Theoretical model of green supply chain management: Support elements

Sana Elhidaoui1,2, Khalid Benhida1
1 Sciences d'ingénieur, LAPSSII, EST de Safi, Université Cadi Ayyad, Maroc
2 Author to whom any correspondence should be addressed
sanaelhidaoui@gmail.com

Abstract. Nowadays, works on supply chain management continue to expand, which is associated with the speedy growth of technology on one hand, and the global issue of climate change on the other hand. All these factors have contributed to the emergence of a new field of research, namely the green supply chain management especially in the early 2000s. Through this paper, a brief literature review was conducted in order to summarize the published research work on green supply chain management, followed by a theoretical model that combines a set of tools and practices as support elements for the green supply chain management.

1. Introduction
Supply chain management (SCM) is among the most attractive topics for industrials and researchers, in the logistic field. However, new constraints are appearing, which incite to improve the existing methods, in addition to adapting them to traditional management, especially the case of the environment, where the company is requested to balance between respecting regulations in this sense, and the competitiveness, in terms of environment respect, and ensuring green products.

The paper is intended to provide management researchers with a general framework in green supply chain management (GSCM) research, and also a conceptual model for future research directions. Through this paper, we tried to draw up a general framework of green supply chain management (GSCM), we review current research works in green supply chain management (GSCM), and then provide a brief discussion of research opportunities and future research.

This article has been divided into five parts, the first section devoted to the introduction. The second section provides the state of the art of green supply chain management (GSCM), section 3 is devoted for material and methods, and section 4 to discuss results. And finally section 5 is devoted to the conclusion and some perspectives.

2. Green supply chain management
Supply chain is a network, linking several parties like suppliers, distributors, retailers, and manufacturing site[1], another definition: "a supply chain is defined as all the companies involved in the processes of component procurement, manufacturing, distribution and sale of the product, from the first supplier to the end customer”[2]. While green supply chain is considered as a traditional supply chain that involves environmental practices during all processes, such ‘life cycle assessment of product’ and ‘environmental analysis’ etc., it is also based on sustainable development. Moreover, the green supply chain aims to minimize and ideally eliminate the negative effects of the supply chain on the environment [3].
SCM is to manage the inputs of goods or services as well as a variety of activities, not only in a single department of an organization but in the different departments as well as outside the organization; for final users from procurement of raw materials to the end of the products’ useful life [4].

GSCM can be regarded as one of the fastest expanding management areas. Several relevant reviews have been written over times that demonstrate various aspects of GSCM related research works. Today a set of tools and methods of GSCM are employed across all industrial companies, due to many factors, such competitiveness, technological development, and the appearance of new constraints as the climate change which involve companies in setting up an action plan to protect the environment. We define (GSCM) as a set of managerial practices including the following:

- Environmental axis (impacts, issues, regulation)
- Channel relationship (attributes, suppliers, retailers, customer…)
- Coordination between each process

All these elements are further seen critical for the GSCM, including their interaction between the main activities of the supply chain. It is necessary to distinguish the difference between the two dimensions, sustainable and green, where sustainable SCM is an extension to the conventional concept of SCM by encompassing environmental, social, and ethical aspects [5].

3. Material and methods

As previously mentioned, this paper aims to give a general framework of GSCM, based on the collected research works. To achieve this purpose, initially, a comprehensive literature review is carried out; hence a literature review has proved to be a crucial step in structuring a field of research [6], followed by a qualitative approach where the theoretical model was limited to some practices and tools, as support element of the GSCM.

The selection of publications for this study was evaluated using the Web of Science and Scopus database, includes peer-reviewed journal articles and conference paper with managerial impact on the topic. For the period of search, it is chosen from 2000 to 2019. A set of search keywords is planned to effectively search for GSCM. Our methodology is summarized in figure 1 below:

![Figure 1. Structure of the research methodology.](image-url)
Furthermore, we proposed, in the next section, a conceptual model that includes a set of actions and tools to be implemented, which combines both the SCM pillars and the support elements of a green supply chain.

4. Results and discussion
Several GSCM practices are proposed in the literature covering the majority of the functions of the supply chain [7] [8]. An efficient management of supply chains is essential for the smooth running of their activities and directly affects the global performance of the supply chain [9] [10]. Efficiency poses real challenges at the level of supply chain components on the one hand, and supply chain partners on the other hand. Supply chain members are requested to move to a unified system and coordinate with each other to meet these challenges [11].

Most of the environmental practices of companies mainly characterized by initiatives focused on vehicle use, on the reduction of CO2 emissions throughout the supply chain [12] [13], and also waste recovery or waste management [14]. To build a sustainable model of supply chain management, it stays primary to focus on the sustainability of the supply chain, and introduce the new tools into the management system. It appears that practicing continuous improvement and lean management are among the best methods that allows integrating easily the environmental practices into the SCM.

The proposed conceptual model of GSCM below covers a set of practices and tools, as support elements, to be integrated into the traditional SCM. Reverse logistics is among the primary keys of the management of the green supply chain, it allows reducing, managing and eliminating waste from products and inputs. Thanks to Life Cycle Assessment (LCA), a company can measure, improve and report on the environmental performance of a product throughout its life cycle, and the supply chain at all levels (design, transport production, etc.). Also, from now on, more companies are forced to adopt the principles of sustainable development in their activities in accordance with the regulations.

![Figure 2. Theoretical model for the GSCM.](image)

5. Conclusion and perspectives
This research work presented a theoretical model of GSCM. First of all, a brief literature review is proposed summarizing a body of research on SCM and GSCM. We also highlighted the difference between the two terms: sustainable and green.

Then we proposed through a general framework, the support elements of GSCM under the shape of a theoretical model. It is about a set of tools and practices which fall within the framework of environmental respect, as well as key elements that aim to enhance the competitiveness and performance.
of the supply chain. Despite the enormous amount of research work in this field, it is clear that research opportunities remain to be developed in the future:

- There is limited knowledge of the primordial practices that should be taken into account in GSCM.
- As research on the GSCM further expands, it will be increasingly important to deal with inconsistencies, in terms of the proposed models.
- It is becoming important to establish a global and standard model of GSCM that integrates all main elements that relate both greening and management tools.

References

[1] Afolayan A, White GR and Mason-Jones R 2016 Why knowledge acquisition is important to effective supply chain management: the role of supply chain managers 'as knowledge acquisitors' British Academy of Management 2016.

[2] Rota-Franz, C. Thierry and G. Bel 2001 ‘Gestion des Flux dans les chaînes logistiques’. In Performances industrielles et gestion des flux (P. Burlat, J.P. Campagne) Hermès Traité IC2, 2001, pp 153-186.

[3] Andic, E., Yurt, O. and Baltacioglu, T. 2015 ‘Green supply chains: efforts and potential applications for the Turkish market’. Resources, Conservation and Recycling, 2012, 58, 50e68.

[4] Eng, T.-Y., 2005 ‘The influence of a firm’s cross-functional orientation on supply chain performance’. J of Supply Chain Management, 2005, 41 (4), pp.4-16.

[5] Wittstruck, D and Teuteberg F 2011 ‘Understanding the success factors of sustainable supply chain management: empirical evidence from the electrics and electronics industry Corporate Social Responsibility and Environmental Management 19 (3) pp.141-158.

[6] Easterby-Smith M, Thorpe R and Lowe A 2002 Management Research: an Introduction Sage Publications, London, 2002.

[7] Statler H and Kilger C 2000 Supply Chain Management and Advanced Planning: concepts, models, software and case studies Editions Springer Verlag.

[8] Tseng M L, Islam M S, Karia N, Fauzi F A and Afrin S 2019. A literature review on green supply chain management: Trends and future challenges. Resources, Conservation and Recycling 141 pp.145-162.

[9] Das D 2017 Development and validation of a scale for measuring Sustainable Supply Chain Management practices and performance J of Cleaner Production 164, pp.1344-1362.

[10] Foo P Y, Lee V H, Tan G W H and Ooi K B 2018 A gateway to realising sustainability performance via green supply chain management practices: A PLS–ANN approach. Expert Systems with Applications 107 pp.1-14.

[11] Kanda A and Deshmukh S G 2008 Supply chain coordination:perspectives, empirical studies and research directions Inter J of Production Economics 115(2) pp. 316- 35.

[12] Ahmed W and Sarkar B 2018 Impact of carbon emissions in a sustainable supply chain management for a second generation biofuel J of Cleaner Production 186 pp.807-820

[13] Shih-Chang Tseng and Shiu-Wan Hung 2014 A strategic decision-making model considering the social costs of carbon dioxide emissions for sustainable supply chain management J of Environmental Management 133 pp.315-22.

[14] Kucukvar M, Egilmez G and Tatari O 2016 Life cycle assessment and optimization-based decision analysis of construction waste recycling for a LEED-certified university Building Sustainability 8(1) p. 89.