Sustainable Supply Chain Management: review of triggers, challenges and conceptual framework.

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Abstract. An urgent need for organizations arises during the last nine years to incorporate social and environmental concerns into their Supply Chain. The adoption of new sustainable practices is no more a choice neither an option, it becomes one the company worries. This review aims to take a fresh look into the consideration of Sustainability in Supply Chain Management patterns for the last nine years (from 2010 to 2019) with a critical point of view. A growing awareness toward years of sustainability has contributed to the development of the new Sustainable Supply Chain (SSC) practices. The literature review provides an overview about the area of Sustainable Supply chain Management (SSCM), it also outlines practices and patterns that need to be developed, with a focus on the current issues and emphasizing on used methodologies. A timeline of relevant papers is also provided as a reference by using the rich and targeted body of researches. Moreover, a conceptual framework is proposed and the role of stakeholders is clearly defined. Finally, a summary of results and interpretations is provided, and the future research perspectives and issues are highlighted.

Keywords: Green supply chain management; literature review; social supply chain

1. Introduction
Over the last 9 years, Sustainable Supply Chain Management (SSCM) has been a major focus of business concerns. It transforms the whole value chain and consumer’s behavior. Sustainability drivers should not be considered solely emanating from organizations, it comes from each part of the global supply chain. Many companies have noticed significant changes in the economic environment. The ecosystem has become more complicated, with an intensified competition, new consumption patterns emerged and demand prediction has become more difficult and consumer’s power has raised.

Agility is the main feature of unstable and turbulent markets. The control of the supply chain is vital and necessary for the survival of the latter, in this context, implementing sustainability in companies is not easy.

One of the success keys of an overall literature review, is to formulate precise and clear questions. The purpose is to guide the reader throughout the review and inform him of what the present review might answer and what results are to be expected from it.

Q1: What is the state of art of Sustainable Supply Chains? What are their outcomes of the last ten years? How has this research area progressed?
Q2: What are triggers and challenges of a Sustainable Supply Chain Management?
Q3. What are perspectives and gaps that can orientate future research studies?

2. Material and methods
Before starting any study, it is necessary to trace the path to follow and define further steps to take. “A literature review is a systematic, explicit, and reproducible design for identifying, evaluating, and interpreting the existing body of recorded documents” [1].

The purpose of the present literature review is to bring an overview about the research subject area, summarize current reviews, identify issues and patterns, and finally to define the conceptual framework of the field.

2.1. Search scoop identification
Defining clear boundaries and delimitating the search scoop is particularly essential for a literature review [2]. In this step, papers to be selected and analyzed are delimited and criteria of our analysis is defined. Paper identification process concerns mainly literature reviews of the last 10 years ranged from 2009 to 2019. We opted for SCOPUS as a database source for our study.

A total of 171 reviews resulted from the first filter of keywords, period and paper category review using keyword strings as sustainable, supply chain, management. To narrow the field search, and to have more reliable results the engineering subject area was targeted. Thus, the number of papers was reduced to 59.

2.2. Research result analysis
2.2.1. Contributions by year. The descriptive analysis is an important section of this study. It aims to present the insights of 59 reviews in Sustainable Supply Chain objectively and accurately selected from SCOPUS database. It provides a background for the category identification and evaluation of papers. The distribution of papers within a 9-year horizon is carried out as shown in the figure 1 below.

![Figure 1. Evolution of SSCM review papers for the period ranged from 2010 to 2019.](image)

The figure 1 clearly represents the evolution of SSCM state of art papers during the last ten years. Number of publications has raised and has reached 11 until April 2019 compared to 2010, which implies that the literature papers on SSCM are still developing and growing. Recently in 2018, 14 reviews were published, it provides us with a global idea about the total number of publications that might be reached on December 2019.

3. Results and discussion
3.1. SSCM Conceptual Framework
With regard to supply chain sustainability considerations, to draw a conceptual framework is a milestone of this state of art. The inclusive methodology was detailed previously [3]. The first step towards building the theory before analyzing results, is to conceptualize the field [3], [4]. The consolidation of multiple research papers into a unified scoop leads to reviews such as [2], [5], [6]. The Figure 2
summarizes the conceptual framework of a sustainable company, triggers and challenges in an agile ecosystem [2],[5]–[13].

![Diagram of the conceptual framework of a sustainable company, triggers and challenges in an agile ecosystem.](image)

**Figure 2.** The conceptual framework of a sustainable company, triggers and challenges in an agile ecosystem.

Global supply chains are characterized by the complexity of interaction between stakeholders [14]. We find several physical flows (material), information and financial flows between the suppliers and the company and between the latter and its customers [15], [16].

This review of the literature will go through the question to see current research trends and authors who have already treated the topic focusing on the triggers of the SSCM and the challenges to overcome.

### 3.2. Sustainability aspects

#### 3.2.1. First aspect: environmentally friendly.

This is the most popular aspect. Sustainable Development is often wrongly limited to the environmental dimension. When we look to natural resources they are decreasing considerably otherwise they are unlimited and essential to our survival [17]. To ensure this mission several issues must be considered; to limit waste and foster the use of renewable energy, to protect biodiversity and maintain the variety of animal and plants, to fight climate change reduce CO2 emissions. It is true that in industrialized countries, they produce too much, consequently they pollute too much and generates too much waste. Hence waste management and recovery is an important focus [18].

#### 3.2.2. Second aspect: socially inclusive.

The social aspect is attracting more and more interest from researchers and practitioners in the business world. But what is it really about? It's about the ability to ensure the well-being of citizens. To allow everyone, regardless of their standard of living, to meet the basic needs of life in this case: food, housing, health, education, heritage culture and so on [19], fight against exclusion and discrimination especially of disabled people, elderly, minority, to limit disparities of gender equality, salary leveling, accessibility for all and foster solidarity [18] and more importantly to contribute to the well-being of everyone by promoting social cohesion.

#### 3.2.3. Third aspect: economically efficient and responsible.

The economic aspect is the one that interests the most practitioners and people in the business world. For many years, being efficient and
effective was directly related to making profit and increasing the turnover of a company, or on a larger scale contributing to the economic development of a country.

Concretely, it is a question of reconciling the viability of a project, a company or an organization with ethical principles, such as the protection of the environment and the preservation of social cohesion by developing innovative and ethical business practices and fairly distribute benefits and wealth. Other alternatives are emerging to mitigate the effects of capitalism such as the circular economy or the collaborative consumption [18].

3.3. **SSCM triggers**

The 21st century has been marked by the effects of globalization, which has spread to new forms. New practices and behaviors arise. The opening of barriers between countries has led to economic and cultural change. In such context, the evolution of society is notable, an awareness of the need for reactivity and comfort emerged. It is now the customer who has the power to influence the market.

The demand prediction is very complex, new customer requirements are set up such as the customization and originality of services and products [20], [21]. Therefore, it is necessary to arm oneself with an agile work organization and review supply chain configurations [22] as pointed out by E. Koberg & A. Longoni. As a result, the supply chain becomes an essential component that influences customers’ decisions. They are looking for multiple possibilities and more comfort during their shopping trip. Agility is not possible without investing in new technologies [20], [21]! The advent of e-commerce powered by NITCs brings productivity gains and new opportunities for customers. As a result, traditional distribution schemes are disrupted [23]. Moreover, consumer’s awareness of the importance of environment respect and corporate social responsibility is increasing.

Since pre-industrialization, the concentration of greenhouse gases in the atmosphere has increased due to human activities. The UN is sounding the alarm and the emergency to reduce CO₂ emissions. The public authorities concerned must be in line with this perspective. Hence the importance of thinking globally and acting locally, everyone at their own level. Governments, local authorities and universities are encouraged to join this approach and contribute each within their own scope of action.

3.4. **SSCM Challenges**

It is important to know the triggers for the adoption of a sustainable supply chain. But it is even more important to know the challenges facing a SSCM.

3.4.1. **Efficient SSCM.** The first challenge of SSCM is to be efficient. It inevitably involves the Quality, Cost and Delivery (QCD) and resource optimization. We can say that a SSC is efficient if it does not consider customer’s Quality by meeting its requirements, Cost control, because it is critical to any company or have high rate of Delivery Schedule Adherence. It also helps as an excellent starting point for being lean [24], and limit or eliminate wastes for all links of supply chain. However, lean management sometimes does not foster the sustainable part.

3.4.2. **Responsive SSCM.** In an agile ecosystem, it is difficult to predict demand, and to plan ahead for supplies, production and deliveries. Consumer’s behavior has changed, requiring customization and speed of service. Some organizations integrate the customer into their product design and development process. This involves a variety of products to be designed, produced and delivered. An alignment of the supply chain configuration is required. For the production part, mass-customization is a partial solution to overcome this heterogeneity [25]. The rest is the delivery part, with the problems of the last mile, in order to optimize the costs of deliveries and to be able to have a reactive and sustainable supply chain.

3.4.3. **Reliable SSCM.** A supply chain reliability is the ability to deliver perfect orders in accordance with customer expectations. It is considered as the balance of the supply chain links where information flows must be in perfect synchronization in real time to allow readjustments and facilitate decision-making. In an environment where uncertainties are managed, it is even more difficult to be sustainable and reliable at the same time. The NICTs, the Internet of Things and big data [16], are there to overcome
its constraints and help to keep the chain stable and synchronized between these different links anticipate potential upcoming issues.

3.5. Future research perspectives

In this paper, we provide an overview about SSCM research trends, and contribute to the development of upcoming literature reviews. More often, research of this field are more focused on the green or environmental side. The social dimension is not treated or rarely; only few papers focused on the social side of sustainability applied on supply chains. Interests are more oriented on the green aspect of it and a lot of research papers are produced in this sense.

Through this literature review, we were able to identify related research areas with the SSCM. The circular economy based on recovery, recycling and repair instead of producing is a research field that needs to be developed in line with sustainability of supply chains. Another interesting niches that was raised in this study is the collaborative supply chain, mutualization and Cross-channel and omnichannel logistics which can be extraordinary opportunities for companies to optimize their distribution configurations and be part of a sustainable development approach. Another research niche that jumped out at us was cobotics, where humans and robots are led to collaborate in a supply chain. Is this an opportunity to better concretize the social part of sustainable development in supply chains? Or is it a threat given that we are marginalizing the human being in the value chain?

Many other questions remain to be asked. But to sum up, supply chains still need to integrate the three aspects of sustainability, to be economically efficient, socially oriented, and environmentally friendly at the same time. This research field still needs to be developed taking into consideration an integrated vision of sustainable development.

References

[1] FINK, A 2005 Conducting Research Literature Reviews: From the Internet to Paper, 2nd edition. Thousand Oaks, London, New Delhi: SAGE Publications.
[2] Seuring S and Müller M 2008 From a literature review to a conceptual framework for sustainable supply chain management J. Clean. Prod. 16(15) pp. 1699-1710.
[3] Meredith J 1993 Theory Building through Conceptual Methods Int. J. Oper. Prod. Manag. 13(5) pp. 3-11.
[4] Weick K E 1995 What Theory is Not, Theorizing Is Adm. Sci. Q. 40(3) pp. 385-90.
[5] Martins C L and Pato M V2019 Supply chain sustainability: A tertiary literature review J. Clean. Prod.
[6] Brindley C and Oxborrow L 2014 Aligning the sustainable supply chain to green marketing needs: A case study Ind. Mark. Manag. 43(1) pp. 45-55
[7] Srivastava S K 2007 Green supply-chain management: A state-of-the-art literature review Int. J. Manag. Rev. 9(1) pp. 53-80
[8] Ahi P and Searcy C 2013 A comparative literature analysis of definitions for green and sustainable supply chain management J. Clean. Prod. 52 pp. 329-41.
[9] 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 Resour. Conserv. Recycl. 141 p. 145-62
[10] Brandenburg M, Govindan K, Sarkis J and Seuring S 2014 Quantitative models for sustainable supply chain management: Developments and directions Eur. J. Oper. Res. 233(2), pp. 299-312.
[11] Jadhav A, Orr S and Malik M 2018 The role of supply chain orientation in achieving supply chain sustainability Int. J. Prod. Econ. 217 pp.112-25.
[12] Dallasega P and Sarkis J 2018 Understanding greening supply chains: Proximity analysis can help Resources, Conservation and Recycling 139 pp.76-77.
[13] Bastas A and Liyanage K 2018 Sustainable supply chain quality management: A systematic review J. Clean. Prod. 181 pp. 726-744.
[14] Mayring P 2015 Qualitative Content Analysis: Theoretical Background and Procedures », in Approaches to Qualitative Research in Mathematics Education, Éd. Dordrecht: Springer Netherlands pp. 365- 380.

[15] Agarwal A, Shankar R 2007 and Tiwari M K Modeling agility of supply chain », Ind. Mark. Manag. 36(4) pp. 443- 457.

[16] Klötzer C and Pflaum A 2017 Toward the Development of a Maturity Model for Digitalization within the Manufacturing Industry’s Supply Chain Hawaii Int. Conf. Syst. Sci. 2017 At: Hilton Waikoloa Village, HI, USA 50.

[17] Redclift M 1987 Sustainable development: Exploring contradictions. Routledge.

[18] Giddings B, Hopwood B and O’Brien G 2002 Environment, economy and society: fitting them together into sustainable development Sustain. Dev. 10(4) pp. 187- 196.

[19] Eltantawy R A, Fox G L and Giunipero L 2009 Supply management ethical responsibility: reputation and performance impacts Supply Chain Manag. Int. J.

[20] Christopher M 2000 The Agile Supply Chain: Competing in Volatile Markets Ind. Mark. Manag. 29(1) pp. 37- 44.

[21] Christopher M and Towill D 2001 An integrated model for the design of agile supply chains Int. J. Phys. Distrib. Logist. Manag. 31(4) pp. 235- 246.

[22] Koberg E and Longoni A 2019 A systematic review of sustainable supply chain management in global supply chains J. Clean. Prod. 207 pp. 1084- 1098.

[23] Croom S 2001 Restructuring supply chains through information channel innovation Int. J. Oper. Prod. Manag. 21(4) pp.504-15

[24] Garza-Reyes J A 2015 Lean and green – a systematic review of the state of the art literature J. Clean. Prod. 102 pp. 18- 29.

[25] Dubey R, Gunasekaran A and Childe S J 2015 The design of a responsive sustainable supply chain network under uncertainty Int. J. Adv. Manuf. Technol. 80(1), pp. 427- 445.

[26] Wu K J, Liao C J, Tseng M L, Lim M K, Hu J and Tan K 2017 Toward sustainability: using big data to explore the decisive attributes of supply chain risks and uncertainties J. Clean. Prod. 142 p. 663- 676.