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Review

A review of green supply chain management: From bibliometric analysis to a conceptual framework and future research directions

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ABSTRACT

This study reviews the green supply chain management (GSCM) literature and proposes a comprehensive view of the structural associations amongst the GSCM factors, viz. drivers, practice indicators and performance measures. The HistCite software was used to perform bibliometric citation meta-analysis on a sample of 1523 articles, obtained from the ISI Web of Science database. Influential journals, institutions, and trending articles in the GSCM research are revealed. Co-citation analysis coupled with content analysis of the 39 most cited articles identified six underlying research streams, namely (a) conceptual development and sense-making, (b) GSCM impact on performance, (c) integration of green and sustainable operations in the supply chain, (d) green supplier development, (e) GSCM implementation drivers, and (f) review and future research directions. This further led to proposing a comprehensive conceptual framework with logically grouped factors, and directing relationships among the groups. Finally, future research directions claimed by the trending articles in the field were aligned with the findings of the key papers, and an approach to perform non-myopic GSCM research in the future is suggested.

1. Introduction

Since the supply chain revolution of the 1990s, environmental management framework in companies has changed; sustainability goals have become the core of many organizations' vision, and companies have realized that integration of environmental management practices across all departments of organizations is necessary for the best outcome (Srivastava, 2007). Such change was a customer-driven process along with pressure from the stakeholders and competitors of focal company supply chains (Seuring et al., 2005). Some companies addressed environmental management as a good business practice and initiated environmentally sustainable practices voluntarily. Being environmentally friendly is not only about driving costs, but creating value for business (Wilkerson, 2005) and improving financial performance (Zhu and Sarkis, 2004). From this standpoint, companies are considering lifecycle implications of their strategic decisions. Such an implication of green supply chain management (GSCM) is demonstrated by Sarkis (2003).

A number of literature reviews on green supply chain management (Fahimnia et al., 2015; Sarkis et al., 2011; Sharma et al., 2017; Srivastava, 2007) and sustainable supply chain management exist today (Carter and Liane Easton, 2011; Hassini et al., 2012; Rajeev et al., 2017; Seuring, 2013). In a review of definitions of GSCM and sustainable supply chain management (SSCM), Ahi and Searcy (2013) differentiated between both the terminologies. According to Ahi and Searcy (2013), the most cited definition of GSCM is "integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life" (Srivastava, 2007, p. 54–55); and the most cited definition of SSCM is "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" (Seuring and Müller, 2008, p. 1700). These definitions are important as most of the existing GSCM studies are relying on both of them simultaneously (e.g. Vachon, 2007; Zhu and Sarkis, 2004; Zhu et al., 2013).

Existing literature reviews have focused on different aspects of

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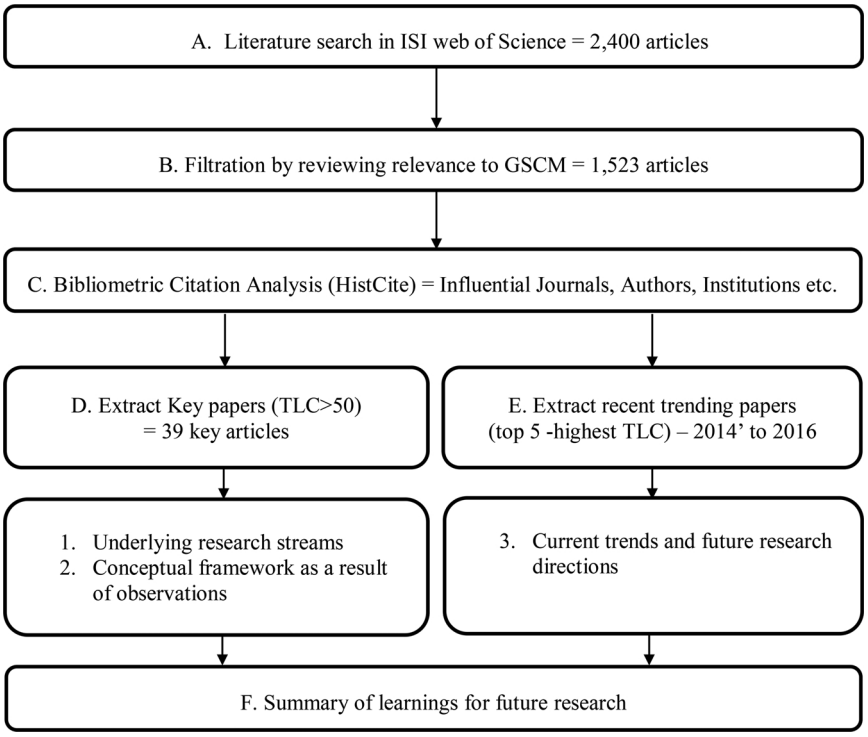

Fig. 1. Research methodology.
TLC refers to total local citations.

GSCM and SSCM. For instance, in GSCM, applications of organizational theories (Sarkis et al., 2011), state-of-the-art review (Srivastava, 2007), bibliometric analysis (Fahimnia et al., 2015), performance indicators in the agro industry (Sharma et al., 2017) and directing future research directions (Dubey et al., 2017). SSCM review studies cover issues like evolution of SSCM studies (Rajeev et al., 2017), performance measures (Hassini et al., 2012), modelling techniques (Seuring, 2013) and conceptual framework development (Seuring and Müller, 2008). Among these studies, only Fahimnia et al. (2015) presented key journals, impactful articles and influential institutions in GSCM research. However, they used the total citation and PageRank measures to identify the impactful articles, which often ignore recent articles due to a lower number of citations. Using other measures and covering recent articles, the first research question this study addresses is: *(RQ1) what are the key journals, influential institutions, impactful and trending articles in GSCM research?* Further, Srivastava (2007) demonstrated the evolution timeline of GSCM, which is more than 10 years old and a significantly high number of articles related to GSCM have been published meanwhile. Hence, the next research question of this study is: *(RQ2) how have the key GSCM studies evolved over time building on each other, and what are the underlying research streams?* Although Dubey et al. (2017) proposed a comprehensive framework of GSCM, they based it on systems theory and knowledge-based view theory. But the current study proposes a conceptual framework based on content analysis of the key papers. Thus, the last research question is: *(RQ3) Based on the key papers - how can GSCM drivers, practices and performance measures be integrated and aligned in one comprehensive framework, and what learnings be derived?*

To answer the stated research questions, we used the HistCite software developed by the founder of the Institute for Scientific Information, Eugene Garfield as well as the content analysis approach. For RQ1, we relied on the bibliometric citation analysis metrics. For RQ2, citation mapping technique was employed coupled with content analysis. For RQ3, we adopted the knowledge synthesis approach.

Results of RQ1 will help researchers in the GSCM field to identify potential research collaborations or employment opportunities while also highlighting the key journals that researchers should consider to publish their most significant work. Findings of RQ2 will help researchers interested in this field to gain an overview of how key articles have been built on each other articulating the prominent underlying research streams and an overview of most used methods. The result of RQ3 presents the relationships among GSCM drivers, practice indicators and performance measures in a comprehensive conceptual framework. Moreover, a summary of learnings for future research has been presented based on the trending and most cited articles.

The rest of this study is organised as follows: Section 2 presents the methodology of this study and results of bibliometric citation analysis. Section 3 depicts the citation mapping of GSCM literature and a brief discussion on the six underlying research streams identified. The comprehensive conceptual framework is developed and presented in Section 4. Section 5 offers the future research agendas, and Section 6 concludes the study with a stepwise guideline to conduct future research.

2. Methodology

The aim of literature review papers can be twofold: (a) summarizing existing literature of a topic through identifying key themes and issues, and suggesting grounds for future research (Seuring et al., 2005); (b) enfolding any scientific literature against existing knowledge and theories (Saunders et al., 2009). There exist different types of literature review techniques — systematic literature review, content analysis, meta-analysis, bibliometric analysis etc. Bibliometrics is a method that includes statistical analysis of published articles and citations therein to measure their impact. The current study employs a combination of bibliometric citation analysis and content analysis technique to analyse the GSCM literature. We used the HistCite software for bibliometric analysis, which has been widely used by other studies in the management domain, e.g. Alon et al. (2018), Christensen and Gazley (2008), provides timeline visualization of citations, pinpoints the most-cited articles and indicates the subsequent impact of those citations (Garfield, 2009; Thelwall, 2008).

Fig. 1 illustrates the research methodology adopted in this study.