

• About 9.5% are destined for incorporation in agricultural soil and are represented mainly by sand + bagacilho, filter cake and boiler ash.

• Approximately 7.26% of the waste destined is reused / recovered / recycled, of which about 48.5% is recycled, recovered or reused within the companies themselves; 40% are sent for reuse/recovery/recycling outside the companies and 11.5% are directed to intermediate scrap yards.

• About 0.88% are sent to municipal, private, third-party or own landfills/dumps. Of these, we can highlight:

• 43% for its own industrial landfill.

• 35% for municipal dump.

• 18% for private dump.

Of the main destinations mentioned above, one can highlight the reuse/recycling/ recovery as the main destination of 81% of the hazardous waste with

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destination, of which 58.5% is recovered/reused/recycled externally and 41.5% internally. From the figures presented, it is perceived that control over the waste generated in the State is very incipient and that without adequate disposal, this is, being sent to municipal or private dumps, as this is an inadequate form of final disposal of solid waste characterized by simple discharge onto the soil, without measures to protect the environment or public health, has negative consequences for both human and animal health and the environment. Analyzing the Energy Balance of Pernambuco, it was verified that, despite renewable sources (hydroelectricity, charcoal, firewood, alcohol and sugar cane bagasse), they still contribute the largest share of total energy supply; this energetics come, year after year, reducing their contribution. In turn, non-renewable sources (oil and natural gas derivatives) have been increasing their share, thus showing that the priority over the last years has been, and it is to encourage "dirty" fuels to meet the state's energy demand.

In the Pharaonic complex Suape Industrial and Port is being implemented a pole of thermoelectric plants to fossil fuels (Costa 2015). It is observed that the state of Pernambuco has great challenges to reconcile economic development with sustainability and eco-responsibility.

III. METHODOLOGY

3.1. Approach of the research carried out

Initially, institutions such as the Federation of Industries of Pernambuco - FIEPE, the National Industry Service - SENAI and the State Environmental Agency were consulted regarding the availability of information on companies located in the state of Pernambuco that would allow the identification of a study group. According to the information available in the respective databases, there was no way to identify which companies had environmental management implemented or not. From then on, the criterion for choosing companies participating in the Environmental Sustainability Award of the FIEPE System was adopted, in addition to those that admittedly have an environmental system implemented or certified. To enable the investigation of environmental management in companies, the following research questionnaire was applied:

FACULTY OF ADMINISTRATION SCIENCES
MASTERS MANAGEMENT OF SUSTAINABLE LOCAL DEVELOPMENT
QUANTITATIVE RESEARCH QUESTIONNAIRE

1-Company:

1.1- Activity: ( ) Industry (indicate type _____) ( ) Service (indicate type _____)
1.2- Number of employees (own + outsourced)_____
1.3- SIZE: ( ) Small ( ) Middle ( ) Large
1.4- Is your company multinational? ( ) Yes ( ) No
1.5- Where it is installed? City: _____ - PE

2-Environmental Management System - EMS:

2.1- Year of implementation of EMS _____
2.2- What motivated the deployment?
( ) Legal requirement ( ) Recognition of the market ( ) Determination of the matrix
( ) Other, explain:_____
2.3- The implementation of the EMS? ( ) Yes ( ) No
2.4- Today, the EMS has? ( ) YES ( ) No
2.5- What was the employee's participation in the implementation of the EMS?
( ) Active (helped build the model) ( ) Passive (received guidelines to be followed)
2.6- What is the EMS focus?
( ) Waste ( ) water ( ) Energy ( ) Effluents ( ) Emissions ( ) All
2.7-In relative terms, what has been achieved with the EMS since its implementation?
( ) Reduction of waste generation in _____%
( ) Increased shipment of materials for recycling in _____%
( ) Reduction of water consumption in _____%
( ) Increased reuse of water in _____%
( ) Reduction of effluent generation for treatment in _____%

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( ) Increased utilization of treated effluent in Reduction of effluent generation for treatment in _____%
( ) Reduction of energy consumption in _____%
( ) Reduction of emissions in _____%
2.8- What is the main gain that the EMS brought to the company?
( ) Legal compliance ( ) Certification ( ) Awards ( ) Increase in market share
( ) Other, explain:_____
2.9- The EMS has some environmental education program? ( ) Yes ( ) No
2.10- The environmental education program includes:
( ) regular trainings ( ) internal commission of the environment ( ) workshops / experiences
( ) Other, explain: _____ ( ) não aplicável
2.11- How do you rate employees' contribution to SGA success??
( ) Directly related ( ) makes no difference ( ) I cannot say

The research was designed in order to make it possible to know the information to be provided, without the need of identification of the company.

3.2. Instruments for data collection

The questionnaire was sent online to the 34 companies selected for the investigation, because they work in the State of Pernambuco (capital, metropolitan region and countryside), amongst them, large, medium and small companies, independently of having environmental certification, which are recognized as having environmental management, as well as those that participated or were highlighted in the Environmental Sustainability Award of the FIEPE System, in the 2011 and 2012 cycles. The data were collected using a questionnaire for quantitative research, sent to each company surveyed between November 2013 and February 2014, and answered by the environmental manager or equivalent. 56% of the questionnaires issued were returned, which served as the basis for the environmental management analysis of companies operating in the state of Pernambuco, considering the ecoefficiency. Two of the companies surveyed did not respond to the survey, but forwarded an electronic message informing them that it was impossible to respond to the questionnaire. No small business responded to the survey.

3.3.Categories of analysis

The categories of analysis considered were:

a) Age of the management system implemented - calculated according to the period in which the management system was implemented in the company;
b) Company size - informed by the company when completing the survey;
c) Number of employees - informed by the company when completing the survey;
d) Employee participation level - informed by the company when completing the survey;
e) Environmental management focus - informed by the company when the research is completed;
f) Motivation of the implantation - informed by the company when completing the research;
g) Legal compliance - informed by the company when completing the survey;

The objective was to verify if there is any correlation between the period in which it was implemented, the adopted model, the activities developed and the size of the company, as well as the number of employees and the level of participation regarding eco-efficiency of the current environmental management and the international initiatives and tools offered in the last three decades. Thus, the analysis made it possible to reach conclusions about the subject under investigation, in order to stimulate other organizations to implement an environmental management model.

3.4. Research locus and sampling

The locus of the research were companies operating in the State of Pernambuco, and, admittedly, have an environmental management system, regardless of whether they are certified, among them, those that participated or were featured in the Environmental Sustainability Award of the Federation of Industries of Pernambuco - FIEPE in editions 2011 and 2012, contemplating small, medium and large companies, throughout the state. The companies surveyed operate in the following activities: food, beverage, chemical, metallurgical, naval, paper, service, sugar and energy industries, and necessarily have a unit in operation in the state of Pernambuco, representing a sample of 34 companies.

IV. RESULTS AND DISCUSSIONS

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The analysis was categorized based on the responses received, representing 56% of the companies that contributed to the present study. In alphabetical order, respondents spontaneously answered the survey, companies that operate in the Food, Beverages, Footwear, Civil Construction, Energy, Consulting, Fibers and Pet, Cargo Handling, Sanitation, Steel, Sugar and Energy sectors, representing 56% of companies. Are companies that are installed in the state of Pernambuco, national and multinational, medium and large sizes. Among the companies surveyed, a balance was observed in relation to the number of employees. Regarding the size, none of the companies surveyed. There was a predominance of large companies. The consignment was made by the person responsible for completing. For reference, the classification of the National Economic and Social Development Bank - BNDES, based on the annual gross operating revenue. 100% of the medium-sized companies that replied to the questionnaire are Nationals. Regarding the origin, among the companies surveyed, there was a predominance of national companies for the Response In case, as shown in Figure 3. Seeking to expand the scope, the universe surveyed went beyond the city of Recife and metropolitan region, contemplated companies that work in the capital, metropolitan region and interior of the state, characterizing a diversified sample A range of 17 years was observed in relation to the adoption of the environmental management system (EMS).

The adoption of environmental management in the companies surveyed took place in the late 1990s and early 21st century, reverberating about a decade after the initiatives of German companies to include the ecological dimension in the management of their businesses. Compared with the evolution of ISO14001 certificates in Brazil it is possible to observe that the year 2004 coincides with the first period of high incidence of issuance of certificates. The companies stated that the motivation for the implementation of environmental management was the recognition of the market followed by the determination of the matrix and also the legal requirement.

Among the reasons for the implementation of environmental management, it is possible to find a correlation with the motives identified by Donaire (1999) for the implementation of environmental protection in the company, especially legal requirements, market pressure and company or image safeguard. The need for support for the implementation of changes was evident, with the predominance of the use of consultancy in the majority of replies sent. It was observed that external support is no longer used with the maturing of environmental management, with most companies declaring that they do not have consulting at this stage. The employees had an active participation in the process of implementing environmental management, suggesting that there may be a possibly greater commitment on the part of the latter regarding the implementation of environmental management.

The employees' role in the implementation of environmental management and in the maintenance of the actions that allow their continuity is declared and recognized by the companies surveyed, whether in a passive or active way. Comparing with the Principles of Environmental Management presented by the International Chamber of Commerce - ICC (Donaire 1999) in which one sees the Personal Education: Educate, train and motivate the personnel, in the sense that they can carry out tasks of responsible way with respect to the environment.

Among the options to indicate the focus of environmental management: waste - water - energy - effluent - emissions - all show that the "all" option prevails and among the responses, the highlight has been, in this sequence: "wastes", followed of "water", "effluents" and energy.

It was possible to observe predominance in waste, water, energy and effluents, in the environmental management of the companies surveyed, corroborating with the Environmental Management Principles, presented by the International Chamber of Commerce - ICC, which sees Equipment and Operationalization: Develop, design and operate machinery and equipment taking into account the efficient use of water, energy and raw materials, sustainable use of renewable resources, minimization of negative impacts on the environment and generation of pollution and responsible and safe use of waste (Donaire, 1999). When questioned about the results achieved, most companies stated that they could not disclose the information. Of those who responded, we highlight the Reduction of Waste Generation, followed by Reduction of Water Consumption and Reduction of Energy Consumption. It was also highlighted, the Increase of Recycling, followed by the Use of Water and Effluent Treatment.

Regarding the paradigms of eco-efficiency as presented by Curi (2011), it was possible to verify alignment regarding the reduction of energy consumption, recycling of materials, reduction of litter, use of clean energy sources and rational use with greater efficiency of the raw materials of the companies surveyed. It was also highlighted the importance of water, as Clarke and King points out (2005) and waste, as highlighted by Negromonte (2002). When questioned about the main gain that the environmental management brought to the

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company, it was verified the highlight of the indication of "Legal Compliance" as the main gain that the SGA brought to the company. Here is confirmation of the importance of legislation to regulate and delimit the performance of companies and the need for environmental management as a tool to achieve legal compliance, and understanding the need to make effective environmental protection. Most of the companies declared to have environmental education program. Among the main environmental education actions adopted, we highlight the Periodic Training, followed by Workshops Experiences and the implementation of an Internal Commission for the Environment. All companies unanimously recognize that employees contribute directly to the success of environmental management. Among the many benefits of education is the conscious change in behavior, which is achieved through acquired knowledge and its practical application. Investing in environmental education is one of the principles that underpin environmental management.

It was verified that not all companies have certification, although they have an environmental management system implemented. Important is the finding that companies that adopt environmental management are not necessarily linked to certification. However, it has been shown that environmental management is a decisive factor, increasing competitiveness in the new world of business (Donaire 1999). The fact that environmental management is positioned in the organizational structure at the level of the Board of Directors and management shows that companies recognize their importance. Most of the companies declared to have environmental license. It was verified that, although there has been an incentive program in the state of Pernambuco to attract companies, in particular to Suape Industrial and Port Complex, the control and the requirement of licenses and grants is maintained, to guarantee the protection of the environment. Most of them predominate the Operation License - LO and Funding and Release Grants. License renewal occurs annually. Most of the companies declared to meet, all the conditions of the license. The issue of the license is predominantly paid for industrial installations. The indication of gratuity was associated to the issuance of an Installation License - IL. The service activity does not require environmental licensing, so the indication of not applicable. According to data from the National Industry Confederation (CNI), micro and small enterprises account for about 95% of the total and have the potential to impact in proportion to the remaining 5%, represented by medium and large industries. The fact that there is no response from micro and small enterprises implies that the level of commitment of these organizations is low and, therefore, they may not even be able to understand the importance of environmental management. Regarding the responses received from medium and large companies, none reported the adoption of action that demonstrates going beyond compliance or protection or ecoefficiency, overcoming its borders and acting in a way to positively impact with environmental action that compensates for what uses of natural resource, what receives of incentive of the state and what it discards in the environment. In this sense, they can be actions of execution of projects developed in the academy to improve the living conditions of less favored cities of the interior regions of the state, related to alternative energies (e.g., solar), water capture (e.g., erns), among others.Or, action developed by the company's technical staff to meet the needs of poor communities and, at the same time, contribute to the preservation or improvement of the environment.

V. CONCLUSION

In the companies studied, it was observed that the adoption of environmental management is strongly linked to compliance with the legislation, besides being a strategic decision and to seek to meet the demands of the market, avoiding at all cost's problems with supervision. The sample included companies operating in the capital, metropolitan region and the interior of the state and, according to the answers analyzed, it was not possible to observe that the companies of the Metropolitan Region of Recife-RMR, because they are closer to environmental agencies / inspection agencies, are more required in terms of legal compliance.

In the universe surveyed, there were companies of small, medium and large sizes of different areas of activity (Food, Beverages, Footwear, Civil Construction, Energy, Consulting, Fibers and Pet, Cargo Handling, Sanitation, Steel, Sugar and Energy) and, according to the answers analyzed, it was not possible to conclude that the industry, in all areas of activity (textile, chemical, food, etc.) is more in demand than the service company. For all those who carry out potentially polluting activity, licenses are issued, whose predominant renewal term is annual and is paid.

Practically, the unanimity of the answers showed that the labor force participated in the process of implementing environmental management, either actively or passively. It was also observed that there is investment in environmental education programs so that employees are trained and contribute to the development of environmental management, however, limited to training.

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Although most of the companies surveyed have omitted the numerical results achieved with their environmental programs, they indicated that there were gains from actions aimed at reducing waste generation, energy and water consumption, and also from effluent treatment and waste disposal.

In environmental management, according to the responses analyzed, it was possible to verify the participation of the employees in the implementation and in the reach of the results, as well as, it was observed that the external support predominates in the initial phase and that is smaller after its implantation and consolidation.

It should be noted that, although there is a stimulus to the adoption of environmental management by conferring an international certificate, the companies surveyed have demonstrated that their environmental management is not necessarily linked to certification or a standard model. There is a mix of different models that have emerged in the last three decades.

The environmental legacy of companies operating in Pernambuco is partially controlled, in terms of medium and large companies, with initiatives focused on legal compliance, waste control, energy and water consumption and environmental education practice, in line with eco-efficiency paradigms, however to a limited extent.

The concept of sustainability is present in the management models adopted, most of them, although in the most basic form, that is the conformity (Age of the conformity - Age of the protection - Ecoefficiency - Environmental Sustainability), being applicable to any type of company, regardless of size or area of operation, without the need to be linked to a certification, with the participation of employees and inserted in strategic management, being able to be more daring or less restricted, more creative and less rigid, to better meet the needs and contribute to the development, effectively, sustainable.

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