

# Sustainability in supply chain management - a literature review<sup>1</sup>

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## Abstract

**Purpose of the paper:** This paper aims to identify the main features of sustainability in supply chain management studies.

**Methodology:** A systematic literature review was conducted, taking 41 papers published from 2007 to 2014 into account.

**Findings:** 41 articles coherent with the research question were identified, with the key issues being highlighted for each one. A fundamental aspect investigated in the literature on sustainability in supply chain management was the performance that concerned all members along the supply chain in a collaborative approach.

**Research limits:** This study could be further explored through a deeper empirical analysis of sustainability in supply chain management.

**Practical implications:** Both academics and practitioners may find this literature review useful, as it highlights the main features of sustainability in supply chain management studies. Of particular importance is the performance measurement of sustainability, which has positive feedback on business performance, and its ability to create competitive advantage.

**Originality of the paper:** A great number of interesting topics related to sustainability in supply chain management have arisen and are worth deepening. These can be profitably extended by academics and developed in various application areas of managerial interest.

*Key words:* sustainability; sustainable supply chain management; systematic literature review

## 1. Introduction

For about twenty years greater attention has been given to sustainability as an essential condition for the long-term profitability and competitiveness of a firm (Carter and Rogers, 2008). This major awareness frequently derives from internal and external pressures, such as legislative factors, various stakeholder actions and pressures (Wolf, 2014; Winter and Knemeyer, 2013). On one hand, sustainability has become a challenging issue because it recalls not only economic aspects, but also environmental and social considerations that the organizational behavior should follow. On the other hand, it is recognized by global organizations as a strategic goal (Closs *et al.*, 2011; Siegel, 2009).

<sup>1</sup> This paper originates from the commitment of all co-Authors. However, sections 1, 6 can be attributed to Enrico Massaroni; sections 3.1 e 3.4 to Alessandra Cozzolino; sections 2, 3.2, 3.3, 3.5, 3.6, 4.1, 4.2, 5 to Ewa Wankowicz.

The commonly known definition of sustainable development, proposed in 1987 by the World Commission on Environment and Development, entails considering the possibilities of future generations while satisfying the needs of the present ones. This approach requires the combination of attentive decision making processes and raising awareness to issues of collective importance (Golinelli and Volpe, 2012, p. 4). This vision assigns clear responsibility to corporations, namely to combine the embedded social and environmental goal in their activities. This universally acknowledged definition of sustainable development requires the widespread consideration of different and frequently contradictory interests.

Seeing the problem of sustainable development in this perspective, interconnections with the stakeholder theory come out rather spontaneously, since it is considered to be a key pillar in studies on sustainability (Ehrgott *et al.*, 2011). According to that theory “*organizations should not only fulfil the wants and expectations of their stakeholders, but also avoid actions that reduce the ability of the interested parties, including the future generations, to meet their needs*” (Garvare and Johansson, 2010, p. 741). A stakeholder is someone who “*can affect the achievement of an organization’s objectives or who is affected by the achievement of an organization’s objectives*” (Freeman and Reed, 1983, p. 91). Stakeholders along the supply chain are multiple and include the customers, the third party logistics providers, the manufacturers, the suppliers and vendors, who refer both inside and outside the organization (Searcy, 2012). Their role is the basis for long-term prosperity and the survival of the organizations (Ehrgott *et al.*, 2011) but, at the same time, the requirement to go beyond the firm’s financial performance (Freeman, 2010; Ehrgott *et al.*, 2013).

Sustainability is a multidimensional construct that enlarges the economic bottom line concept, which focuses on the efficient use of resources and on achieving a return on investments, by adding social considerations and promoting greater ecological responsibility (Elkington, 1997). Given that each company is part of a wider network and is not an island in today’s business world (Ford *et al.*, 2003), there is a great importance in relationship management that requires acting beyond company boundaries. Recently, the way of gaining a competitive advantage has modified the structure of the competition, so that competition between companies has turned into inter-supply chain competition (Hult *et al.*, 2007; Christopher, 2005; Gold *et al.*, 2010).

Now it is the supply chain that assumes an important role in promoting sustainability (Linton *et al.*, 2007; Carter and Rogers, 2008). The biggest challenge for an individual producer in today’s world of interconnected supply chains is to ensure sustainability penetration in multiple layers of the supply chain (Schoenherr *et al.*, 2012) and to develop strategies to improve environmental and socio-ethical performance all along the supply chain (Vermeulen and Seuring, 2009).

*Therefore, the aim of this paper is to identify the main features of sustainability in supply chain management.* The paper is organized as follows. First, we give a brief overview of sustainable supply chain

management. In the third paragraph, we describe the systematic literature review approach used throughout this study. The fourth part aims to report our findings using a qualitative description, the fifth presents a discussion and the last one includes the conclusions.

## 2. Sustainable Supply Chain Management

Supply chain management implies the involvement of different actors in value creation, to encourage the establishment of relationships that are an important element for competing in a changing and turbulent environment (Greenhalgh, 2001). It is vital to incorporate environmental and social management practices into the whole supply chain in order to maintain a competitive advantage (Rao and Holt, 2005).

In the following table we present a few definitions of sustainable supply chain management. The choice to include precisely these definitions in order to better explain the reference field derives from the intention of the authors to introduce an evolution of sustainable supply chain management over time. It can indeed be seen that it has changed from the simple but still valid definition of Svensson (2007), who focused only on the need to highlight the substantial aspects of sustainability in supply chain management. It then passed through the most frequently cited definitions until those of Carter and Rogers (2008), Seuring and Muller (2008), who gave emphasis respectively to the economic aspects and the cooperation between enterprises. A true giant step in the sustainable supply chain was, however, accomplished by Ahi and Searcy (2013), who clearly explained the aspect of voluntariness of enterprise in achieving sustainability. Moreover, these authors highlight how supply chain coordination in sustainable supply chains can be a good starting point, as well as the requirement for ensuring short- and long-term profitability, competitiveness and resilience.

As it may seem quite intuitive, a supply chain is managed in a sustainable way when “*all the three dimensions of sustainability, namely the economic, environmental, and social ones, are taken into account*” (Ciliberti *et al.*, 2008, p. 1580). When the social aspect is lacking, we deal with green supply chain management or ecoefficiency. The first is equivalent to considering “*environmental dimensions in a supply chain context*” (Wu and Pagell, 2011, p. 578) through “*stronger focus on ecological and sociological aspects when making managerial decisions*” (Kumar *et al.*, 2012 p. 1278). Ecoefficiency “*combines the environmental and economic dimensions of sustainability*” (Rossi *et al.*, 2013, p. 585). Although sustainable supply chain management is an extension of green supply chain management, which is characterized by more complexity (Ahi and Searcy, 2013), by analyzing the literature it can be seen that the environmental management of the supply chain that produces a green supply chain is much more frequently examined by both academia and professionals.

Tab. 1: Sustainable Supply Chain Management definitions

Authors	Definition of sustainable supply chain management
(Svensson, 2007) p. 264	“The sustainable management of a supply chain requires a broader vision and must highlight the economic, environmental and social aspects of business practice”
(Carter and Rogers, 2008) p. 368	“The strategic, transparent integration and achievement of an organization’s social, environmental and economic goals in the systemic coordination of key inter-organizational business processes for improving the long-term economic performance of the individual and its supply chain”
(Seuring and Muller, 2008) p. 1700	“Sustainable supply chain management as the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements”
(Pagell and Wu, 2009) p. 38	“A sustainable supply chain is then one that performs well on both traditional measures of profit and loss as well as on an expanded conceptualization of performance that includes social and natural dimensions”; “If a sustainable chain is one that performs well on all elements of the triple bottom line, sustainable supply chain management is then the specific managerial actions that are taken to make the supply chain more sustainable with an end goal of creating a truly sustainable chain”.
(Ahi and Searcy, 2013) p. 39	“The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term.”
(Hassini <i>et al.</i> , 2012) p. 70	“The management of supply chain operations, resources, information, and funds in order to maximize the supply chain profitability while at the same time minimizing the environmental impacts and maximizing the social well-being”

Source: authors

### 3. Methodology

#### 3.1 Systematic literature review

In this study we adopted a systematic literature review approach. Firstly, we consider this method as being suitable for research purposes, because a systematic review, as a methodologically rigorous exercise, permits assessment of the findings of previous related research and then a synthesis of the results (Denyer and Tranfield, 2009).

In fact, Fink (2010, p. 3) defines a literature review as a “*systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners*”.

Secondly, a systematic review of existing published science in management studies can develop knowledge that managers and practitioners can use to design solutions to problems in their area (Denyer *et al.*, 2008). This paper presents a systematic literature review according to the steps proposed by Denyer and Tranfield (2009).

They developed a systematic review process that includes the following five steps: question formulation, locating studies, study selection and evaluation, analysis and synthesis, reporting and using the results. The next paragraphs describe how systematic review steps were applied to our research.

### 3.2 Question formulation

The research question developed was the following: What are the main research features in sustainable supply chain management studies?

### 3.3 Locating studies

This phase is related to choosing the search engine and search strings. The following data sources were chosen: EbscoHost Web and then Business source Premier, EconLit and Green File databases.

The preliminary research was conducted by combining Boolean logic operators with parenthesis: “supply chain management” AND “sustainab\*”. This preliminary search of the database yielded hundreds of articles, more precisely 463 papers. Given the multilayered composition of both terms and the need to consider all their aspects, the decision was taken to refine the search strings without losing significance.

Therefore the second phase consisted in putting attention on the search string “sustainab\* supply chain management”, that embraced sustainability and supply chain management issues in one concept. This second refined search produced 94 study papers. After a second search phase, it was observed that the search string appeared for the first time in the year 2003. To assure a wide range of articles, it was decided to analyze a period of time from 2003 to 2014 focusing on peer reviewed journals.

Table 2 shows articles identified after the second search phase with additional elements, such as the name of the journal and its year of publication<sup>2</sup>.

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<sup>2</sup> The complete list of articles, in a form of an appendix, is available upon request since it can't be reported here due to space limits.

*Tab. 2 Distribution of papers related to sustainable supply chain management by journal and year*

Journal/Year 20-	03	04	05	06	07	08	09	10	11	12	13	14
International Journal of Production Economics						84				37, 38, 39, 90		1, 2
International Journal of Operations & Production Management								62				3, 4, 5
International Journal of Production Research					94					46	23	6
Journal of Supply Chain Management						77, 9	69, 72,	63, 66, 67			28, 29	7
IUP Journal of Supply Chain Management									47			
Journal of Cleaner Production						75, 76,		59			19, 21, 24, 25	8
European Journal of Operational Research												9
Cornell Hospitality Quarterly												10
Journal of Business Ethics							68		53		17	11
Industrial Marketing Management										44		12
International Journal of Productivity & Performance Management											13, 14	
International Review of Retail, Distribution & Consumer Research											15	
Computers & Operations Research											16	
International Business Review											18	
Supply Chain Management					93	79, 82	73			41, 42, 48		20
Corporate Social Responsibility & Environmental Management				91		83		60		43	22	
Bulletin of Indonesian Economic Studies											26	
Journal of Environmental Planning & Management											27	
Decision Support Systems											30	
Gestion 2000											31, 32	
International Journal of Physical Distribution & Logistics Management						78		65	56	45	33	
Journal of Purchasing & Supply Management										34		
Business Strategy & the Environment		90				74, 8			51	35		
Ecological Economics									54	36		
Supply Chain Forum: an International Journal									40			
IIMB Management Review									49, 50			



- (3) International Journal of Production Research (Taylor & Francis - IF 1.460)
- (4) Journal of Supply Chain Management (Wiley - IF 3.32)
- (5) Journal of Cleaner Production (Elsevier - IF 3.398),
- (6) European Journal of Operational Research (Elsevier - IF 2.038),
- (7) Supply Chain Management: An International Journal (Emerald - IF 1.684),
- (8) International Journal of Physical Distribution & Logistics Management (Emerald - IF 1.826),
- (9) Journal of Purchasing & Supply Management (Elsevier - IF 1.458),
- (10) Journal of Operations Management (Elsevier - IF 4.4),

The articles were examined to ensure that their contents were relevant to the aim of this article and, from the initial sample, 42 were identified as being relevant to the theme of sustainable supply chain management.

### 3.5 Analysis and synthesis

Each paper included in the research set was analyzed in order to find features of sustainability in supply chain management. The purpose was to identify, and if possible classify, the emerging, existing and more frequently present constructs around the characteristics of sustainable supply chain management. The initial analysis was based on extracting both the keyword delivered by the authors of each paper and the subjects delivered by Ebsco (Appendix 1).

From a quantitative point of view, a general trend of growth in the number of publications on sustainable supply chain management in recent years was observed. 60 % of the articles had been written during the last two years. This trend may explain the importance of sustainability in supply chains that was shared by researchers and professionals. A commonly accepted vision of sustainable supply chain features is, however, still missing. A commonly agreed approach to sustainable supply chain management requires the simultaneous respect of three aspects. Nevertheless, a small number of researchers consider sustainable management of the supply chain as a synonym of green supply chain (Subrata and Partha, 2014).

Sustainable supply chain management issues are implemented in a global scenario, in different continents (Europe, Asia, South America, Australia), countries such as Brazil (Delai and Takahashi, 2013), Malaysia (Zailani *et al.*, 2012), China (Geldermann *et al.*, 2007; Park *et al.*, 2011), England (Preuss, 2009), through public and private small, medium (Ayuso *et al.*, 2013) and large companies, in various sectors (food: Beske *et al.*, 2014; Validi *et al.*, 2014; Pullman and Dillard, 2011, automotive, tourism (Sigala, 2008), banking services (Keating *et al.*, 2008), shipper-logistics services (Kudla and Klaas-Wissing, 2012; Wolf and Seuring, 2011). It seems that due to increased communication and awareness towards sustainability issues, it is becoming a cross cultural and sectorial phenomenon.



### 3.6 Reporting and using this paper

This paper is a result of literature reviews on sustainability in supply chain management. We have highlighted how this research topic was addressed in studies of productions and operations management, and logistics and supply chain management. The remainder of this paper is dedicated to reporting the results in terms of main research features in sustainable supply chain management studies.

## 4. Findings

The results highlighting the dimensions of sustainability in supply chain management are presented in paragraph 4.1. The analysis of keywords and subjects is presented in paragraph 4.2.

### 4.1 Dimensions of sustainability in supply chain management

In order to give some conceptual bases of sustainable supply chain management beyond definitions, insights into existing literature reviews were made. Having analyzed previously conducted literature reviews on sustainable supply chain management, it is noticeable that dimensions of sustainability are not described equivalently. While researchers are becoming more aware of the complexity of sustainability in supply chain management and do not treat green aspects and sustainability issues interchangeably anymore, more attention should be given to a holistic view of sustainability in supply chain management. Carter and Rogers (2008) point out that pursuing the three components of the triple bottom line strategically and contemporarily achieves a higher economic performance. At the same time, they state that any environmental or social initiative should be undertaken if aligned with economic goals to identify those activities which are able to improve economic performance and to eliminate those that do not fall inside the intersection of dimensions (Carter and Easton, 2011). Sustainability in supply chain vision implies the need for each member to fulfil social and environmental criteria (Seuring and Muller, 2008). Branderburg *et al.*, (2014), in the analysis of a quantitative model for sustainable supply chain management, confirm the need to look further into social aspects to prevent them from becoming limitedly relevant.

Sustainability is a multidimensional and bi-level construct; it refers both to organizations and countries. The economic dimension is the easiest to measure and describe due to its quantitative nature. It refers to costs, profitability, revenues and returns on investments. At a macroeconomic level it regards gross domestic product, labor productivity or import dependency (Branderburg *et al.*, 2014).

Carter and Rogers (2008) explicitly mention economic dimension as a sine qua non for any environmental and social initiative.

The social dimension can be related to social well-being (Hassini *et al.*, 2012) both at micro and macro levels. The first deals with the treatment of labor force, customers and sourcing practices, while the second evaluates the

social impact of these practices on communities. Labor force management can be extended in the following aspects: wages, employment gender ratios, working conditions, investments in human capital and child labor (Carter and Rogers, 2008, Branderburg *et al.*, 2014, Beske *et al.*, 2014). Hassini *et al.*, (2012) summarized that socially responsible organizations engage only in labor practices that are considered ethical.

Sourcing practices deal with socially responsible purchasing (Ashby *et al.*, 2012) in the broader vision of a firm that entails supplier collaboration in terms of compliance for sustainability development or its improvement, such as the SA8000 certification (Pagell and Wu, 2009). Unemployment reduction, and the prevention of social exclusion are the expressions of social sustainability at a national level. Social practices are few in literature and are mentioned in relation to certification (e.g. fair-trade) (Ashby *et al.*, 2012).

Environmental sustainability embraces environmental responsibility and environmentally friendly technologies (Winter and Knemeyer, 2013). Environmentally friendly practices include reduced packaging, fuel efficient transportation (Carter and Rogers, 2008), efficiently and environmentally friendly material sources, low carbon emission, energy efficient machines (Hassini *et al.*, 2012), green transport practices (Abbasi and Nilsson, 2012), renewable energy sources, water and energy consumption, waste management, and pollution (Branderburg *et al.*, 2014). Environmentally sustainable supply chains refuse any practice that uses toxic substances in product manufacturing (Hassini *et al.*, 2012) or which increases deforestation (Beske *et al.*, 2014). Ashby *et al.*, in 2012, classified environmental practices into reactive, for example pollution control, and proactive, which includes recycling or reuse.

Environmentally responsible managers of sustainable supply chains should work to close the loops, creating a reverse chain that implies efficient end-of-life product management, product reuse, product recovery, reverse logistics, and closed-loop supply chains. (Pagell and Wu, 2009; Ahi and Searcy, 2013). The role of suppliers is crucial for sustainable development, because they are required to undertake environmental programs proposed by the focal companies in order to uniform their practices to the standards of the industry in which they operate (Carter and Rogers, 2008, Pagell and Wu, 2009). Certification like ISO 40001 is strongly related to the firm's engagement in environmentally friendly practices (Hassini *et al.*, 2012). The great difficulty in evaluating sustainability dimensions is how to measure the effects of supply chain activities (Abbasi and Nilsson, 2012). While the materiality of economic dimension facilitates the measurement to a certain extent, the remaining aspects of sustainability become complex. Researchers are aware of the need to develop "*scales to measure the triple bottom line*" (Carter and Rogers, 2008, p. 377) and the impact of the improved activities on economic performance "*without getting lost in detailed accounting*" (Winter and Knemeyer, 2013, p. 35). Environmental management systems can make available measures for environmental performance (Seuring and Muller 2008; Ashby *et al.*, 2012), but there is a need for expanded criteria to "*integrate [both] environmental and especially social aspects*" (Branderburg *et al.*, 2014, p. 309).

## 4.2 Results from keyword analysis

Having explored the word frequency analysis, it appears that the three most frequently used words are: environmental (56), sustainability (46 times), and performance (22). In order to promote some new approaches toward sustainability in supply chain management, we analyzed the third term, since we considered that focusing on the first or the second word could be redundant. Table 3 presents different ways of finding the word performance in articles, considering its presence in titles, keywords and objects.

Tab. 3: Different approaches to the word Performance

N°	Title	Keyword/object
2	Performance	-
3	-	Key performance indicator
6	Performance	-
9	Performance	Firm performance, organizational performance
19	Performance	Performance management, performance evaluation
21	-	Organizational performance
28	Performance	Firm performance, organizational performance
29	Performance	Environmental performance, financial performance
37	Metrics	Key performance indicator, Performance management, performance evaluation
56	-	Economic performance
82	-	Performance management

Source: authors

Sustainability in supply chain management is still in its infancy as a new paradigm (Carter and Easton, 2011), thus creating some difficulties in measuring what is still not fully known. Ahi and Searcy (2013) in their recent literature analysis of sustainable/green supply chain management pointed out that only two previously given definitions included performance characteristics. Different types of performance that could be generally evaluated and managed in firms or organizations are assessed on an economic, environmental or financial basis. Other dimensions for measuring firm performance can space from environmental to operational, organizational, marketing and competitive (Subrata and Partha, 2014). These authors use green supply chain management and sustainable supply chain management as a synonym, thus considering environmental sustainability. Environmental sustainability is positively and indirectly related to competitiveness and firm performance (Subrata and Partha, 2014). Meeting environmental goals efficiently leads to important sustainability performance improvement, if managed “*thoroughly and strategically*” (Blome *et al.*, 2014, p. 657).

The environmental performance “*measure evaluates the extent to which firms reduce their environmental impact through a reduction in hazardous materials, resource consumption, greenhouse gas emission, waste disposal and waste water drainage*” (Wong, 2013, p. 125). The financial performance deriving from environmentally friendly products is measured by standard metrics, such as returns on investment, market share growth, profit growth and profit growth rate (Wong, 2013). Both environmental and financial

performance are based on the organizational capabilities of environmental management (Wong, 2013).

Due to this expansion of the supply chain in a global scenario, the management of each stage is subject to changes that imply high dynamism (Beske, 2012). Additionally, there are even more unpredictable changes for organizations chasing sustainability goals (Beske, 2012). For sustainable supply chains that are often located in dynamic environments, dynamic capabilities such as knowledge assessment, supply chain partner development or coevolving can lead to an improved supply chain performance in all dimensions of sustainability. Once the environmental and social knowledge is integrated in daily supply chain management practices, it can become difficult for competitors to imitate, thus it is considered as a source of competitive advantage (Carter and Rogers, 2008).

The social dimension has been addressed less than the environmental dimension, although it is receiving the attention of companies through the publishing of corporate social responsibility reports (Subrata and Partha, 2014). The measure for the social performance of sustainability in supply chain management that can be related to the “human” focused nature of this field is, however, still lacking (Ashby *et al.*, 2012, p. 509).

Performance management regards effective and efficient supply chain management through a major focus on improving profitability, competitiveness and resilience of the organization over short and long term (Ahi and Searcy, 2013).

Hassini *et al.* (2012) proposed a framework for sustainable supply chain metrics that involves each supply chain partner from the supplier to the customer, the manufacturer, the distributor and the retailer, and measures their performance in the three dimensions: economy, environment and society. There were few endeavors made towards social sustainability performance measurement in supply chain management. Hassini *et al.*, (2012) included that dimension in their own composite indicator, where social aspects refer to “*social well-being and the way in which the supply chain treats its employees, customers and the community*” (Hassini *et al.*, 2012, p. 71). Govindan *et al.* (2013) summarized the supplier selection criteria in Tbl vision, separating internal social criteria that refer to employment compensation, human resources, and health and safety committees at work, from external social criteria regarding the relationship with local communities and suppliers, customers, local communities, and NGOs.

In the perspective of overall supply chain performance improvement, all members should embed sustainable practices in their activities. Sustainability management in the supply chain has shifted from being not only internal and an individual business responsibility but to being external and a supply chain partner responsibility as well (Wong, 2013). The involvement of all actors in the supply chain gives an opportunity to improve environmental performance and to innovate products (Wong, 2013). At the same time, “*environmental aspects have entered the class of order qualifiers*” in services, too (Wolf and Seuring, 2011, p. 95).

A dispersion of operational processes calls for an increased focus

on supply chain performance, which depends on the performance of each member, so that the selection and evaluation of a supplier becomes essential (Seuring, 2008; Hassini *et al.*, 2012, Asby *et al.*, 2012). Selecting a supplier on sustainability criteria seems to be an influential decision-making process that enriches standard selection measures such as cost, quality and delivery. This process should therefore be aligned with sustainability criteria in order to measure the sustainability performance of each supplier. The aims of selecting a supplier on environmental and social criteria is to benchmark, to improve their performance and to reduce negative impacts (Govindan *et al.*, 2013, p. 353). The choices related, for example, to supplier selection can impact environmental and social performance (Carter and Easton, 2011).

The considerations of the supplier in the sustainable supply chain are at least twofold. On one hand, he is frequently asked to unify his practices to the standards in the supply chain in which he operates by adopting sustainable practices.

On the other hand, his role becomes crucial when directly involved in the initial phase of product life, such as design or product development. From this point of view, supplier collaboration (with product design and logistics) for environmental sustainability reveals itself to be a key success factor for firm performance (Subrata and Partha, 2014). The role of the supplier is based on facilitating the introduction of green practices and reveals itself to be an important stakeholder with a decisive impact on firm operations (Zhang *et al.*, 2014). Supplier development through proactive engagement and communication can give visibility into upstream and downstream supply chain operations (Carter and Easton, 2011). Furthermore, supplier involvement along the upstream supply chain can enhance firm performance and become the source of competitive advantage (Golicic and Smith, 2013). Involving suppliers in the development of environmental practices is the “*best tie to profitability metrics*” (Golicic and Smith, 2013, p. 88).

## 5. Discussion

This paper, as well as previous ones, confirm that sustainability in supply chain management is still an evolving and developing field. The innovativeness of this emerging trend causes difficulties in performance measurement, hence only what is really known and understood can be evaluated. Implementing performance measures that embrace various supply chain actors as well as various sustainability dimensions includes a number of emerging challenges, at least in terms of contents for adoption of the performance measurements (6), collaboration with players along the supply chain (6, 3, 29, 37, 82), links with firm performance and competitive advantage (6, 28, 21), supplier criteria selection (9), supplier collaboration and alignment (21, 29, 25, 82), stakeholders and standards (37), intersection among environmental and/or social performances, and economic performance (56). Collaboration as a standalone theme assumes that individual effort is not involved, therefore it is collective effort that achieves common interests. Collaboration with supply chain partners through partnership and joint initiatives is an opportunity to meet the increasing requirements of stakeholders, but simultaneously may improve efficiency

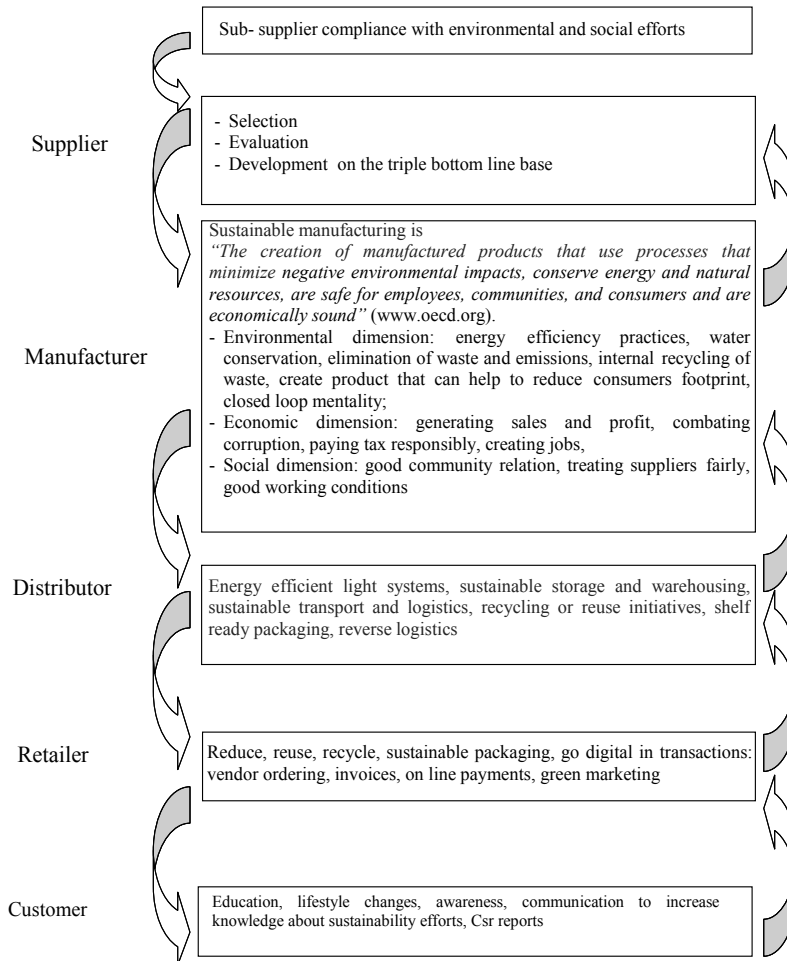
along the supply chain (Blome *et al.*, 2014). Collaboration capacity, which is a multidimensional organizational construct, is essential in buyer supplier relationships that can generate a competitive advantage based on sustainability (Van Hoof and Thiell 2014). In order to facilitate supply chain partner collaborations, firms can use environmental information integration (EII) as an instrument for coordinating environmental practices (Wong, 2013). Efficient management of environmental issues using (EII) facilitates environmental sustainability in operations (Wong, 2013). EII supports internal, supplier and customer processes to achieve the environmental goal (Wong, 2013). In particular supplier EII enables “*supply chain partners to align their environmental objectives while collaboratively engaging in environmental practices to reduce their adverse environmental impact*” (Wong, 2013, p. 117) through participation in the initial phase of product creation, and sharing information on environmental performance along the supply chain.

Some companies already measure the impact of their activities through life cycle analysis for example, which embraces only environmental aspects and not social ones (Pagell and Wu, 2009). The initiatives of supplier, environmental and social collaboration “*can play a significant role in achieving the “triple bottom line” benefits*” (Govindan *et al.*, 2013, p. 352) and contribute to the sustainable development of the society. Sustainability along the whole supply chain can be guaranteed if a collaborative approach is achieved (Blome *et al.*, 2014) between upstream and downstream. The “*improvement of resource consumption from environmental perspective*” (Blome *et al.*, 2014, p. 640) requires collaboration based on reciprocity and co-alignment (Blome *et al.*, 2014). Collaboration from both the supply side and the demand side also implies internal sustainability practices (Blome *et al.*, 2014). In fact, the “*responsibility for sustainability cannot be given to a separate entity within the organization; it must be part of everyone’s job, starting with top management*” (Pagell and Wu, 2009, p. 39). Collaboration gives supply chain partners the opportunity to share and transfer sustainability knowledge (Blome *et al.*, 2014). Sustainability collaboration means devoting specific resources for joint activities to address sustainability issues (Blome *et al.*, 2014, p. 644).

The social aspects appear through the following terms: social responsibility of business (20, 48, 56, 79), corporate social responsibility (20, 66, 79) and social sustainability (41). These terms do not strictly consider the problems of performance measurement, but their major presence and importance can confirm the necessity of creating indicators of social sustainability in a quantitative and more approachable way. Figure 1 presents the possible actions that can be undertaken by every member of the supply chain for sustainability achievement. Even though it is not exhaustive, it could constitute a good starting point in managing supply chains in a sustainable way. The most relevant aspects are: first, all actors contribute actively in this process, and second, there is a compelling need for collaboration, particularly when it comes to dealing with bidirectional relationships and processes from not only upstream to downstream, but from downstream to upstream as well.

Fig. 1: Initiatives for sustainability in supply chain management

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Sustainability in supply  
chain management –  
a literature review



Source: authors

The growing number of articles, conferences, special issues and calls for paper in sustainable supply chain management can be an indicator of its importance both to academia and practitioners. Even if sustainable supply chain management is mainly approached by case-based research (Seuring, 2008; Ashby *et al.*, 2012), which could be reasonable given the innovativeness of the field (Yin, 2003), there should be more rigor in conducting research. At the same time, modeling-based research "needs to be completed to more fully understand and integrate SSCM into business thought and practice" (Branderburg *et al.*, 2014, p. 310).

## 6. Conclusions

The implications arising from this research affect a wide range of current features in sustainable supply chain management, from which strategic and operative directions to compete can be derived in a managerial perspective, and further research can be developed in an academic perspective.

The contribution of this paper is to identify what are the main research features in sustainable supply chain management studies. The current analysis is valuable for academia and professionals. The first may find it useful because it provides theoretic insight into sustainable supply chain management and gives its possible explanation considering multidimensionality and complexity.

The contribution of this research to the sustainable supply chain management body of knowledge is expressed by describing features of sustainability in the supply chain and highlighting themes of performance evaluation and collaboration.

The second may appreciate it mainly in different decision making processes that should be designed while keeping in mind the sustainability requirements. Therefore it supports practitioners during management processes related, for example, to supplier selection and supplier evaluation in order to choose business partners with superior competitive capabilities. This research shows the essentiality of supplier performance management on an extended evaluation basis that goes beyond traditional metrics. Simultaneously, it emphasizes the role of collaboration for sustainability as a relevant factor in achieving truly sustainable supply chains.

Companies have become aware of the sustainability of their businesses and supply chains: being more environmentally, societally and economically responsible may also give the potential to gain better firm performance and improve the competitive advantage. Our research suggests that to obtain these results, companies have to go towards the implementation of supply chain performance measures that embrace collaboration among various actors in a systemic approach. That emerges as a burning topic in the literature review in this paper.

This research has certain limitations that can be addressed in future papers. Further research should strive to extend the analysis to a more comprehensive coverage of the field of production and operations management, and logistics and supply chain management, so it could be possible to go further and select more key words that would allow for the literature review to adequately represent the range of key topics in the field in a broader way.

The present paper is theoretical in its nature so it might also be valuable to conduct an empirical investigation in order to collect evidence from companies about sustainable supply chain management and its performances.

Moreover, it could be possible to investigate and benchmark how companies in different sectors manage the topic of sustainability in the supply chain.



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#### Appendix 1

References	Keywords	Subject (Ebcso)
Validi <i>et al.</i> (2014)	Food supply chain distribution Dairy market case analysis Sustainable distribution routes Multi-objective approach Scenario analysis	Not listed
Beske <i>et al.</i> (2014)	Sustainable Supply Chain Management Dynamic Capabilities Food industry Literature review	Not listed
Fabbe-Costes <i>et al.</i> (2014)	Empirical, Environmental scanning, Environmental scanning scope, Qualitative research, Supply chain management, Sustainable development	*SUPPLY chain management *RESEARCH *SUSTAINABLE development *ENVIRONMENTAL management *FOCUS groups *ORGANIZATIONAL behavior
Roehrich <i>et al.</i> (2014)	Bounded rationality Decision making Multiple case studies Reputational risk Risk management	*CORPORATE image *RESEARCH *SUPPLY chain management *REPUTATIONAL risk *DECISION making REPUTATION (Sociology)
Van Hoof and Thiel (2014)	Collaboration capacity, Implementation of cleaner production, Sustainable supply chain management, Cleaner production in small and medium sized enterprises	*SUSTAINABLE development *SUPPLY chain management *SMALL business *BUSINESS enterprises *EMPIRICAL research *BUSINESS models MEXICO

Chong (2013)	Production modelling Quality management Strategy optimisation Supply chain dynamics Sustainable manufacturing	MANUFACTURING processes *SUPPLY chains SUSTAINABLE development *QUALITY of products *QUALITY of service *PROBABILITY theory *REVERSE logistics *DECISION support systems *SUPPLY chain management *FLOW charts *SIMULATION methods & models CLOSED loop systems
Delai and Takahashi (2013)	Corporate sustainability; Retail; Sustainability practices; Brazil; Sustainable consumption and production; Emerging markets; Sustainability report	*EMERGING markets *SUSTAINABLE development *RETAIL industry BRAZILIANS QUALITY of life NATURAL resources
Wong (2013)	Dynamic capabilities Environmental management Environmental performance Environmental sustainability Financial performance Information integration Sustainable supply chain management	ENVIRONMENTAL management *SUPPLY chains *CORPORATE environmentalism *FINANCIAL performance *ENVIRONMENTAL protection SUSTAINABILITY ACQUISITION of data
Golicic and Smith (2013)	Environmental sustainability Firm performance Meta-analysis Supply chain management	*SUPPLY chain management *ORGANIZATIONAL performance *SUPPLY chains META-analysis*SUSTAINABILITY OPERATIONAL definitions
Govindan <i>et al.</i> , (2013)	Environmental sustainability Firm performance Meta-analysis Supply chain management SUPPLY chain management	*ORGANIZATIONAL performance *SUPPLY chains META-analysis SUSTAINABILITY*OPERATIONAL definitions
Ahi and Searcy (2013)	Sustainable supply chain management (SSCM) Green supply chain management (GSCM) Definitions Sustainability Supply chain management (SCM)	*SUPPLY chain management *CLEAN energy industries *ORGANIZATIONAL performance *STAKEHOLDERS *BUSINESS development SUSTAINABLE development reporting COMPARATIVE studies
Ayuso <i>et al.</i> , (2013)	Corporate social responsibility Small to medium-sized enterprises; Spain;Supply chain management Sustainable supply chain management	*SOCIAL responsibility of business *RESEARCH *SUPPLY chain management *SMALL business *SUPPLY chains ENVIRONMENTAL standards
Winter and Knemeyer, (2013)	Literature review Supply chain management Sustainability Sustainable development Triple bottom line	*SUPPLY chain management *ENVIRONMENTAL management *INDUSTRIAL management *MANUFACTURING processes *LOGISTICS LITERATURE reviews SUSTAINABLE development reporting
Blome <i>et al.</i> , (2014)	Buyer-supplier relationships Learning Profile deviation Supply chain management Survey Sustainability Sustainable supply chain management	*SUPPLY chain management *RESEARCH *MANUFACTURING industries *SUSTAINABLE development *KEY performance indicators (Management) *SUPPLIERS *CUSTOMER services

Brandenburg <i>et al.</i> , (2014)	Literature review, OR in environment and climate change, OR in societal problem analysis, OR in sustainability, Supply chain management, Sustainability	*SUPPLY chain management *SUSTAINABLE development *QUANTITATIVE research *ECONOMIC models *EMPIRICAL research COMPARATIVE studies
Subrata and Partha (2014)	Environmental sustainability; Green supply chain management; Survey; India; Factor analysis; Structural equation modelling	*SUPPLY chains *RESEARCH *SUPPLY chain management *BUSINESS enterprises FACTOR analysis INDIA *STRUCTURAL equation modeling SURVEYS - India
Abbasi and Nilsson (2012)	Environment;Logistics;Research Supply chain management Sustainability; Sustainable development Transport operations	*SUPPLY chains*BUSINESS logistics *TRANSPORTATION *SUSTAINABLE development *SUPPLY chain management SUSTAINABILITY
Ashby <i>et al.</i> (2012)	Environmental sustainability Research;Social sustainability Supply chain management Sustainable development Sustainable supply chain management	*SUPPLY chain management *SUSTAINABLE development *SUPPLY chains *SUPPLIER relationship management *SUPPLIERS*SUSTAINABILITY
Beske (2012)	Conceptual framework Dynamic capabilities Management strategy Supply chain management Sustainable supply chain management	*SUPPLY chain management *CORE competencies *BUSINESS planning SUSTAINABILITY PERFORMANCE METHODOLOGY
Hassini <i>et al.</i> (2012)	Sustainable supply chain Performance measurement	*SUPPLY chain management *SUSTAINABLE development *PERFORMANCE evaluation *KEY performance indicators (Management) **UTILITY functions LITERATURE reviews*CASE studies
Gopalakrishnan <i>et al.</i> (2012)	Sustainability Triple bottom line Social responsibility Environmental considerations BAe Systems	*SUSTAINABLE development SUPPLY chain management *ENVIRONMENTAL economics *EMPLOYMENT (Economic theory) *ECONOMIC activity *COMPETITION (Economics)
Kudla <i>et al.</i> (2012)	Agency theory case studies, Incentive mechanism stimulus Organism, Response, Sustainability	*THIRD-party logistics *AGENCY theory *ECONOMIC stimulus *PURCHASING agents SUSTAINABILITY TAXONOMY
Walker and Jones (2012)	Case studies; Corporate responsibility; Supply chain management; Sustainable development; United Kingdom	*SOCIAL responsibility of business *PRIVATE sector *RETAIL industry *CHILD labor*SUPPLIERS
Zailani <i>et al.</i> (2012)	Practices Outcomes Sustainable supply chain Developing country Malaysia	*SUSTAINABLE development *SUPPLY chain management *AGRICULTURAL economics *INDUSTRIALIZATION *ENVIRONMENTAL impact analysis *ENVIRONMENTAL economics
Carter and Easton (2011)	Supply chain management, Economic sustainability, Social responsibility, Environmental management, Economic performance	*SUSTAINABLE development *SUPPLY chain management *SOCIAL responsibility of business *ENVIRONMENTAL management RELIABILITY

Pagell <i>et al.</i> (2010)	Environmental issues Procurement/purchasing processes Social responsibility Supplier management Sustainability	*PRODUCTION management (Manufacturing) *INDUSTRIAL procurement *STRATEGIC planning *MANUFACTURERS' agents SOCIAL responsibility
Tate <i>et al.</i> (2010)	Centering resonance analysis Content analysis Corporate social responsibility reports *Crawdad software Global operations* Supply chain* Sustainability* Sustainable supply chain management *SUPPLY chain management	*INDUSTRIAL procurement *INDUSTRIES - Environmental aspects *SOCIOECONOMICS SOCIAL responsibility CRITICAL analysis
Park <i>et al.</i> (2010)	Environmental management; China; Circular economy; Value creation; Electronics industry; Ecological modernization; Supply chain	BUSINESS - Environmental aspects *ENVIRONMENTAL management *ECONOMIC development *SUPPLY chain management SUSTAINABILITY *ECOLOGICAL modernization
Wolf and Seuring (2010)	Supplier evaluation Supply chain management Sustainable development Third party vendors	*THIRD-party logistics *BUSINESS enterprises - Environmental aspects *SUPPLY chain management *SUSTAINABLE development *ENERGY consumption *ENERGY management
Pagell and Wu (2009)	Case studies Supply chain management Sustainability	*SUPPLY chain management *SUPPLY chains SUSTAINABLE development reporting CASE studies SOCIAL context SOCIAL factors ENVIRONMENTAL aspects GREEN movement
Krause <i>et al.</i> (2009)	Purchasing strategy Supplier relationships Sustainability	*SUSTAINABLE development *SUPPLY chains *SUPPLY chain management *PURCHASING *GREEN business *BUSINESS planning
Preuss (2009)	England Local government Public sector organizations Sustainable development	*LOCAL government *STRATEGIC planning *GOVERNMENT purchasing *SUSTAINABLE development *PRIVATE sector *SUPPLY chain management *SUPPLY chains
Seuring and Müller (2008)	Supply chain management; Sustainability; Sustainable supply chains; Literature review; Conceptual framework; Environmental and social standards	*PHYSICAL distribution of goods *SUPPLY & demand *INVENTORY control *PRODUCTION management (Manufacturing)
Carter and Rogers (2008)	Economic sustainability Social responsibility Supply chain management	*SUPPLY chains *SUSTAINABLE development *SUPPLY & demand *SOCIOECONOMICS *PHYSICAL distribution of goods *INDUSTRIAL management *INDUSTRIAL procurement *INVENTORY theory ENVIRONMENTAL sciences



Wu and Pagell (2011)	Green supply chain management; Decision making, Sustainability	*DECISION making *ENVIRONMENTAL protection *BUSINESS models *PROFITABILITY*NATURAL resources *CASEstudies*SUSTAINABILITY *SUPPLY chain management
Sigala (2008)	Supply chain management; Sustainability; Tourism; Tour operators	*SUPPLY & demand *INVENTORY control *INDUSTRIAL procurement TRAVEL
Pullman and Dillard (2010)	Animal husbandry Food industry Organizational culture Supply chain management Sustainable development	Not listed
Seuring (2008)	Case studies, Economic sustainability, Performance management, Research method, Supply chain management	*SUPPLY chain management *BUSINESS logistics *STRATEGIC planning *SUPPLY chains *INDUSTRIAL procurement CASE method (Teaching)
Keating <i>et al.</i> (2008)	Australia, Banking, Corporate social responsibility, Supply chain management, Sustainable development	*SUPPLY chains *SUSTAINABLE development *SOCIAL responsibility of business *CORPORATE governance *BEST practices CASE studies
Geldermann <i>et al.</i> (2007)	China Environmental conscious manufacture Pinch analysis Process integration Production networks Sustainable supply chain management	*MANUFACTURING processes *RESEARCH *INDUSTRIES *Environmental aspects *SUPPLY chain management *INDUSTRIAL procurement ENVIRONMENTAL aspects CASE studies CHEMICAL engineering
Svensson (2007)	Distribution channels and markets, Economic sustainability, Supply chain management	*SUPPLY chain management *SUSTAINABLE development *SUPPLY chains *RECYCLING (Waste, etc.) *INDUSTRIAL policy

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