Sustainability in Supply Chain Management: Investigating the Best Practices

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Abstract

The main objective of this paper is to identify a set of best practices used in the management of Sustainable Supply Chains (GSCM). This discussion is relevant to the extent that it can be said that the concept and scope of coverage of GSCM is a relatively recent and not yet consolidated in the literature on Supply Chain Management and Operations Management. The main results of the research led from the review of major studies in the literature on the topic, identify a number of practices that appear to be ripe within the concept of GSCM. Likewise, were identified practices still in full development of the concept of GSCM. This research intended to broaden the debate on Sustainability in Supply Chain Management, in order to make your concepts clearer and more applicable in organizations.

1. Introduction

The development of the concept of Green Supply Chain Management is not yet consolidated in the literature and many authors have debated the subject in search of better understanding it. Similarly, practice to support GSCM must be addressed and investigated. In this sense, the scarcity of natural resources and increased levels of pollution have led the debate on environmental sustainability for several segments of society such as business, government, NGOs and the general population. In Walker et al. (2008) idea, political pressures from government and laws and the search for a new competitive advantage has led some organizations to adopt green practices environmentally friendly.

Currently, the GSCM has been discussed as an important alternative in the environment of organizations use sustainability practices. Routroy (2009) explains that today GSCM is considered to be a prerequisite for sustainable development. In search of a definition about GSCM, it can be said, according Routroy (2009), that GSCM is a method to design and re-design the Supply Chain, which incorporates recycling and remanufacturing within the production process. As Srivastava (2007), GSCM defined as the integration of environmental thinking in Supply Chain Management, which includes the following elements: product design, selection and provision of material, manufacturing processes, delivery of the final product to the customer and managing of life product after its disposal. This definition of GSCM is adopted in this paper.

In the vision of Qingua et al. (2008) the practice of GSCM should contemplate green purchasing processes, including the vendors, manufacturers, consumers and closing the chain with reverse logistics. Walker et al. (2008) pointed some of GSCM practices, among which are: packaging and materials reuse, recycling products and use

of recyclable packaging, environmental data collection of chain sellers, reducing the emission of pollutants generated in shipping.

2. Green Supply Chain Management (GSCM)

As Lu et al. (2007), GSCM refers to improve the environmental performance of companies, their suppliers, customers and the relationships among them. The GSCM has its origin at the same time, the concept of environmental management and supply chain management. Similarly the concept of SCM, the boundary of GSCM is dependent on the goal of the investigator (Srivastava, 2007). As proposed by Zhu and Sarkis (2004) the defining of coverage scope of GSCM in the literature ranges from the procurement process green materials to integrate the Green Supply Chain, flowing from supplier to producer to client and reverse logistics. Accordingly, Qingua et al. (2008) state that the GSCM can be understood from the following five dimensions: internal environmental management, green purchasing, cooperation with customers including environmental issues, eco design and Investment in material recovery. Dias (2006) suggests, for example, in the definition phase of purchased materials and product development, should be the aspects of recycling and reuse of materials. Along with the concept of reverse logistics, the concept of product life cycle must be addressed, and so organizations must understand the logistics management together with the cyclic product life, a closed circuit, and not as a form of disposal organized product (Day, 2006)

Despite the use of some practices as sustainable product design, reverse logistics and purchasing green seems to be difficult to implement GSCM (Grandzol and Sodano, 2011). Evidence of difficulties to deploy the GSCM were found in Narasimhan and Carter (1998). Narasimhan and Carter (1998) found that although some organizations determine the economic risk of environmental impact, they found low budget available to address and difficulty in terms of knowledge on the part of management to conduct actions. Bangalore (2009) reported that many green companies led projects without clear definition of objectives and indicators of return to be achieved. A review by Sodano and Grandzol (2011) showed that although there is some literature on models and practices to implement GSCM, there is a disparity between what these guides to guide organizations to act and what organizations actually do. The literature behind a relatively low number of investigations on the factors of success and failures in projects GSCM and now, this issue is addressed as an opportunity for future research.

3. Methodology

The methodology of this research is divided into two strategies. The first involves proposing a debate exploring the topic of GSCM and its practices, incipient focus of discussion in the literature. The second strategy, from the exploitation of the findings in the literature, aimed to provide evidence of best practice in the academy GSCM and especially for the Brazilian. To meet the two strategies were analyzed studies that discuss the themes of GSCM practices. The criterion for selection of papers resulted from the combination of two factors: recent publication date and adherence to the goal of this research. To drive this strategy used to approach the literature.

According to Gil (2010, p.29), the literature is prepared based on previously published material, whether printed or digital as: articles, theses, journals, dissertations etc. "Virtually all academic research requires some time to carry out work that can be characterized as literature (Gil, 2010 p. 29)." As for approach this research is qualitative as Yin (2004), since the analysis of relationships and interpretation of evidence from the

literature are done inductively. As for goals, this work is exploratory and descriptive characteristics as defined in Marconi and Lakatos (2008). Exploratory because the purpose of this research is to generate proximity to this issue to better understand and generate possible hypotheses. Descriptive, because the present discussion describes characteristics of GSCM and tries to establish relationships between the elements that compose it.

4. Discussion of best practices in Green Supply Chain Management

Seuring and Muller (2008) after a search of the literature review of 191 articles on Supply Chain and Sustainability, identified gaps and identified the main directions that should be considered in the development of best practices in GSCM. The first shortcoming is evident that sustainable development is often reduced to environmental improvements, when in fact it is necessary to include technical aspects, an understanding and a positive approach to social science. Therefore, an integrated approach is required where the vision of social science has highlighted, as well as the integration of the three dimensions mentioned above. Another shortcoming is evident that direct the development of best practices is the use of a consistent theoretical framework, the literature review showed that the case studies and surveys of the articles analyzed, needed a better theoretical basis for deployments that can get in practice an SCM or operations management organizations.

Sodano and Grandzol (2011) from a survey grouped and identified the use of best practices in GSCM classes: i) strategic focus: focus on sustainability as a driver of SCM agenda; adopting reverse logistics, direct resources in the budget for GSCM ii) organizational resources: create standards for GSCM; GSCM articulate the mission of the company, have an executive leader responsible for GSCM initiatives, developing multifunctional teams to GSCM iii) empowering practices of GSCM: quantifying costs and benefits of GSCM; use clear performance standard for GSCM, use analysis tools to investigate life cycle impact on overall Supply Chain; insert GSCM on metrics management and integrate it into the practices of existing improvements; iv) green manufacturing practices: an action plan for reduce water use, energy, emissions, materials, production methods use pulled; adopt recycling program; v) GCSM: collaborate with partners to improve performance green; include the vision in green procurement, green adopt criteria for evaluating suppliers vi) Green Logistics and transport and packaging: take actions to minimize routes, deliveries and emissions; redesign packaging to minimize use of materials, use reusable or recyclable packaging.

Nunes and Bennett (2010) investigated the sustainable practices in the automotive industry focusing on case studies at Toyota, GM and Volkswagen. In findings related to GSCM, best practices were perceived and can serve as a basis for other segments and industries. Overall, the study showed an attempt to shift from a reactive to proactive stance, extending control over other activities of SCM and thereby taking actions within a context of increased uncertainty of their business. Best practices in GSCM involve suppliers and logistics in-bound and out-bound. Among these actions are highlighted incorporate environmental criteria into purchasing decisions and supplier relationships. Such practices also involve sharing risks along the SCM, technology transfer and reducing losses and costs in fornedores. These findings are also present in Kleindorfer et al. (2005), Sarkis (1998) and Zhu et al. (2007).

Different practices are adopted GSCM between the three automakers. Toyota for example has the green manual for SCM (Greener Supplier Guidelines Green Purchasing Guidelines) which is used for all operations around the world. Another practice adopted by Toyota is the optimization of routes and loads of deliveries and collections of trucks.

It also showed the development of sustainable packaging and the use of container handling and delivery of metal extended life over the use of container pallets of cardboard or wood.

Already GSCM practices found in GM include: sustainable partnerships with suppliers, the transfer of sustainable technologies along the SCM; environmental improvements in packaging, chemicals and the requirement of ISO 14000 certification for all suppliers. Already in VW, practices include: the demand requirements of sustainable events and training for their suppliers; actions for changing the mode of transportation of the SCM road air and sea; optimization via software routes traveled for delivery and collection materials; logistics practices focused on reducing the use of plastic and cardboard packaging.

Nunes and Bennett (2010) attributed to reverse logistics a broader scope of action, as of GSCM practices in the automotive industry. Toyota stands out: adopt practices of life cycle analysis of end vehicles from product design, to use systems to ensure the correct selection, recycling and treatment of airbags and greenhouse gas emissions; practices to collect and recycle parts end of life through partnerships such as resellers and distributors of components. General Motors also has a dedicated group in Europe to coordinate the actions of end-of-life vehicles, also includes the design of products that vision. The company's goal is to have by 2015 the proportion of material in late lifecycle (FCV) that should be reused or recovered, in the range of 95% of vehicle weight, leading best practices segment as the FCV. Volkswagen also has advanced systems for recycling in the SCM also adopts such practices in manufacturing. The company coordinating a novel process for increasing the rate of recycling of materials VGF to 95%. The three companies are adopting green energy, such as hybrid cars, to reduce dependence on oil and generally the actions of GSCM are focused on vendor selection, technology transfer and more efficient logistics systems (packages, routes, optimization loads, etc.).

The study by Hsu and Hu (2008) conducted in the electronics manufacturing showed several practices to sustain GSCM. Among them are: green procurement, environmental audits to suppliers, collaborative product development with suppliers, partners with local organizations and collaboration with recycling industries in the same sector on recyclable products, product disassembly manuals. Among the practices related to human factors are: environmental education and training, support from top management, integration between sectors, involvement of the workforce. Among the practices in SCM showed up: effective communication within the company and with suppliers, establish system of environmental risk management, supplier evaluation and selection and portfolio of sustainable products.

Routroy (2009) proposed the following practices as antecedents to deploy GSCM: i) top management support: is defined as the first and most critical factor for the success and implementation of GSCM, as evidence from the literature, ii) government initiatives: as the author, and place pressure on companies, the government can promote innovation in green areas of significant environmental regulations by adopting GSCM transparent (data about other companies, companies that violate) and recognition of green companies, the government could open an institute of excellence green to promote training and research GSCM; raise awareness of sustainable issues in general. Ghobadian and Holt (2009) surveyed a sample of 149 industries in the UK and concluded that most of GSCM practice focuses on cost reduction activities internal to the organization, with less effort in the processes of in-bound and out-bound. As a way to expand the use of GSCM authors suggest increasing communication and disseminate best practices that quantify costs and benefits. In addition to management support,

building communication, best practices and the creation of buying groups of green materials, green culture may enhance internal and external to the organization. Ghobadian and Holt (2009) also showed that the focus of improvement in internal operations, from operational efficiencies rather than a proactive relationship with SCM, leads firms to adopt audits on suppliers rather than establish a win-win relationship.

In search of the state of the art in GSCM Srivastava (2007), surveyed 227 papers dating from 1990 to 2005. The main findings of the author on the topic of best practices were to present the most common practices and opportunities for improvement in GSCM. Among the best practices highlighted the following groups: i) related to green projects: design and material recovery of manufactured products, design for disassembly of product design in order to minimize losses, life cycle analysis of the product , the project aimed laws, aimed at refurbishing project, the project aimed at recycling and environmentally conscious design, ii) operations green: green manufacturing and remanufacturing products (minimize the use of virgin materials and energy), recycling and recovery and reuse of materials and products, reuse of products, reverse logistics and SCM project management, losses, reduced inventory, planning and production control.

According Zucatto et al. (2008), to implement GSCM operate means considering environmental aspects, profitability and quality. Approaches to implement GSCM suggested by the authors are originally proposed by Nunes et al. (2004): environmental strategy and logistics. Logistics takes the actions of purchase, processing, internal processes, distribution, storage, disposal and return of products after the end of its useful life. The approach relates to strategic long-term decisions, forming lasting partnerships, choice of suppliers, processes, products and markets.

The study by Moore and Manring (2009) unlike most researched work on GSCM practices in environmental sustainability of small and medium enterprises (SMEs). The authors demonstrated some practices to optimize GSCM. The first is the development of cooperation networks between SMEs in markets where large companies have less work to direct the systematic problems that arise in GSCM and industrial ecology. In their view, building collaborative networks is important not only because SMEs represent a majority of the number of companies, but also quickly involve communication technologies that follow several routes. Furthermore, through the success of networks where they are inserted, SMEs can benefit individually from the overall performance. Manring and Moore (2009) states that the force multiplier of networks will become essential for addressing systemic problems of GSCM and global sustainability because they can leverage the sustainable efforts initiated by the government, private and NGO.

Board 1: Synthesis of best practices in Supply Chain Management

Author	Best Practices
Seuring e Muller (2008)	Need for better theoretical basis for the developments may come into practice in a SCM or operations management organizations.
Sodano e Grandzol (2011)	Six groups: 1. Strategic emphasis; 2. Organizational resources; 3. Enablers of GSCM practices; 4. Green manufacturing practices; 5. GCSM; 6. Green Logistics and transport and packaging.
Nunes e Bennett (2010); Kleindorfer et al. (2005); Sarkis (1998) e Zhu et al. (2007).	Incorporate environmental criteria into purchasing decisions and supplier relationships. Such practices also involve sharing risks along the SCM, technology transfer and reducing losses and costs on suppliers.
Hsu e Hu (2008)	Green procurement, environmental audits to suppliers, collaborative product development with suppliers, partners with local organizations and collaboration with recycling industries in the same sector on recyclable products, product disassembly manuals. In human factors are: environmental education and training, support from top management, integration between sectors, involvement of the workforce.
Routroy (2009)	Two groups: 1. Support from top management: first and most critical factor in the implementation and success of GSCM; 2. Government initiatives: the government can promote innovation in green areas of significant environmental regulations by adopting GSCM transparent recognition of Green companies, and other practices.
Holt e Ghobadian (2009)	Focus on cost reduction activities internal to the organization, with less effort in the processes of in-bound and out-bound. Increased communication and dissemination of best practices that quantify costs and benefits, expanding the green culture inside and outside the organization.
Holt e Ghobadian (2009)	Focus on improving internal operations, from operational efficiencies rather than a proactive relationship with SCM, leads firms to adopt audits on suppliers rather than establish a win-win relationship.
Srivastava (2007)	Two groups: 1. Green projects: design and material recovery of manufactured products, design for disassembly of product design in order to minimize losses, analysis of the life cycle of the product, the project aimed laws, project devoted to remanufacturing, recycling project aimed at and environmentally conscious design; 2. Green Operations: green manufacturing and remanufacturing products, recycling and recovery and reuse of materials and products, reuse of products, reverse logistics and SCM project management, losses, reduced inventory, planning and production control.
Nunes et al. (2004) e Zucatto et al. (2008),	Environmental concern, strategy and logistics. Which addresses actions purchasing, processing, internal processes, distribution, storage, disposal of products, return after the end of its useful life. Including long-term decisions, forming lasting partnerships, choice of suppliers, processes, products and markets.
Moore e Manring (2009)	Development of cooperation networks between SMEs in markets where large companies have less work to direct the systematic problems that arise in GSCM and industrial ecology.

5. Conclusions

The development of the concept of Green Supply Chain Management (GSCM) is in development literature and its discussion is important to the context of contemporary society. Thus, the main objective of this paper was to present the best practices of Green Supply Chain Management (GSCM) for manufacturing environments evidenced in the literature. Overall it was possible to identify a convergence treatment of GSCM practices for internal activities aimed at improving the organization and reduce costs, as advocated Srivastava (2007), Zucatto et al. (2008), Routroy (2009). The results showed the focus of discussion of GSCM directed to organizations large and complex SCM. However, research conducted by Moore and

Manring (2009) that address the small and medium enterprises (SMEs) can emerge practices important to the context of other businesses and industries such as trade and services. It is noteworthy in this context, as suggested practice for GSCM your organization in collaborative networks to explore markets where large firms have less expertise.

This job allows me to present a broad set of best practices adopted by various organizational levels to develop and maintain the performance of GSCM. It was perceived as a recurrent practice and strategic management level: the need for management support as seen in Ghobadian and Holt (2009), Routroy (2009), the need to strategically focus on the implementation of GSCM (Grandzol and Sodano, 2011; Wisner et al., 2005; Mentzer et al., 2001; Nunes and Bennett, 2010; Ghobadian and Holt, 2009). As for the areas of manufacturing and other areas involved with the GSCM, best practices are related to: i) use, reuse and recycling of raw materials, products, packaging, and resources such as water, air and so on, ii) development sustainable products, sustainable supplier development partners.

The discussions are far from exhausted in this work and therefore how routing works suggest future research in two points. The first are studies that investigate which indicators should be used to support certain set of best practices GSCM. The second focus of future research that emerges from the low number of investigations, is the proposition of critical success factors and failures in implementation projects of GSCM.

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