

Study of the impact of Green practices on the performance of Supply Chain: collaborative approach.

Abdelwahed Echchatbi, Abdelkabir Charkaoui and Mohamed Dif El Idrissi

Mechanical, Industrial management and Innovation laboratory
Faculty of Sciences and Technologies of Settat, University Hassan First
FST Settat, KM 3 Casablanca road, Morocco.

contact_fsts@uhp.ac.ma

Abstract

Research in the field of Green Supply Chain Management has known a big growth in recent years as the environmental aspect has become a major concern for all internal and external stakeholders of the supply chain. Indeed, several researchers have proposed tens of collaborative practices at the Green Supply Chain Management level to enable partners to reduce the environmental impact of their activities while ensuring a better level of overall performance of their supply chain. But the implementation of these practices is closely related to other parameters that could have a direct influence on this performance. Therefore, the objective of this research work would be to propose a framework that would, on one hand, facilitate the choice and implementation of GSCM practices, and on the other hand, study the relationship between GSCM and overall performance of the supply chain based on a key parameter which is the capability of collaboration.

Keywords

Supply Chain Management; Supply Chain performance; Green Supply Chain Management; Capability of collaboration.

1. Introduction

In order to be more competitive in a highly globalized market, organizations tend to expand their supply chain around the world through large investments, which has tremendously increased the demand for natural resources. In addition, with increasing attention from customers, stakeholders, government legislation, and environmental organizations, companies are driven to consider environmental impacts while doing business. All these external and internal calls for reducing environmental impacts and rationalizing the use of natural resources have led companies to think about integrating the "Green" concept into their supply chain. Over the last decade, many companies around the world have implemented Green Supply Chain Management (GSCM) to improve their competitiveness in the global market. In this context, a large number of researchers are interested in the subject of the GSCM. Today, sustainable development, or the social and environmental issues of the supply chain have become one of the main concerns of researchers. Thus, several studies have tried to study the impact of Green practices on the overall performance of the supply chain. Indeed, a large number of publications on the effects of environmental practices on the performance of the supply chain is present. In addition, a large number of studies have examined whether the implementation of GSCM strategies leads to an improvement in the performance of the supply chain. Collaboration has also been seen as a key element that facilitates the transition to GSCM, and therefore can have an impact on the performance of the supply chain. Indeed, GSCM strategies involve a wide range of activities, requiring the expertise of almost all members of the supply chain. In addition, collaboration with a wide range of actors, including suppliers, customers, governments and non-governmental organizations, can be beneficial for the performance of a supply chain. Despite the large number of studies done on GSCM strategies, their impacts on the performance of the supply chain and the role of collaboration in these strategies, there are still challenges in terms of studying and understanding the relationship between the GSCM and the performance of the supply chain. Indeed, several researchers call for a more nuanced examination of the relationship between GSCM practices and performance. On the other hand, the choice of Green mechanisms and practices on the basis of the collaboration capability of the various partners as well as the evaluation of the impact of this choice on the performance of the supply chain also remains an area of investigation.

2. State of art

2.1 Supply Chain

The supply chain is a concept that has been widely discussed in the literature in recent years, so a variety of definitions and analyzes from different angles are proposed. The logistics chain can be seen as a network of interacting companies whose purpose is to deliver a product or service to the end user by coordinating the activities associated with the movement of goods from the raw material to the delivery of the final product by effective combinations of resources that contribute to the creation of value. It should be noted that recent research on the concept of the supply chain involves the integration of constraints related to sustainable development. Indeed, "the supply chain must be coordinated with voluntary integration of economic, environmental and social considerations with a conception of the main inter-organizational processes, oriented towards efficient management of materials, information and capital flows related to the placing of orders,

production and distribution of products and services that meet the needs of stakeholders and improve the profitability, competitiveness and robustness of the organization in the short and long term". Since the supply chain is made up of a network of companies that coordinate together to deliver a product or service to the end customer, the management of this chain is complicated by the heterogeneity of the partners, the diversity of the products and the nature of the products competitive market. Over the last fifteen years, the context of industrial relations between companies has become more complex and more turbulent. In addition, the management of a supply chain network is complex and difficult because the network involves different subsystems, activities, relationships and operations. Hence the need to look at the relationships that bind the different partners in the supply chain.

2.2 Supply Chain Management

SCM is defined as the process of integrating organizational units along the supply chain and coordinating physical, informational and financial flows in order to satisfy the end consumer and improve the competitiveness of the chain in its together. Thus, SCM is a set of approaches used to effectively integrate suppliers, producers, distributors and retailers to ensure the production and distribution of finished products at the right time, in the right place, in good meeting the requirements of end customers at the lowest cost. SCM is also defined as the systematic and strategic coordination of traditional functions between companies in the supply chain, with the aim of improving the long-term performance of the entire chain.

All these definitions specify that the basic foundation of the SCM concept is in the form of an integrative approach of all supply chain partners, in order to satisfy the needs of their end customers and to achieve their local and regional overall performance objectives. Following this direction, the SCM distinguishes itself from the supply chain by its reference to methods and tools of strategic management that aim at optimizing the entire chain.

2.3 Evolution of Supply Chain Management

During the 1950s and 1960s, the development of new products was slow and complicated and it relied only on the technological aspect. In addition, purchasing problems were almost neglected by decision makers at that time, as this function was considered a production service. Increasing the volume of production was the main objective of this period, and little importance was given to the partnership between the actors. Sharing technology and expertise with customers or suppliers was considered too risky and unacceptable. In the 1970s, managers became aware of the impact of WIP (Work In Process) on manufacturing costs, the development of new products, quality and delivery time. One of the factors driving this heightened awareness has been the adoption of Material Resource Planning (MRP). So the goal was not only to have a fairly high production volume, but rather to increase performance. During the 1980s and early 1990s, companies began to outsource their logistics activities and focus on their core business. The external logistics provider was a real business advantage and a viable way for businesses to achieve their productivity and efficiency goals. As a result, many manufacturers have gone more for a relationship-oriented approach with their supplier and customer. They understood the benefits of the cooperative relationship with other companies in the different levels of the chain. Another reason that influenced the partnership between supplier and customer was increased global competition.

The introduction of Enterprise Resource Planning (ERP) systems in the 1990s has contributed to the evolution of SCM and supplier customer relationships. While EDI (Electronic Data Interchange) systems mainly focused on inter-organizational integration, ERP systems mainly concerned intra-organizational integration. The evolution continues in the 21st century with the development of more sophisticated information technologies. In addition, the client-provider relationship during this period has shifted from a normal partnership to a long-term relationship and strategic alliances. Manufacturers and retailers routinely leverage vendor strengths and technology to support new product development, distribution channels, cost reduction. The latest trend in the evolution of SCM is the move towards supplier relations systems across national boundaries and to other continents. Some authors have segmented the evolution of SCM in several stages:

- 1950s and 190s: Fragmentation of activities
- 1960s to 2000s: integration of activities
- 2000s: Supply Chain Management

It should be noted that Green Supply Chain Management (GSCM) was among the latest concepts introduced in the SCM literature. Indeed, businesses are much bigger than before. They have achieved economies of scale and with the establishment of trade liberalization policies, they are internationalizing their activities into other growing markets. The concept of SCM alone is not enough to be effective and competitive in the new environment, which is why new concepts and management strategies (such as the GSCM) are emerging. In developed economies, there is a shift from competition between firms to competition between channels.

2.4 Green Supply Chain Management

Green Supply Chain Management is a concept that has experienced a significant development in the number of publications in recent years. Today, sustainable development, or the social and environmental issues of the supply chain have become one of the main concerns of researchers.

One of the most used definitions of the GSCM describes this concept as the integration of environmental thinking into the management of the supply chain, including product design, sourcing and choice of raw materials, manufacturing processes, the delivery of the final product to consumers and the management of the product after its lifetime. A literature review was recently conducted and found 22 unique

definitions of GSCM. It was found that, in general, the definitions dealt with environmental and economic considerations while emphasizing the role of coordination and flows. In addition, GSCM definitions range from reactive monitoring of general environmental management programs to more proactive practices and even environmental innovations.

The implementation of GSCM in organizations is quite different from the MCC. The stages of transition from SCM implementation to GSCM include: product life cycle; operational life cycle; and the minimization of waste. The integration of the GSCM into the SCM requires careful analysis and systematic changes in existing systems. Businesses should be well equipped to mitigate the obstacles that can affect the functioning of an organization both internally and externally. Although it is not possible to mitigate all obstacles simultaneously, a careful analysis of these barriers can help to prioritize them and successfully implement the GSCM. External barriers to successful implementation of GSCM in construction organizations are rigid vendor practices, lack of data availability to measure GSCM performance, financial constraints, and changing regulations. Internal barriers include the novelty of the GSCM, the lack of support from senior management and the lack of communication. Other common barriers are lack of public awareness, lack of government support for adoption of new technologies, lack of senior management involvement and lack of technical transitions, financial constraints, the lack of mission and vision of organizations towards sustainable practices, poor knowledge and communication management techniques also noted as common obstacles. In construction organizations, environmental issues have become more relevant, where organizations need to focus on the efficient use of energy and resources for an ecologically sustainable supply chain. From the analysis of the barriers and their sources for a successful implementation of the GSCM, no individual flow acts as the only obstacle and they are interdependent on each other.

In the GSCM perspective, sustainability is only associated with measures to reduce the environmental impact of the supply chain activities by neglecting aspects of the social dimension. Several researchers have introduced another more comprehensive concept called Sustainable Supply Chain Management (SSCM) which encompasses the three social, economic and environmental dimensions and they note that it is necessary to incorporate these three dimensions to achieve a more sustainable performance. The figure below shows the difference between the GSCM and the SSCM:

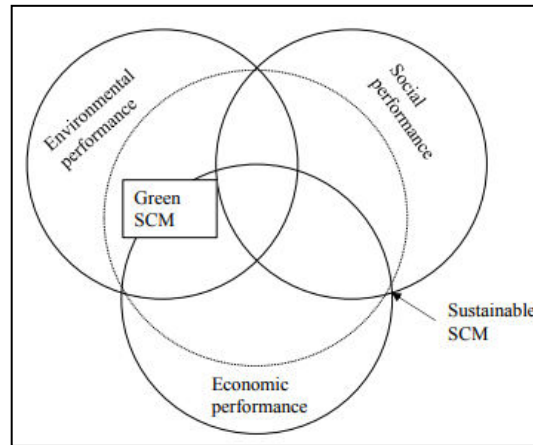


Figure 1: GSCM and SSCM

2.5 Green Supply Chain Management practices

Researchers discussed GSCM practices from different perspectives in the literature. The GSCM practices identified are interrelationships between suppliers to reduce hazardous materials, reverse logistics, product recovery and reuse of used products, green design, green purchasing and collaboration with suppliers and customers. In addition, other researchers discussed support for internal management, client environmental collaboration, green manufacturing and green packaging. Therefore, the successful implementation of the GSCM can be done through various practices and initiatives. It should be noted that a company cannot be more environmentally sustainable than its suppliers. So the implementation of these practices requires a certain level of collaboration between the various partners of the Supply Chain.

Many GSCM practices are already proposed in the literature and can be categorized in different aspects based on their use. The below table illustrates the different aspects of the GSCM in which dozens of practices are proposed:

GSCM Aspects	Sources
Reverse logistics	Govindan et al. (2015); Tseng and Chiu (2013, 2012)
Industrial symbiosis	Berlina et al. (2016); Tseng and Bui (2016); Albu (2017).
Eco innovatio practices	Crum et al. (2011);Rao and Holt (2005)
Green infomation technology and systems	Boudreau et al. (2008); Jenkin et al. (2011);
Green Design	Lin (2013); Tseng and Chiu (2012); Sarkis (1998)
Crbon management	Govindan et al. (2015); Hsu et al. (2013);
Supplier environmental collaboration	Vachon and Klassen (2008); Gunasekaran et al. (2008)
Customer environmental collaboration	Lawson et al. (2006); Lin (2013); Azevedo et al. (2011)
ISO 14001 certification	Nawrocka et al. (2009); Robèrt (2000); ISO (2010);
Internal management	Olugu et al. (2011); Rao and Holt (2005)
Green purchasing	Saghiri and Hill (2014); Yang et al. (2013);
Green manufacturing	Walker et al. (2014); Tseng et al. (2009); De Giovanni (2012); Zhu and Sarkis (2007);
Green packaging	Hsu et al. (2016); Lin et al. (2013); Liu et al. (2013)
Green logistics	González-Benito and GonzálezBenito (2006); Salimifard et al. (2012)
Green outsourcing	Tseng et al. (2011); Babin et Nicholson (2011);
Green warehousing	Zhu et al. (2008)

Table 1. GSCM

Aspects

2.6 Collaboration and Green Supply Chain Management

Several works in the literature have emphasized the positive impact of collaboration between partners in the context of a supply chain. Indeed, the fundamental purpose of collaboration is to maximize profits for all chain partners and to create a competitive advantage. In addition, collaboration in the supply chain can have a positive impact on operational efficiency and effectiveness as well as profitability.

Similarly, the importance of GSCM collaboration is very detailed in the literature and several authors consider environmental collaboration to be at the heart of GSCM strategies. The collaborative effort between the focal company and the supplier is the main ingredient of the GSCM to facilitate environmental and socially responsible activities. In addition, GSCM needs to involve collaboration with suppliers in designing green products, organizing awareness seminars and helping suppliers build their own environmental programs. As a result, environmental collaboration is one of the initiatives' responses to environmental problems, focuses on the protection of the environment, and promotes coordinated development of economic and environmental perspectives.

The need to integrate collaboration into GSCM strategies is mainly due to the multitude of activities and practices to be implemented throughout the supply chain. The success of this implementation is closely linked to the levels of expertise and knowledge of all partners in the environment. Indeed, GSCM strategies involve a wide range of activities, requiring the expertise of almost all members of the supply chain.

2.7 Supply Chain performance and Green Supply Chain Management

Organizations' attempts to achieve sustainable development at each level of their supply chain can be followed by defining performance measures. In fact, performance measurement is useful for balancing GSCM processes and for identifying areas where improvement is needed. Several detailed studies of performance measurement reveal that by measuring the performance of the GSCM, a company may decide to continue its current strategy or improve it further. Thus, various scale shapes can be used to measure the GSCM in order to continuously improve the implementation of the GSCM and to perform Benchmarking.

A wide range of parameters for measuring the performance of GSCM has been proposed in the literature. For example, several studies have noted that the overall objective of GSCM is to reduce negative environmental impacts (air, water and soil pollution) and waste of resources (energy, materials, products) from extraction of raw materials and delivery of products. They also proposed the use of ISO 14031 as a basis for measuring GSCM performance. In addition, other findings noted that various process-oriented measures should be integrated at different levels of management in the supply chain. Quality has also been introduced as a measure of GSCM performance. In addition, environmental competencies, current environmental effectiveness, green supplier image and life cycle cost were taken into account as indicators of supplier performance assessment under the GSCM.

3. Synthesis and analysis of state of art

Faced with increased internal and external demands for reducing the environmental impact of industrial activities, supply chain decision-makers are today obliged to review and adapt their strategies in order to make all their activities more ecological. In this context, several researchers are calling for the implementation of GSCM strategies for the success of this environmental transition through a panel of dozens of GSCM practices. These are treated and categorized in different ways to encompass all the activities of the supply chain involved directly or indirectly in this negative impact on the environment.

Implementation of these GSCM practices remains difficult due to several challenges that supply chain partners' face. Indeed, the integration of the GSCM into the traditional SCM requires careful analysis and systematic changes in existing systems. For this reason, researchers also stress the role of collaboration in these strategies as a company cannot be more environmentally sustainable than its suppliers. On the other hand, the adoption of a GSCM strategy can have an impact on the financial and environmental performance of the supply chain. Several works in the literature consider that the GSCM and the performance of the supply chain are two inextricably linked concepts and incite in-depth analysis to explore the nature of this relationship. Indeed, several researchers are calling for a more nuanced examination of the relationship between GSCM practices and the performance of the supply chain.

On the basis of these observations, we can conclude the following points:

- The implementation of a GSCM strategy is full of obstacles and requires a more careful analysis.
- Several GSCM practices are proposed in the literature covering the majority of the functions of the supply chain.
- Collaboration is a key element that plays a major role in the success of GSCM strategies.
- The GSCM and the performance of the supply chain are two closely related concepts. The nature of this relationship requires further reflection.

Despite the large number of studies conducted on GSCM practices, their impacts on the performance of the supply chain as well as the role of collaboration in GSCM strategies, there are still challenges to be faced in terms of studying and understanding the relationship between GSCM practices and the performance of the supply chain from different angles. In addition, the implementation and choice of practices to be implemented in collaboration with other partners as well as the evaluation of the impact of this choice on the performance of the supply chain also remains as an area of investigation. Indeed, there are still interesting challenges that could certainly be deepened: the choice of the mechanisms to be implemented according to the level of maturity of each partner, the most appropriate mechanisms to select on the basis of the inter-organizational collaboration structure.

Following the same direction, the objective of this research project would be to propose a framework to facilitate the choice and implementation of GSCM practices and to analyze the relationship between the GSCM and the performance of the supply chain. Based on another parameter which is the capability of collaboration. This one can be defined as the ability of a company to leverage the resources and knowledge of others. Several researchers consider the ability to collaborate as a separate factor. Indeed, there is growing evidence that a firm's ability to collaborate should be conceptualized as a separate factor.

4. Conclusion and perspectives:

The originality of this research project lies in its contribution to further reflection on the relationship between GSCM strategies and the measurement of the overall performance of the supply chain. Indeed, several researchers call for a more nuanced analysis of this relationship. In addition, the proposed analysis introduces another moderating element of this relationship, which is the ability of the various supply chain partners to collaborate to see how much influence it has on these two components. Thus the methodological framework that will be developed at the end of this work would have as objective both the production of scientific knowledge and also the proposal of a practical decision panel for the managers of the supply chain based on a methodology research action / intervention known by its cyclical nature as well as a strong implication of the actors of the organization. The architecture of the scientific contribution can be summarized as follows:

Scientific contributions:

- Analyze the structure, the action plan and the obstacles related to a GSCM strategy.
- Identify the different GSCM practices as well as the possible measures for their implementation.
- Study the concept of collaboration capability in the context of the supply chain.
- Analyze the GSCM strategy relationship and the overall performance of the supply chain by introducing the ability to collaborate as moderator of this relationship.
- Study the design of performance measurement systems in relation to GSCM strategies.

Managerial contributions:

- Propose a clear roadmap for the adoption of a GSCM strategy.
- Develop a framework that is both methodological and practical for the implementation of a GSCM strategy.
- Design an overall performance measurement system for the proposed framework.

Methodological contributions

- Use the action / intervention research method that allows both the production of scientific knowledge and participation in the transformation of a process, system or organization.
- Design the framework based on real data.
- Use different types of variables to enrich the results of the research.

In conclusion, this work is a first step of the conceptual research related to the subject of the GSCM which aimed to make a bibliographic study of the state of the art and still needs to be followed by an empirical study allowing to answer to the predefined problematic which lies in the study of the relationship between the GSCM and the performance of the supply chain.

The search for other moderators of the relationship between GSCM strategies and the performance of the supply chain can be proposed as a perspective for future research.

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