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Review

Information systems and sustainable supply chain management towards a more sustainable society: Where we are and where we are going

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ABSTRACT

The objectives of this study are to identify and systematize scholarly articles on the use of information system to support sustainable supply chain management and to suggest future research opportunities. Therefore, a structured literature review was conducted. The most relevant studies identified were classified and categorized into seven dimensions: research context, research focus, research method, sector analyzed, information system (IS) beneficiaries, relationship between IS and green supply chain practices, and performance benefits. The main authors and articles on this particular topic were identified. In addition, it was concluded that IS is an important support tool for sustainable supply chain management practices since it brings benefits to the organization, suppliers, and customers. Furthermore, IS positively influences the operational, financial, and environmental performance of the organization. However, further advances in the literature are still needed. The major contribution of this research is related to the recommendations that provide opportunities for future research.

Contents

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1. Introduction

The integration of environmental aspects into organizations' strategic and operational decisions is a reality that affects not only the organization which makes decisions, but also its customers and suppliers (Sarkis, 2003). A critical issue that demonstrates the growing concern over sustainability issues is the convergence of supply chain and sustainability (Seuring & Müller, 2008; Srivastava, 2007; Zhu & Sarkis, 2004). Seeking to incorporate environmental and sustainable practices into the supply chain, organizations have demanded a great deal of information from their partners. Thus, information systems (IS) have become important tools for the adoption and management of these new practices (Chen, Tai, & Hung, 2012; Dao, Langella, & Carbo, 2011; Green, Zelbst, Meacham, & Bhadauria, 2012; Green, Zelbst, Bhadauria, & Meacham, 2012; Hu, Li, Chen, & Wang, 2014; Khor, Thurasamy, Ahmad, Halim, & May-Chiun, 2015; Sarkis, Koo, & Watson, 2013; Shaft, Sharfman, & Swahn, 2001; Wognum, Bremmers, Trienekens, van der Vorst, & Bloemhof, 2011). IS hold greater promise for addressing environmental issues in organizations; they can support business initiatives in reducing negative environmental impacts (Jenkin, Webster, & McShane, 2011). Bose and Luo (2011) state it is imperative that organizations understand how to integrate information systems and green initiatives in order to improve business sustainability and identify better practices.

Nevertheless, despite the benefits that information systems can bring to the sustainable supply chain management, this topic has been sporadically discussed in the literature (O'Rourke, 2014; Sarkis et al., 2013). No studies that sought to systematize the existing knowledge of this topic have been identified so far, which leads to the research question of the present study: which studies address the use of information systems to support sustainable supply chain management?

Therefore, the objectives of this study are to identify and systematize scholarly articles on the use of information system to support sustainable supply chain management and to suggest future research directions. To this end, a structured literature review was conducted. The present study provides useful insights for organization administrators, since it highlights the benefits of using information systems in sustainable supply chain practices, and for researchers, by providing a comprehensive account of what has been published by accredited scholars and by indicating possible gaps in the literature.

The theoretical concepts of sustainable supply chain management and information systems are briefly presented below, followed by the presentation of the methodological approach and the results obtained and, finally, the discussion and conclusion sections.

2. Conceptual background

2.1. Sustainable supply chain management

Managing the sustainability of supply chains is one of four key issues for diffusing corporate sustainability (United Nations, 2013). However, there is no consensus about the definition of green and sustainable supply chains (Fahimnia, Sarkis, & Davarzani, 2015). A commonly used definition was introduced by Srivastava (2007) as the integration of environmental issues into supply chain management, including product design, raw material selection, manufacturing processes, deliver of end products to consumers, and end-of-life product management. On the other hand, Seuring and Müller (2008) define 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.

Organizations have been incorporating environmental practices into their supply chains driven by regulatory, competitive, and stakeholder pressure (Dauvergne & Lister, 2012; O'Shea, Golden, & Olander, 2013). They have responded to these pressures by demanding from their partners a great deal of information enabling the adoption of sustainable supply chain practices (Perl & Vorbach, 2009).

2.2. Information systems and sustainability

Despite the pressure for environmental issues incorporation and the consequent growing demand for information, most companies still know very little about the potential environmental and social impacts of their production networks. Therefore, better data, decision-support tools, and incentives are needed to predict and prevent unsustainable supply chain practices (O'Rourke, 2014). Accordingly, information systems have become essential as accurate and reliable sources of information to support decision making and information flow management.

The role of information systems (IS) in supply chain management has been widely investigated (Auramo, Kauremaa, & Tanskanen, 2005; Barut, Faisst, & Kanet, 2002; Gunasekaran and Ngai, 2004; Kärkkäinen, Laukkanen, Sarpola, & Kemppainen, 2007). Gunasekaran and Ngai (2004), for example, argue that it is impossible to achieve an effective supply chain without information technology (IT) since it is the backbone of supply chain management.

Similarly, information systems have been identified as a key factor for achieving environmental sustainability (Bengtsson & Ågerfalk, 2011; Elliot, 2011; Wang, Chen, & Benitez-Amado, 2015). They facilitate the alignment of information planning and sustainability with organizational practices (Pozzebon, Petrini, de Mello, & Garreau, 2011). IS can be enablers for sustainable processes, services, and products (Melville, 2010; Seidel, Recker, & Vom Brocke, 2013; Vom Brocke, Watson, Dwyer, Elliot, & Melville, 2013; Watson, Boudreau, & Chen, 2010). For example, the information capabilities of an IS, in terms of its abilities at enhancing communication and knowledge sharing within and across functions, permitted effective compliance with environmental requirements in the study of Butler (2011).

3. Research methodology

A structured literature review was conducted according to the method initially proposed by Lage and Godinho Filho (2010) and later employed by Jabbour (2013) and Mariano, Sobreiro, and Do Nascimento Rebelatto (2015). The steps are summarized in Fig. 1. A literature review informs about what has been already published regarding the subject under examination and helps the researchers to justify and support their arguments in providing an original contribution (Pozzebon et al., 2011).

Firstly, the relevant terms were defined and the initial searches were conducted. The keywords used in the search were: information systems, information system, sustainable supply chain, and green supply chain. Due to the fact that green supply chain management is a result from one of the sustainability dimensions (Fahimnia et al., 2015), the term "green supply chain" was also included in the search. The keywords used in combination are shown in Table 1. The search was conducted in the Scopus database using the default search field "title; abstract; keywords". Initially; 226 articles were identified. This list was narrowed down to 67 titles by selecting journal articles only and eliminating duplicates. It is