

Environmental Management Practices in Brazilian Industries

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ABSTRACT

Changes in the behaviour of Brazilian companies are motivated by three peculiar factors of the environmental trajectory of Brazil; first, from the pressure of the growth of urban societies which organized themselves to stop the deforestation process of the Atlantic Mata and of the Amazônia; second, from the pollution caused in greater urban centers and third, from the restrictions imposed from the environmental legislation of the country since the Rio 92 conference. These combinations of factors have started to influence the traditional bases of the Brazilian business competition pattern. Organizations initiated to really include environmental concerns in their productive mechanisms when they started adopting new technological strategies, implementing environmental management systems and rationalizing natural resources consuming. The expectation is that environmental management strategies, besides decreasing environmental impacts, may generate more profit, once they increase competitiveness and efficiency. The objective of this study is to evaluate methodologies and tools used in Cleaner Production practices adopted by two major companies from the metal-mechanic pole of Caxias do Sul, Serra Gaúcha (Brazil), as well as to analyze the results derived from implementing this concept into both companies. This qualitative research multi-case study demonstrates that both enterprises improved some organizational factors related to their productive process, an increase in operational efficiency and environmental image; generating competitive advantage by reducing costs with raw material, supplies, and energy.

Keywords: *Environmental Management, Cleaner Production, Metal-mechanic Industry*

INTRODUCTION

Pressures from international organizations, governments and various levels of society on the necessity to have more environmental criteria of quality, have lead South Brazilian industries to look for new strategies to serve these demands. The region of Caxias do Sul (RS – South of Brazil) is considered one of the most important Metal-Mechanic Poles in the country and does concentrate a great number of companies in the segment of agricultural equipments and heavy vehicles (SIMECS, 2008). A vision of the future, constructed collectively with a Strategic Plan (2007-2008), demonstrates the intention of reinforcement of the companies of the Metal-Mechanic Automotive Pole of the region of Caxias do Sul. It is considered a world-wide reference of competitive products that permanently contributes to technological innovation, with the integration of the public and private institutions, through the improvement of their management processes and for the generation of a better quality of life for its habitants. From this context, various companies of the northern region of the Rio Grande Do Sul had started, from the decade of the 1990s, to export goods and services to the European, African and Latin American continents. In recent years, given the dynamics of the international insertion process of the Brazilian economy and the strong character of requirement in the area of natural resources management in almost all developing countries, the Pole region of Caxias do Sul has started to lack of scientific researchers and researches in this field of study. For these reasons, the analysis of the strategies of environmental management became necessary to enhance the companies of Serra Gaúcha to incorporate it in their production processes.

On a global scale, the industrial production allied to strong economic growth in the last four decades has provoked negative impacts over the planet's natural resources. This scheme has been reflected in the quality of life and the environmental health of the whole planet's

population. From an organizational perspective and with the necessity to refrain from impacts caused by industrial activities, Environmental Management Systems (EMS) has been seen as a competitive difference and as an organizational improvement factor. From this context, arose various methodologies of environmental management, which aim to sensitize higher administrations, demonstrating the possibility of reaching profits with environmental strategies such as Cleaner Production. According to PNUMA (2008), the practice of Cleaner Production (CP), inserted as an instrument of sustainable development, offers companies more competitiveness because of the economy of scale it is possible to reach, as well as the valorization of its brand by associating it with respect of the environment, a common good that belongs to the whole humanity.

According to North (1992), social pressures to improve quality of life together with environmental rules, which are getting stricter to fight against environmental pollution and heavier pressure from global markets, have significantly influenced changes in companies' management strategies. The first palpable managerial reaction came through design strategies, which were becoming more restrictive on the economic aspects, through competitiveness, efficiency, profitability and, it started to focus on environmental issues to incorporate them to the productive processes. This has led to a need to change management scope in organizational structure, redirecting objectives and goals in order to internalize environmental variables in management models.

Almeida (2007) suggests that the environmental services that are still free of charge will no longer be available or it will be quite expensive of access in a close future if the current tendency does not change. "This cost must be internalized by every level in the productive chain,

changing and making the business environment more difficult for every company” (ALMEIDA, 2007: 17).

Then, environmental management becomes a question of survival for the organizations, once environment is part of a productive process and not a mere external factor. This leads to the apparition of environmental variables for any organization’s planning, considering that it evolves the opportunity to reduce costs, since polluting companies are in general entities that waste raw material and supplies.

The objective of this research is to identify what methodologies and tools the two industries of the Metal-Mechanic automotive Pole of the region of Caxias do Sul, Serra Gaúcha, used as well as understand the results generated by means of the implementation of this concept in these companies.

THEORETICAL CONSTRUCT

The problematic environment

Industrialization is evidence of the importance of technological development. Such development is based on the use of raw material and energy, a process that speeds up the use of natural resources. Because of the intensive use of natural resources, production of wastes sent back to the environment have resulted in the accumulation of pollutants above its capacity of absorption (resilience), generating levels of pollution each time more elevated, provoking degradation of hydride bodies, of the soil and the quality of air - at a regional and global dimension (Sadler, 1995; Willums and Golüke, 1992).

There is scientific recognition that the industrialization process intensifies the use of energy sources such as coal, natural gas and oil especially; causing global heating effects (green

house) that may become irreversible and possibly cause catastrophic consequences for societies, ecosystems and its biodiversity. This is what is referred to environmental matters or issues (Rosenberg, 1982).

After the realization of the ECO-92 conference in Rio de Janeiro, Brazil, the environmental question started to be part of the managerial conceptions for the major organizations of Brazil. However, in contrast to what was prescribed from a report of the Club of Rome, entitled the Limits of Growth, it is not more the risk of exhaustion of the inexhaustible resources that is at stake and that imposes environmental limits to economic growth. What have become more pertinent, since the second half of the decade of 1980, are the problems of contamination of water and air, the loss of biodiversity, the deforestation, food contamination and the exhaustion of water resources (Meadows, 1972). Consequently, with such change in ideological position, the environmental issue in Brazil, as well as in the rest of the world, took a more present posture, and the economic and marketing dimensions of environmental questions started to be essential in organizational management.

The conditions of this recent position from the organizations, in relation to the environmental problem, can be summarized as the following. 1º) The necessity to reduce costs: with the increase of competition between companies, especially after the decade of 1970, where the reduction of the rhythm of growth of income provoked a fall in the levels of profit of almost all the economic segments; 2º) The requirements of environmental regulations: it is well-known that in its first months and/or years, environmental management requires investments without expecting any short term financial benefit returns for the organizations. With this, if there would not have been any public regulation which conducted disciplinary action against polluting counter productive activities, there would probably not have appeared any spontaneous strategies

of management of natural resources. In that context, environmental regulations become a key instrument to legitimize any State or Country in its attempt to implement a cost/benefit distribution between its private stakeholders and its public entities. 3°) The possibility to improve the image of the company: in this aspect, the increasing preoccupation of consumers concerning environmental problems, especially those linked with international markets which pertain to more polluting activities, has enhanced various organizational improvements to be used as competitive advantages. The organizations look for a vehicle to link their actions and projects to their organizational image, meaning that environmental strategies have a clear objective of enhancing competitive advantages. 4°) The increasing concern with health and the environment is provoking a change in consumers' preferences.

From these factors, some companies have perceived that the financial cost of reducing environmental liabilities and managing social conflicts could increase cost and jeopardize the maintenance of their competitiveness in the future (Suris, 1989; Cairncross, 1992). Such diagnosis appears to have crystallized itself throughout a responsabilization process, mixed with business and culture effects.

Environmental management

According to the International Norm ISO 14001, Environmental Management is part of the global management system of an organization. The conception of this environmental management system is a dynamic and interactive process that involves a structure, responsibilities, practices, procedures, processes, and resources to implement policies, objectives and environmental targets, which may be coordinated with existing efforts and with other areas (e.g. operations, finances, quality, occupational health, security at work).

For Christie *et al.* (1995) an Environmental Management System (EMS) is defined as an organizational structure that allows the company to evaluate and control the environmental impacts of its activities, products or services. It is characterized by six important elements: environmental policy, planning, implementing and operating, monitoring and correcting actions, management review and continuous improvement. Berkel (1995) and UNIDO/UNEP (1995) both mention that the objective is to observe the barriers that companies face to implement an EMS, such as:

- a) Organizational barriers: company survival, technical staff turnover, owner's decision power, lack of involvement of the employees;
- b) Systemic barriers: inadequate management system, lack of information and employees' capacity;
- c) Behavioral barriers: resistance to change, lack of leadership and organizational culture;
- d) Technical barriers: technological discrepancy, lack of infra-structure, limited access to technical information;
- e) Economical barriers: exclusion of environmental costs from decision-making process, availability of resources, and financing costs;
- f) Governmental barriers: lack of incentives to minimize environmental impacts, lack of institutional support.

For Schneider (2006), EMS is a system that identifies improvement opportunities to reduce environmental impacts and allows a control over environmental problems and it may be (or not) certified by the norm ISO 14001. According to Hunt and Auster (1990), the Environmental Management System is not only about some questions related to organizations,

but it incorporates market tools in several knowledge areas, in a multidisciplinary perspective, in which it is possible to recognize that mankind and ecosystems health depends on social, economical, and environmental factors.

Problems related to the environment are typically associated with the increased industrialization process since the end of the last century. Social environment concerns are the consequence of an increasing perception of risks and environmental impact consumers have. Thus, production processes and their products have damaged human health and ecosystems (Hartman; Stafford, 1997) with the consequence of perceiving a preference for products from technologies that are less aggressive to the environment.

Nowadays, companies realize the importance of operating in a way which may generate more profit and more competitiveness while including environmental concerns, new technological strategies, environmental management systems and a more rational use of natural resources among their business strategies. To do so, they may adopt new technological strategies, implement environmental management systems, and rationalize consuming natural resources. Consequently, companies are induced to invest in the environment by pressures of environmental rules, through final and intermediary consumers, through investors, investment brokerage or by the community itself; or else, by all its stakeholders.

Cleaner production tools

According to the United Nations Environmental Program – UNEP (2007) and UNIDO/UNEP (1995), a Cleaner Production (CP) process is the continuous application of a preventive and integrated environmental strategy directed to process, products and services

(Christie *et al.*, 1995). It also aims to increase global efficiency and decrease risks for human health and the environment (PNUMA, 2008).

The environmental treatment mentioned by the National Centre of Clean Technologies (NCCT as a translation of CNTL) states that CP approach may be used in several processes and segments within a company. It is characterized by the decrease in consuming or waste of raw material, water and energy, recycling material; adopting new technologies and monitoring techniques, in order to get an Eco-efficient Management of the resources (KAZMIERCZYK, 2002; CNTL, 2009).

According to Jaworski and Minns (2001), approaches on Cleaner Production (CP) can be grouped into three categories:

- a) Level 1 – Waste reduction at source: good housekeeping; process modification; product modification; change of materials;
- b) Level 2 – Recycling of wastes: internal recycling; external recycling;
- c) Level 3 – Use of renewable resources: for the production of energy; for the production of materials and chemicals.

For Wilkinson (1991) and Bass (2007), CP consists in the application of an economical, environmental and technical strategy, integrated into processes and products within the business productive operations. For Getzner (2002), CP is also a tool that focuses on improving the environmental behavior of organizations with the purpose of reducing production costs and increasing efficiency and competitiveness, qualifying health and security conditions for the employees (work environment) and the company's image for the market which results in possible increasing levels of customers' satisfaction.

Also, North (1992) states that organizations that have creativity and internal conditions may change restrictions and environmental threats into business opportunities. Among these opportunities, it is possible to mention the development of new productive processes by using cleaner technologies. Within this context, the program of cleaner production aims to investigate the production process and other activities of industry in order to eliminate environmental impacts from their source (in plant control) – the control occurs at the moment and at the place waste is generated.

The CP process considers the environmental variable at all levels of the organization, characterizing itself for actions that are implemented inside the company, mainly in the production process, with the objective to become the most efficient process, generating more products and fewer residues.

Environmental innovation

Recognition of the tension between competitiveness and environmentally conscious production took importance by the end of the 1980's when the process of financial and productive globalization started in the worldwide economy. Some developed countries were adopted "green barriers" instead of tax based programs. The authors argue that developing countries would have environmental laws less rigorous than the ones from developed countries, and this would lead to lower costs (ecological dumping) and, as a consequence, smaller prices on the international market.

Inclusion of environmental concerns, with respect to sustainable development in business strategies, through adequate ecological practices, can become a decisive action for the development of companies in the next decades. The innovations that aim at the improvement of

productive processes, the reduction of costs and a lesser energy consumption will be essential for the maintenance of their profitability and competitiveness.

The seminal paper on the importance of technological innovations for the development of the economy of a country is due to Joseph Schumpeter (1934), who attributes the technological innovations introduced by innovative entrepreneurs as the main stimulus for the beginning of a new economic cycle. Without audacious entrepreneurs and their proposals for innovation, the economy would remain in a constant position of static balance, in a closed economic circle of goods and services and with no growth. Even though, the author did not specifically mention environmental wastes, he has estimated the concepts of efficient management of the natural resources and the economics of energy.

For Schumpeter, innovation is produced in five different situations: 1) through the introduction in the market of a new good from which consumers are not familiar with; 2) through the introduction of a new method of production, based on a scientific discovery or, a new form of commercial treat on a definite product; 3) through the creation of a new market in a country, irrespective of whether it already existed in another one or not; 4) through the conquest of a new source of supply of raw material or half-products elaborated independently if it already existed and; 5) through the implantation of a new market structure. The author still emphasizes that in situations of monopolistic competitiveness; competitive emphasis will not be only linked to costs and prices and will tend to become competitive in terms of technological innovations between organizations.

In synthesis, innovation is synonymous to change. Innovative companies are those which follow an evolutive path, which offer new products and put in place new processes or services. Furthermore, in relation to the problem of the environment, companies started to innovate, as

well in their production processes as in their offer of new goods or services. In other words, if they do not innovate, they will be surpassed, either by the competitors, or by the pressure of the consumers, or still by any effective environment legislation.

Beyond these aspects, it is important to note that products generally have a life cycle every time shorter due to the development of new processes which are more and more influenced by environmental pressures. This tendency occurs from some basic aspects: 1) the technological progress, where current products can brusquely disappear because of the appearance of new products with better environment and social benefits; 2) the internationalization of the economy, where competitiveness increases, not only from the part of the neighbouring countries - industrialized or not, but from countries that until recently did not have international projection in regard to technology; 3) the *un-massification* of the markets, where tendency to manufacture more personalized or customized products, is increased considerably.

However, the efficient allocation of the natural resources of the organizations must not be pointed as an isolated action for competitiveness, but more as a strategy that adds, jointly, competitive advantages to social and environment responsibility. For Kinlaw (1997), ecological competitiveness of the organizations does not only reflect environmental resources that they use, but also improves its competitive position by defining strategies of efficient preservation of the resources and improvements of its products. Environmental innovations that result from these rules may be classified into two categories: the first is about the most efficient actions of a company in treating pollution that already exists; where it is also known as end-of-pipe technology. In the second category, it is possible to find innovations, whose innovativeness balance costs to implement them. Innovations not only reduce pollution but also result in safer and cheaper products with better performance, better quality, and higher re-sale value, smaller

costs of final disposition or possibility of recycling. It is known as technology of pollution prevention.

It can be concluded that the innovations adopted to accomplish environmental rules make companies use their inputs in a more productive way, reducing costs and balancing expenses with environmental improvement. Thus, the use of CP tool and environmental preservation are associated to increased productiveness of the resources used in production process and, as a consequence, increased company's competitiveness.

METHODOLOGY

The main objective of this study is to evaluate the methodologies and tools used for Cleaner Production adopted by two industries from the Metal-Mechanic Pole in Serra Gaúcha (Brazil), as well as the results of implementing this concept within the companies, by means of a multi-cases study.

The specific objectives of the research are the following:

- a) To analyze the motivation elements which led to the establishment of a business tool for Cleaner Production in both studied companies;
- b) To identify the opportunities that allowed (or disallowed) greater efficiency;
- c) To discuss the relationship between costs and benefits of the implementation of Cleaner Production in each of the companies.

This research may be characterized by two basic criteria: (i) from its finality, such as exploratory or descriptive; and (ii) from its investigation methods, such as empirical or bibliographic, or a multi-case study. The study composes two companies from the Metal-Mechanic Pole at Caxias do Sul, Rio Grande do Sul, Brazil and the research strategy is

qualitative. The object of the study is to analyze the results of these two major companies in reference to the implementation of CP tools.

As of the investigation methods, data was empirically collected, by means of in-depth semi-structured basic interviews with participants from the environmental management of each company. The secondary data collection was based on a systematized research from books, journals, newspapers, magazines, dissertations, and thesis, among other sources.

From Yin (2002), case studies extended an extensive research strategy, allowing Use of multiple evidence sources. Pursuant to the author, with data triangulation, it was also possible to dedicate attention to the potential problem of construct validity, once several evidence sources provided different evaluations of the same phenomenon. The analysis and the interpretation of data depended on the conceptual research structure, establishing a triangulation among the several evidence sources and the collected data, establishing convergences, or divergences, in each of the researched companies.

The Alfa Company

The Alfa Company is well-known in the segment of road implementation, off-road and special vehicles, services and car parts, on the national and the international markets; also, it is considered a world leader in “fifth-wheel technology” and is one of the most important suppliers of parts for trucks, semi-trailers and the trailer industry on the international market. The company was founded in 1995, and in 2001, it started to operate in the segment of agricultural machines as well. Today, it is a main supplier of components and systems for the truck assembling industry and for trailer and semi-trailer manufacturers. It exports mainly within South America.

Currently, the Alfa Company maintains more than 310 employees: 80 in the administrative sector and more than 230 in the production sector. It is certified by NBR ISO 14,001 and its mission is to offer products and services focusing on safety and environment, with excellence in quality, supplying and costs, aiming success in its business relationship with its customers, team, suppliers, society and shareholders.

The Beta Company

The Beta Company was founded in 1995 and operates in the road implement segment. It has already manufactured more than 150,000 pneumatic suspensors and is a pioneer in innovating with these types of products. It aims to develop projects for its clients according to their needs, with an agile service, delivering daily or weekly, according to its logistic strategy.

The Beta Company now has a factory of approximately 2,200 m² and has 40 employees, which are trained and evolved in the productive process, besides its main executives and an engineer's corpus which is responsible for new projects development and implementation.

RESULTS AND DISCUSSIONS

In order to analyze and interpret data, the method used was based on a grounded conceptual structure, establishing a triangulation analysis (YIN, 2002) among the several sources of evidences and collected data to determine convergences, or divergences, in each studied industry, in order to accomplish the objectives of this work.

The results show that the main technological investment of Alfa Company during the last years were related to the acquisition of new machines, whose new technology produces less dirt, losses and waste, demanding less maintenance. Consequently, these machines needed more

sporadic maintenance. Alfa Company has an Environment Management System since 2001 and the certification NBR ISO 14,001 is a way to improve the company's image. Besides, the environmental policy is also exposed in prizes and quality cases such as the Gaucho Program of Quality and Productivity (GPQP), among others.

However, the Beta Company has destined its technological investments to substitute a diesel boiler by an electrical machine. This resulted in a decrease in accident risks at work, in gas emission, and, as a consequence, it reduced pollution. The Beta Company does not have EMS.

Methodologies and tools of cleaner production (CP)

The CP process aims to integrate environmental objectives to productive processes in order to reduce waste of raw material and decrease dust and gas emission in terms of quantity and danger.

From the investigation carried out in each of the companies, data was collected by means of individual semi-structured in-depth interviews. The subjects were selected based on criteria referring to environmental management. Figure 1 details the tools used in both companies.

Alfa Company	Beta Company
Change the roof of the company for a better profitability of the natural lightening	Packages (wooden boxes) received from raw material suppliers are re-used to pack products for other customers
Project to recycle oily emulsion from the machine equipments	Change of the oil boiler by an electric equipment
Review projects for better profit of raw material and generate less waste	Review projects for better profit of raw material and generate less waste
Exchange mineral oils by vegetable oils	Re-use of rainfall water for flushes and to water plants (implementing project)
Re-use of rainfall water for flushes (project for next year)	

FIGURE 1 – CP tools used in both companies.

From figure 1, it is possible to notice that the Alfa Company has used some (CP) tools that are different from those used by the Beta Company. This fact is due to the use of the Environmental Management System by the Alfa Company and not by the other. The Alfa Company has benefited from the natural lightening because they have changed their roof to get a better use of natural light in order to decrease the consuming of electrical energy. This company also implements a project of recycling oil emulsion in the machine wastes and it has changed mineral oils for vegetable oils.

On the other hand, the Beta Company has started to use an electrical machine to replace the diesel boiler and has recycled wooden boxes received from raw material suppliers to pack products for other customers.

Both the Alfa and Beta Companies reviewed projects to improve the raw material used to generate less waste. Both companies are developing projects in order to re-use rain water for toilets.

Results

Based on a script of questions adapted by Berkel (1995) and Christie *et al.*, (1995), companies obtained several results by implementing CP tool. Figure 2 presents the following data.

From the analysis of figure 2, it is evident that the Alfa Company was more successful in implementing CP: among the 17 possible results proposed, the company was successful in 12 of them. This fact may be a consequence that the Alfa Company has an environmental policy about training and informing its employees leading to using the new implemented tools.

Results	Alfa Company	Beta Company
Generation of Technological Innovation on processes, products and management	X	
Benefits from commercial advantages (conceding financing advantages, getting insurances with more active taxes, opportunity to become a supplier of major companies)		
Competitiveness improvement (by reducing costs or improving efficiencies)	X	
Reduction of costs with raw material and energy	X	X
Economic improvement on a short term basis		
New business opportunities		
Minimization of risks for environmental obligations	X	
Reduction of environmental responsibilities caused by industrial activity	X	
More supported economic development		
Improvement of the product's environmental quality	X	X
Improvement of the company's public image	X	X
Increase in ecological efficiency	X	X
Improvement in work conditions for the employees	X	X
Increase in employees' motivation	X	X
Diversity of benefits for the companies and for the whole society	X	
Inducement of the process of innovation inside the companies	X	
Increase of consumers' confidence for the products		

FIGURE 2 – Results generated with the implementation of CP. Source: Developed by the authors.

The Beta Company, however, was successful in 6 of the 17 results in implementing the tool, and all of these results converge with the Alfa Company in reducing raw material, supplies, and energy costs, improving environmental quality of the product, improving its public image, increasing its ecological efficiency, improving working conditions for its employees and increasing employees' motivation.

It is important to point out that the Beta Company does not have an Environment Management System (EMS), but it shows concerns about the environment, by the fact of having introduced some (CP) tools and reached results from that.

The motives to implement this tool at the Alfa Company may be described as environmental, quality and economical factors. The environmental ones refer to the environment preservation and the natural resources preservation mainly; the motivational ones refer to the improvement of quality in work environment; and the economical factors are more relevant in

the marketing area and in the improvement of the company's image.

For the Beta Company, the motivating elements were to keep the factory organization with a decrease in wastes of raw material, in improving the waste share and its destination, and to increase productivity in its working environment.

The main opportunities that made possible (or not) a greater efficiency of (CP) tools at the Alfa Company were characterized as training and informing the internal public, as generating collaboration with the Environmental Management System and as the new implemented tools. At Beta Company, there is a lack of time for the employees to produce in accordance with the program, which has led to smaller efficiency. It is worthy to mention that the company is still trying to train its employees to optimize the use of the tool.

The relationship between costs and benefits from the implementation of the CP tool at the Alfa Company shows that less waste led to a smaller need of available stocking area and a smaller expense with transportation and final destination; reducing raw material and supply consuming; being in accordance to environmental laws and, avoiding fines and interrupting the company's activities.

At the Beta Company, the cost-benefit relationship happened within the production scheme, improving the work environment and production flow, combined with a little decrease in the production of wastes.

FINAL ASPECTS

Environmental preoccupations are evolving, partly because of the effective environmental problems, but also due to more severe legislations, with the objective of enhancing respect from the industries to force them to do a re-think of themselves on environmental production process

and its consequences. It is important to point out that in the current situation, environment management and its CP tools constitute basic elements of a global management of a company. It is possible to conclude that the (CP) methodologies and tools used in both companies, as well as the results generated by means of implementing this strategy in both companies, show they have got improvement in factors related to the productive process, operational efficiency, environmental image, and a consequent competitive advantage. According to this, even if the Beta Company did not have an implemented Environmental Management System, attitudes such as reviewing projects to improve raw material use and generate less waste, as well as re-using packaging (wooden boxes) received from raw material suppliers to pack products for other customers, brought positive results to the company. Thus, the environmental variable introduced in the productive process, besides reducing waste in terms of quantities and dangers, reduces harmful effects to the environment. The relevance in this research is in fact the information and the data that may propitiate the academic community and related professionals for a better implementation of Cleaner Production, spreading out the concept of Environmental Management Systems.

Finally, the study is particular in an exploratory context because it opens new thinking about the importance and the feasibility of implementing such tools, but the limitations of this study is that it may be difficult to of generalize the results, since the realities of only two companies were explored. Therefore, it is suggested that broader studies with a major number of companies need to be carried out to evaluate methodologies and CP tools, as well as the organizational results generated consequent of the implementation of these concepts.

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