ARE COMPANIES IN BRAZIL PREPARED TO PARTICIPATE
IN THE GSCM?

Eduardo Freire Galban¹, Miroslava Hamzagic², Giorgio Eugenio
Oscar Giacaglia³

MAY / 2019

Taubaté, São Paulo, Brazil
The “Engineering Research” is a publication with purpose of technical and academic knowledge dissemination.
ARE COMPANIES IN BRAZIL PREPARED TO PARTICIPATE IN THE GSCM?

Abstract. Considering the increasing concern for the preservation of the environment, companies are looking for new ways to act together with the markets, increasing their competitiveness and improving the value added of their brands. Mitigating sustainable actions are no longer enough to recover the environmental losses, such as pollution, loss of vegetation cover, heating of ocean waters. Urgent actions should be taken in the coming years to avoid further damage. In general, it is understood that manufacturers must assume responsibility for the damages that their products’ cause, since they have obtained gains from sales. In this context arises the Green Supply Chain Management (GSCM) as a tool to manage chains of suppliers who are responsible for designing products and their returns, after the end of their life cycle, planning and designing the production and recycling, reuse or even proper disposal, thereby avoiding damage to the environment. In this way, the whole chain shares the environmental responsibilities, and this synergy has a greater chance of success. The question to be answered is: Are Brazilian companies prepared for the GSCM?

Keywords: Green Supply Chain Management, Sustainability, Cleaner Production.

1. INTRODUCTION

The concern about the environment and sustainability has been gaining more and more repercussion in business circles and in society in general. The demand for environmentally friendly products has increased in recent years, causing this concern to drive many business strategies in search of greater competitiveness with better environmental performance, according to Zhu & Sarkis (2011 apud Arantes, 2014). Pressuring factors from economic globalization, increased environmental awareness, tougher legislation and environmental regulations require companies to make changes to address environmental issues. The search for cleaner production methods which generate less or no waste has been a constant, even though environmental damage, which is already noted, does not allow time to lose. But working to find cleaner production methods is not enough, since mitigating the damage no longer meets current needs. Jabbour (2013) comments that it is necessary to design new production structures more sustainable, looking at the path a product follows to get to the consumer and planning the return of this product at the end of its life cycle, recycling, reusing and disposing of materials properly. But developing this new structure requires investments and generates costs that companies are reluctant to take on, reducing the expected profit margin.

Schmidheiny (1992) already stated that economic growth and environmental preservation
were not necessarily conflicting with each other, but objectives that could be pursued in parallel provided that they were the targets of planning and policy correctly aimed at those goals. This vision was already commonplace in 1992, when sustainability had not yet put pressure on markets and companies. And the development of competitive strategies that encourage the adoption of environmentally sound practices has been mandatory in order to cover the life cycle of all production (Jabbour, 2013). In Brazil, the New National Solid Waste Policy (PNRS) (BRASIL, 2010) has established that responsibility for environmental protection should be shared among manufacturers, importers, distributors, traders, citizens and holders of urban solid waste management services in Brazil called Post-consumer Reverse Logistics. In the sustainability matter, Rogers & Tibben-Lembke (1998 apud Pereira, 2012) cite that this first reaction led to the implementation of reverse logistics processes, where product returns are controlled. But these actions have not proved sufficient to lead to green logistics because they do not include measurement of the environmental impact generated by the various means of transportation, ISO 14000 certifications, reductions in water consumption, materials and raw materials. Reverse logistics mitigate impacts and green logistics go ahead, anticipating and planning all the impacts of the means of production, marketing strategies used, etc.

But a new managerial approach, called Green Supply Chain Management (GSCM) which takes into account both internal and external contexts, emerges as a tool that can be used by companies (Sarkis et al., 2011, Min & Kim, 2012). This shared responsibility guides local and multinational companies to adopt GSCM practices as a continuation of reverse logistics. It is an interdisciplinary approach, which has been gaining prominence in recent years, for adopting a greener perspective on supply chain management (Srivastava, 2007; Sarkis et al., 2011). The main objective is to project, plan and operate all logistic actions and at all levels of the chain, both in the direct and in the reverse direction, always with environmental focus so that production maintains its purpose in clean production. This general approach distributes responsibilities and costs in a more homogeneous way since each player is part of the project. Munck (2013) mentions that all productive means in a given chain can act more effectively in reducing environmental impacts since integration facilitates this reduction.

Despite the advantages that GSCM presents, its operationalization requires players to be adapted to a series of actions and control measures and to be characterized as an eco-efficient company, applying concepts and actions of Clean Production, seeking sustainability in all its operations, and controlling the life cycle of its products. In addition, the company must be prepared to work together with other GSCM players, in a planned, integrated and synchronized manner. All this preparation requires investments and work philosophies which many companies cannot follow. It is precisely at this point that this article is based on the research of main concepts, such as
Sustainability, Life Cycles, Reverse Logistic, Eco-efficiency, and the advantages of operating GSCM for the production sectors in that chain, and whether suppliers would be prepared.

2. LITERATURE REVIEW

2.1. Environmental Issues and Social Responsibility

Miller (2008) points out that when considering the new environmental requirements it is necessary to evaluate and search the real situations that the company can face in the market, where sustainability and social responsibility require new postures, which should be managed, internally and also externally in its suppliers and customers, affecting the entire supply chain involved and all production activities.

Business strategy is the basic element in the business relationship with suppliers and defines the guidelines of corporate policies and social and environmental responsibilities. This strategy should guide the relationship with suppliers participating in a GSCM in order to distribute necessary responsibilities, roles and actions in the processes, thus ensuring compliance with both the proposed goals and the applicable rules and standards. It is understood that a problem encountered in the raw material used by a supplier can "contaminate" the whole chain with social and environmental risks, as well as cause several production problems. Hence the need for a deeper, responsible and high-level engagement of all elements of the supply chain (Barrientos & Smith, 2007 apud Hoejmose, 2012). In this regard, is necessary to define what are eco-efficient companies are and what are the main operating philosophies of these companies, to define which are appropriate.

To understand what companies must implement in their strategies, production and production philosophies, and referring to the definition of quality, which seeks to serve customers broadly, it is important to understand the needs of consumers as human beings inserted in a society. Understanding the paths that this society seeks, or is being forced to seek, becomes a fundamental point, emphasizing that environmental preservation has become an urgent subject and cannot be ignored in light of other priorities. Without this understanding it is very difficult to seek the quality and sustainability added to products and services to meet society's demand, in order to adapt to the new requirements (Munck, 2013).

More than a necessity, the preservation of the planet is rapidly becoming an urgent obligation as its lack jeopardizes the survival of humanity and the signs of stress in the life support system on Earth are already perceived. Briefly, Miller (2008) summarizes the current situation as follows:
Our lives and our economies depend on the energy of the Sun and the Earth's natural resources and services;

We currently live in an unsustainable manner, depleting and degrading the natural capital of the Earth, which sustains us and our economies;

The main causes of our environmental problems are population growth, waste of resources, poverty, lack of evaluation of Earth's natural capital, and ignorance of how the planet works;

We have between 50 and 100 years to make a transition to more sustainable human societies, copying the way the Earth has sustained itself for billions of years.

2.2. Development and sustainability

As quoted by Munck (2013) in his book "Managing Sustainability in Organizations," a critical analysis of sustainable development, sustainability, and organizational sustainability reveals the lack of a global, consolidated framework for understanding the applied theory of these concepts and their specificities. In general, after a careful analysis, it can be seen that the definitions related to the terms cited above are vague and discordant in ethical, ideological and practical aspects, as well as lacking a common and unifying conceptual basis. There are even doubts about what should be sustained, at what time and with what interests. These presented definitions are insufficient when the question arises: 'how to articulate these concepts systematically so that they become an effective part of organizational actions and decisions?’. In other words, how to structure these definitions clearly and objectively? So, that they are understood in all their dimensions, and applied correctly and efficiently in companies. This structuring process starts with its "philosophical" part, and it can evolve into the study of necessary, possible, or sufficient actions.

Miller (2008) defines sustainability as the ability of Earth's natural systems and human's cultural systems to survive environmental change by developing and adapting to these conditions in the long-term future, ensuring the next generations. In this way, it is understood that economic growth should be planned so as not to cause environmental impact, even if it brings financial gains to society. Complementing this context, Munk (2013) mentions that the term "Sustainable Development" has been inserted in world academic, political, social and economic circles by the work of the Brundtland Commission in the 1987 report Our Common Future (World Commission on Environment and Development, 1991, apud Munck 2013), defining it as 'a development model that must meet the needs of the current generation without compromising the ability of future generations to meet their own needs'. Munck (2013) explains that this was the first global initiative to consider the environmental aspects of development from an economic, social and political perspective.
"Global society, through its scientists, environmentalists and economists, is mobilized to develop a model where development is compatible with the urgency of combating climate change as well as the conservation of natural resources such as water and forests", Says Adeodato (2015) in his article "The urgency of covering Brazil" in the Feb / Mar publication of the journal Page 22, published by the Center for Sustainability Studies of the Getúlio Vargas Foundation School of Business Administration of São Paulo. The author also says that the path demands accountability and revenue generation through sustainable use as one of the business objectives options to be implemented. Adeodato (2015) also comments that a study conducted by Instituto Escolhas reports the massive cost of R $ 52 billion for the recovery of 12 million hectares, according to the Brazilian commitment to mitigate the emission of greenhouse gases by 2030, announced in December Of 2015 at the United Nations conference on climate in Paris, France. The calculation considers the planting of 50% of the area for 21 years with exotic species, such as eucalyptus, which should be replaced by native trees after 30 years. In this way the financial return was calculated at 4% through the exploitation of wood, creating 215 thousand jobs. In addition to the collection of R $ 6.5 billion in taxes, this model would build an entire production chain environmentally favorable, considering the collection of seeds, nurseries, laboratories, machinery, maintenance services, etc.

Returning to the model proposed by the Instituto Escolhas study, it is easy to see that it prioritizes sustainability in the whole chain resulting from the business studied, which should be composed of eco-efficient companies, it is understood that the best way to obtain cooperation is to develop value chains that generate profits, with the intimate cooperation of the players that work with a goal, economic and environmentally viable at the same time. In this way, investments in production chains are sustainable and profitable, as well as bringing social benefits, such as the increase of direct and indirect jobs. Thus, despite the difficult definition of the term "sustainability", companies can already count on an initial model to guide them in the necessary actions, provided they are convinced that there are lucrative paths to be followed (Adeodato, 2015).

2.3. Product life cycle

Kotler (2000) points that “a positioning and differentiation strategy must be modified as product, market and competitors are changing all the time”. And to operate these modifications one must understand that these changes have four inductors:

- Products have a limited life;
- Sales of products go through different stages, with different challenges, opportunities and problems;
• Profits rise and fall at different stages of the product life cycle;
• Products require different marketing, financial, production, purchasing and human resource strategies at each stage of their life cycle.

Since the industrial revolution, this has brought to mankind the use of natural resources in production processes, and the incentive to mass production and consumption, competition, which is not local but global, has led to a reduction in product life cycles. The limitation of the usable life of products cited by Kotler (2000) is a factor of pressure on the productive means, so that they innovate and replace the technologies used with increasing frequency (Barbieri, 2007). This pressure shows its environmental side, because with the reduction of the lifecycles, the discards of products that is still very functional, but no longer accepted by the market. This process generates obsolescence and high costs, because entire production processes have to be modified or replaced by others, which, although new, do not always prove to be more efficient. The result is a generalized cost increase, with a major impact on production costs, and there is no way to reverse this trend as technologies advance faster and faster. The most viable alternative is to develop a project that would take this obsolescence into consideration and would seeks ways to bring this product to the reverse chain, reusing or recycling products in a way that does not cause environmental problems. Acting in this direction, with effective results, will make a company eco-efficient.

2.4. Eco-efficient companies: operating philosophy of Clean Production

According to Munck (2013), organizational objectives that are directly related to the obtained profit and work in the innovation processes to get more sustainable conditions are often long-term actions and, in this case, are difficult to predict profits. This explains why most companies consider sustainability actions as a cost, which requires a new form of management be deployed. Hahn et al (2010 apud MUNK, 2013) defined the main trade-offs as "situations in which there is a commitment to make a sacrifice in one area in order to obtain benefits in another." The Table 1 below shows the various levels and dimensions of the most common trade-offs in corporate sustainability.
Table 1 - Analytical framework of trade-offs in corporate sustainability (Munck, 2013)

<table>
<thead>
<tr>
<th>Level</th>
<th>Result Dimension</th>
<th>Time Dimension</th>
<th>Process Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social</td>
<td>Trade-offs between different economic, environmental and social outcomes for the social level.</td>
<td>Trade-offs between intra and intergenerational aspects of sustainable development.</td>
<td>Trade-offs between a more resilient economic system and a more efficient one.</td>
</tr>
<tr>
<td></td>
<td>Trade-offs between the different organizational results: economic, environmental and social.</td>
<td>Trade-offs between present and future industrial structures and activities in relation to sustainable development.</td>
<td>Trade-offs between processes of structural and technological changes for sustainable development.</td>
</tr>
<tr>
<td>Industrial</td>
<td>Trade-offs between different economic, environmental and social outcomes for the social level.</td>
<td>Trade-offs between present and future industrial structures and activities in relation to sustainable development.</td>
<td>Trade-offs between processes of structural and technological changes for sustainable development.</td>
</tr>
<tr>
<td></td>
<td>Trade-offs between short and long-term orientation towards sustainability and business effects.</td>
<td>Trade-offs between different strategies and modes of governance for corporate sustainability.</td>
<td>Trade-offs between different strategies and modes of governance for corporate sustainability.</td>
</tr>
<tr>
<td>Individual</td>
<td>Trade-offs between individual interests and preferences of different actors of economic, environmental and social outcomes.</td>
<td>Trade-offs between preferences and interests of different actors with respect to short- and long-term strategies.</td>
<td>Trade-offs between the different actors' perceptions of corporate sustainability.</td>
</tr>
</tbody>
</table>

The WBCSD (World Business Council for Sustainable Development, 1982) and the IISD (International Institute for Sustainable Development) identified some benefits to the sustainable development assumptions listed below (IISD, WBCS, 2002 apud MUNCK, 2013):

- Reduction of costs by using cleaner production and innovations, with greater efficiency;
- Reduction of costs related to health and safety, since safer and healthier work environments increase the life quality of employees and the community;
- Reduction of labor costs, which arise by promoting better working conditions, more motivation and productivity, and the consequent reduction of absenteeism and turnover;
- Use of better environmental practices influences the reputation of companies;
- Market advantage, because the adoption of a more integrated chain of relationships allows the construction of deeper relationships with consumers, with increased sales;
- Ethical investors prefer to invest in ethical companies then taking risks of investing in companies that are harmful to the environment can destroy the invested capital.

With the purpose of environmental preservation, the Cleaner Production (PML) and Environmental Management methodologies were developed. The intention of Cleaner Production is to minimize waste and emissions of pollutants, addressing their causes at the time of product manufacturing, rather than treating them once they have been created, by streamlining and simplifying processes with respect to the environment. (Van Berkel, 2006 apud Anacleto, 2012). Figure 1 below illustrates these operations.
UNEP (2006 apud Anacleto, 2012) said, "In this context, Cleaner Production provides a practical path to the conceptual framework of sustainable development for action. It is not a new concept, but a logical extension of the desire to conserve materials and reduce waste, and requires people to examine the results of increased productivity, reduced input and waste resources, and most importantly, reduced environmental risk. Cleaner Production is not just an environmental initiative; it supports other productivity-oriented programs and strategies.

“Cleaner Production emphasizes both energy and resource-efficiency improvement, and many of the requirements relating to organization, data, and the best practices are the same for both, and it results in benefits for all parties; it protects the environment, the consumer, and the worker while improving industrial efficiency, profitability, and competitiveness.” (Guidance Notes World Bank Group, 2011).

The term eco-efficiency introduced by the Word Business Council for Sustainable Development (WBCSD) in 1992 through the publication of Schmidheiny's (1992) book "Changing Course", which is endorsed by the Rio-92 Conference, is fast becoming globally popular. According to WBCSD (1992), the term defines "delivery of competitively priced goods and services that meet human needs and bring life quality, progressively reducing environmental impacts of goods and services throughout the life cycle, in line with the Earth's estimated capacity to withstand.”

2.5. Reverse Logistics and Sustainability

It is very important that all players in a supply chain establish ways of acting with the environmental objective, seeking to define the reverse flows so that there is no waste in any part of the chain. And the production sectors of companies participating in such chain benefits from this planning, achieving reduction of waste, reduction of the use of raw materials in general and the
inherent reductions of costs, an integral part of the objectives of Cleaner Production.

Reverse logistics, also known as return flow logistics, is defined as a "flow of materials in the opposite direction from raw material suppliers to the user" (Correa, 2010). It aims to achieve a high level of efficiency in the recovery of products, seeking reduction, disposal and management of toxic and non-toxic waste. Developing reverse logistics projects throughout the supply chain is still a difficult task. Correa (2010) comments on the economic aspect of actions in reverse flows, such as reuse, reform, recycling and others, along with actions to reduce consumption of raw materials and reduce waste generation, as being associated with increasing costs, and that with good management can aim not only to minimize costs but also to generate and recover value.

This posture requires companies to watch very close all their processes and to act in a way to motivate their suppliers to do the same. These actions are based on three main groups of closed cycle networks, the first one being called the closed cycle in the production phase, the second closed cycle in the distribution phase and the third closed cycle in the final phase of the economic life, as defined by Correa (2010):

- Closed cycle in the production phase: obsolete and consumable production materials, pallets, end of life internal transport containers, production scraps and defective products. Of these, some may be reprocessed and recovered;
- Closed cycles in the distribution phase: returns, erroneous deliveries, products returned when actual or potential defects are identified by the manufacturer himself, distribution containers and end-of-lease products, which are returned to the manufacturer;
- Closed cycles in the final stage of economic life: end-of-life products that are returned for reprocessing and re-use, end-of-life packaging that will be recycled or reused for other purposes.

Pozo (2015) separates reverse logistics into two processes: the first one being post-consumer and the second after-sale, with the intention of separating the processes because the necessary reverse environmental actions will have different characteristics, requiring an adequate study of these processes as Figure 2 below:
Setting up a reverse logistic network is a key factor in reducing costs in a way that does not affect the profitability of the final product (Correa, 2010).

In addition to the environmental pressures arising from the market, one must take into account the legal aspects where laws already fit environmental actions in specific legislation, which seek to regulate economic and technological development, guaranteeing environmental preservation. One of these legal texts is Federal Law No. 12,305 / 2010 - National Solid Waste Policy (PNRS) sanctioned in August 2010 and regulated by Federal Decree No. 7,404 / 2010, which provides principles, objectives and instruments, as well as Integrated management and solid waste management in Brazil, which includes the responsibilities of generators and the Government, as well as the applicable economic instruments. In these terms, Article 30 defines shared responsibility for the life cycle of products from manufacturers, importers, distributors and traders, consumers and public service providers.

As Pozo (2015) proposed "It is important to emphasize that the National Solid Waste Policy (PNRS BRASIL, 2010) reinforced the need for environmental, social and economic concern of solid waste, encouraging the adequacy of treatment and disposal, as well as intensifying the importance of collected by the cooperatives. Among the novelties is the insertion of reverse logistics as one of the instruments of this policy (Article 3) and the mandatory management of waste generated after consumption (Articles 32 and 33), both for manufacturers, distributors and vendors, in order to offer an Environmentally sustainable destination. This measure is valid for pesticides, batteries, batteries, tires, oil, lubricants, light bulbs and electro-electronics ".

Table 2 below defines responsibilities more objectively according to Article 30 of the National Policy on Solid Waste (Brazil, 2010):
Table 2 – Responsibilities as article 30 of the PNRS (Pozo, 2015)

<table>
<thead>
<tr>
<th>ACTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Share interests between economic and social agents and the processes of business and market management with those of environmental management, developing sustainable strategies.</td>
</tr>
<tr>
<td>II</td>
<td>Promote the use of solid waste, directing them to its productive chain or to other productive chains</td>
</tr>
<tr>
<td>III</td>
<td>Reduce the generation of solid waste, waste of materials, pollution and environmental damage</td>
</tr>
<tr>
<td>IV</td>
<td>Encourage the use of inputs of lesser aggressiveness to the environment and greater sustainability</td>
</tr>
<tr>
<td>V</td>
<td>Stimulate market development, production and consumption of products derived from recycled and recyclable materials</td>
</tr>
<tr>
<td>VI</td>
<td>Work to enable productive activities to achieve sustainability</td>
</tr>
<tr>
<td>VII</td>
<td>Encourage good socio-environmental responsibility practices</td>
</tr>
</tbody>
</table>

In general, environmental laws related to solid waste are a reaction to the environmental impacts caused by the excesses of these wastes and the negative impacts caused. In this sense, stricter legislation and greater awareness of consumers and employees about environmental damage have led companies to review their responsibility for their products, not only during their use but after use, taking care of the appropriate disposal or other action environmentally correct and causing less damage. Pozo (2015).

2.6. Definition and challenges of GSCM

Taking into consideration the requirements of business practices that demonstrate their concern with the environmental factors mentioned above, and with the objective of expanding these business practices internally, it is noticed that the focus must change towards creating a chain of companies with the same practices, and thus form a truly sustainable supply chain, which is named as GSCM, and considered a hybrid conceptual approach by integrating environmental management fundamentals with supply management assumptions (Srivastava, 2007). Its deployment will encounter operational difficulties, which will be overcome when the participating partners are aware that actions in this direction will add value to their brands and meet society's needs in relation to maintaining a healthy and sustainable environment, in addition to complying with the legislation, thus avoiding fines and legal punishments.

In the matter of sustainability, Rogers and Tibben-Lembke (1998 apud Pereira, 2012) describe that there is a clear distinction between reverse logistics and green logistics, which includes the measurement of the environmental impact generated by the various means of transportation, certifications ISO 14.000, reduction of consumption of water and energy as well as reduction of the use of materials, raw materials, etc. These authors also mention that many green
logistics activities are not directly related to reverse logistics, but there is an indirect relation when considering the aspects of marketing, production, use, reuse and recycling, among others. When evaluating the historical evolution of the concept of green logistics, it is realized that some solutions that seemed appropriate at the time, have become a problem. As an example we can mention the landfills made away from the large centers, which were viable alternatives in the past, but with the disorderly growth of cities, have become a major problem. A landfill has limited capacity and shelf life, coupled with high maintenance and control costs. Therefore, it is not a matter of changing the location of the tailings, but rather of minimizing or eliminating them.

Countries such as Germany, the Netherlands and Belgium, among others, already have advanced environmental legislation in place, where customers and end-users as well as manufacturers have an exact awareness of their responsibilities in each phase of the reverse logistics flow. The basic principle followed is that a company responsible for a product would pay for the cost of cleaning whilst the producer of the packaging would pay for the cost of its recycling or disposal, and the total cost in the end would be paid by the final consumer. The immediate impact of these legislations in these countries was a 30% increase on the interest in reusable and recyclable packaging (Pereira, 2012).

In this context, GSCM appears as an alternative for facing the challenges with the strength of a chain of stakeholders, and that the entire reverse chain is designed in conjunction with the direct product cycle. At this point it becomes easier to define and design the whole reverse, because in addition to involving all the required parts of a supply chain, it charges the environmental responsibility from all involved. According to Jabbour (2015), the theme "Green supply chain management" has been discussed at the corporate level in order to identify the motivations, pressures and barriers to the adoption of GSCM, and to propose a supplier selection criterion that adopts an environmental perspective. An important factor is the investigation of the effects of adopting GSCM practices on organizational performance, aiming to obtain necessary collaboration from suppliers to structure the chain and exploring the role of internal environmental management as a prerequisite. An important issue in the understanding of GSCM is how companies begin the structuring process, as empirical studies have pointed out that organizations adopt more in-depth GSCM internal practices than in external practices.

Several studies highlight mechanisms that support GSCM, such as process collaboration and monitoring, vendor assessment, and how GSCM adopts internal precursor practices of the GSCM. It is key to understand the intra-organizational effect caused by this structuring, with Gimenez and Tachizawa (2012 apud Jabbour, 2014) by identifying internal mechanisms that follow sustainability practices in a company, such as environmental commitment, senior management and the availability of resources.
This restructuring is similar to a process of organizational transformation, as some business management philosophies must be structured in a new way, seeking to be sustainable without adding costs that would affect the competitiveness of a product (Jabbour, 2014). And the best way to get to this point is to work so that all direct and reverse players actively participate in product design. Supply Chain Management, already developed and used in companies, is used as an amplified model by the integration philosophy (Jabbour, 2014).

3. METHODOLOGY

According to the methodology proposed by Lakatos & Marconi (2001) and Miguel (2012), the deductive method was used in this study by using previously established theories and contemplating an exploratory study through a survey of the main theoretical and empirical studies, which addresses the object of the search. As an exploratory quest was chosen, this study was not intended to present a hypothesis, but rather to help establish the priorities to research. As cited by Galban (2017) which complements this work, due to the characteristics of the problem addressed in this work, the research method chosen was the Survey type, also called evaluation research, where a significant sample of a problem to be investigated for the purpose of drawing conclusions, also known as Non-Probabilistic Research for Convenience (Oliveira, 1999).

In a classical work, Miguel (2012) proposed, "survey-based investigations have been used to investigate phenomena in different areas of production engineering and operations management. A survey of this nature, also called evaluation search, has as general objective to contribute to the knowledge in a particular area of interest, through the collection of data / information about individuals or about environments of which these individuals are part. Data on a given phenomenon are collected in a sample in order to draw conclusions about the phenomenon investigated. In general, the survey provides an overview of the phenomenon according to defined variables (frequency distribution of occurrences, usually through descriptive statistics) or draw conclusions, for example, about the cause and effect relationship between variables”

4. DATA

A survey conducted by Galban (2017) would complement and confirm the challenges that the implementation of a GSCM should overcome. This survey identified the minimum requirements for a company to participate in a GSCM with a minimum risk for all the chain. The adherence to the minimum requirements was evaluated in a specific questionnaire, applied to professionals working in Brazil in the areas pertinent to the GSCM, without segmentation of size or market where they operate. This research showed that only 14.70% of the companies surveyed met the minimum requirements, according to Graph 1 below, which is considered low considering its importance and
This research has shown clear evidence that the low adherence of companies to the aspects of Sustainability has influence on the lack of preparation to be part of the GSCM. Table 3 below shows the percentages of adherence to the four areas surveyed. The survey was split into four distinct parts, namely Quality, SCM, Sustainability and GSCM, in which the preparation for each of the phases was measured, so that it would be made possible to understand the evolution of the concepts involved and measure the level of preparation of each company surveyed. This table demonstrates that the number of enterprises considered prepared have significantly decreased as further requirements were added.

Table 3 – results of search about GSCM

<table>
<thead>
<tr>
<th>Results</th>
<th>% Prepared</th>
<th>% Not Prepared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality ISO 9000</td>
<td>60,0</td>
<td>40,0</td>
</tr>
<tr>
<td>Supply Chain Management</td>
<td>47,0</td>
<td>53,0</td>
</tr>
<tr>
<td>Sustainability ISO 14000</td>
<td>32,0</td>
<td>68,0</td>
</tr>
<tr>
<td>Green Supply Chain Management</td>
<td>14,7</td>
<td>85,3</td>
</tr>
</tbody>
</table>

When it comes to Quality-dependent requirements, such as ISO 9000, 60% of companies survey have been considered prepared. When it comes to the composition and operation of a Supply Chain Management, only 47% of the companies surveyed have been considered sufficiently prepared. When Sustainability requirements were added, focusing on ISO 14000, the percentage of eligible companies fell to 32% and finally to the GSCM, only 14.7%. It should be noted that in order for a supplier to be able to participate in the GSCM, it must fully meet the prerequisites of Quality, SCM and Sustainability areas as the GSCM requires skills from all across these fields. The reasons behind such low rates go across a series of elements, such as high costs of certification, weak or no government regulations with environmental requirements, non-demanding applicability.
markets, among others.

5. RESULTS AND DISCUSSION

When evaluating the results of the survey, it is noticed that the implementation of the GSCM provides advantages for the production systems, by preserving the environment, reducing costs with waste and often generating value with raw materials, which can be used in the logistics of return, improving the ecological image that can be explored from a Marketing perspective, adding value to the brand, among other benefits.

GSCM collaborates directly with Cleaner Production in the following ways:

- Reduction of materials and energy consumed in the manufacture of products, with the reuse of recycled or reused raw materials, using greener technologies;
- Reduction in the use of hazardous materials needed for production;
- Reduction in the emission of harmful gases, reduction in water consumption and reduction in generation of production residues, with the implementation of prevention programs;
- Reducing the risk of fines and punishments for more demanding environmental legislation;
- Reduction of costs related to the control of generated waste (storage, transport, disposal, etc.) and losses of raw material and inputs;
- Improvements in the image of the company with positive impact to what its brands and products represent to the customers, with the greener character that GSCM provides.

Despite the many advantages, the still low compliance of companies to the basic requirements is a strong obstacle for implementation of the GSCM. Companies must meet Quality requirements, then also be prepared for the SCM and all the conditions that this management tool requires, and finally they must fully meet the requirements of Sustainability. In this way the GSCM can generate all the benefits mentioned in the literature review.

Recommendation for further studies:

1. What are the real reasons for the low adherence to the environmental cause that Brazilian companies present?
2. What drives the high costs for obtaining ISO 14000 certification?
3. Could costs be costs amortized over time?
4. Is there employee resistance to change in culture?

REFERENCES

Adeodato, S. A urgência de recobrir o Brasil- Revista Página 22, publicação da FGV EAESP, Centro de estudos em sustentabilidade, edição Fev/Mar 2015.
Anacleto, C. Beuren, F. H., Lohn, V. M., Campos, L. M. S., Miguel, P. A. C., Ecoeficiência e
produção mais limpa: uma análise das publicações em quatro periódicos brasileiros da engenharia de produção, Revista Eletrônica Sistemas & gestão 7 (2012), pp 476-489
Doi: http://dx.doi.org/10.1590/S0103-65132014005000007

Munck, L., Gestão da sustentabilidade nas organizações: um novo agir frente à lógica das

PNRS, Política Nacional de Resíduos Sólidos, lei 12.305/10 de 3 de agosto de 2010.  


http://dx.doi.org/10.1016/j.ijpe.2010.11.010.

