



## Research article

# Understanding influential factors on implementing green supply chain management practices: An interpretive structural modelling analysis



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## ABSTRACT

In this study, we establish a set of 19 influential factors on the implementation of Green Supply Chain Management (GSCM) practices and analyse the interaction between these factors and their effect on the implementation of GSCM practices using the Interpretive Structural Modelling (ISM) method and the “Matrice d’Impacts Croisés Multiplication Appliquée à un Classement” (MICMAC) analysis on data compiled from interviews with supply chain (SC) executives based in the Gulf countries (Middle East region). The study reveals a strong influence and driving power of the nature of the relationships between SC partners on the implementation of GSCM practices. We especially found that dependence, trust, and durability of the relationship with SC partners have a very high influence. In addition, the size of the company, the top management commitment, the implementation of quality management and the employees training and education exert a critical influence on the implementation of GSCM practices. Contextual elements such as the industry sector and region and their effect on the prominence of specific factors are also highlighted through our study. Finally, implications for research and practice are discussed.

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## 1. Introduction

Driven by the accelerated deterioration of the environment and multiple market and non-market pressures (Zhu et al., 2013a), GSCM has been gaining much traction among practitioners and researchers alike through the last two decades and has developed into a distinct body of literature and investigation (Srivastava, 2007; Seuring and Müller, 2008; Sarkis, 2012; Tate et al., 2012; Fahimnia et al., 2015). GSCM consists of integrating the environmental issues and concerns into Supply Chain Management (SCM) (Beamon, 1999; Zhu and Sarkis, 2004; Srivastava, 2007; Sarkis et al., 2011; Lee, 2015). It extends the focus of greening efforts from the internal level of the firm to the activities conducted with upstream and downstream SC partners through the implementation of a number of environment-friendly practices such as practices oriented towards reducing wastes and energy consumption, reusing, remanufacturing, or recycling the products, the eco-design and the reverse logistics both at the internal (functional and inter-functional) level of the company and at the external (inter-organisational) level (Zhu and Sarkis, 2004; Rao and Holt, 2005; Sarkis,

2012; Zhu et al., 2008, 2013a; Azevedo et al., 2011).

Previous research on GSCM (for instance Handfield et al., 2005; Zhu and Sarkis, 2004; Zhu et al., 2013a; Hojmosse et al., 2014) extensively discusses diverse managerial, market and non-market GSCM pressures or drivers that push companies to try to implement GSCM practices. Existing studies also point out that the success of a company in implementing GSCM practices and achieving the targeted performance objectives could be hindered or encouraged by the effect of influential factors such as: the size of the company (Klassen and Vachon, 2003; Walker and Jones, 2012); its technical capacities (Gmelin and Seuring, 2014; Kirchoff et al., 2016); the employees' education and training (Ramus and Killmer, 2007; Large and Thomsen, 2011; Jabbour et al., 2016); the top management commitment (Pagell and Wu, 2009; Dai et al., 2015); as well as external factors including the dependence relationship with SC partners (Cheng, 2011); the cooperation from SC partners (Simpson et al., 2007; Large and Thomsen, 2011; Cianiëls et al., 2013; Lee, 2015); and information and knowledge sharing with SC partners (Fawcett et al., 2008; Wong et al., 2012; Lee, 2015). However, there is still a need for a better understanding of how these influential factors in isolation as well as jointly impact the success of the company in implementing GSCM practices. Specifically, there is a need to examine contexts, distinct from those examined in the past, and, thus, hitherto were relatively

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unexplored.

This study is intended to address this gap. Consequently, an extensive literature review of GSCM was carried out and 19 influential factors on implementing GSCM practices were identified. Using the results of the review of previous fragmented research and the contingency theory (Burns and Stalker, 1961; Lawrence et al., 1967; Morgan, 2007), this study develops a conceptual framework for GSCM that takes into account the effect of the influential factors on implementing GSCM practices and on the related performance outcomes. Through an empirical investigation using the ISM technique (Sage, 1977) and MICMAC analysis (Duperrin and Godet, 1973), this study contributes also to understanding how the influential factors interact with each other and affect the organisational performance. Results from our study show that the dependence relationships between the company and its SC partners, the company's size, the employees' education and training, all seem to have a huge influence on the implementation of GSCM practices. This highlights the salience of customers and suppliers and resources available to organisations in the implementation of GSCM practices.

The data used in this study were collected from 13 practitioners and experts in SCM pertaining to middle-level management in a number of companies operating in the Gulf countries, the Middle East region. The choice of our samples adds extra value to our results as studies on GSCM in the Gulf region are rare, though the Middle East economy is about 2 trillion dollars strong (World Bank, 2015), and its carbon footprint is steadily increasing (ibid.). The Middle East economy departs from other regional economies in its strong focus on petroleum- and petrochemical-related industries that are counted as the most polluting industries (Heras-Saizarbitoria et al., 2015). Our sample includes experts and practitioners from companies working in the highly polluting petrochemical and plastic sectors, in addition to the textile and mechanical sectors. Studies such as Eurostat (2010) identify the petrochemical and plastic sectors as sectors with the greatest environmental impact per unit of gross value added. Given the unique contextual setting and profile of our sampled experts, the findings from this study contribute to the nuanced understanding of GSCM.

The rest of this paper is organised as follows. Section 2 introduces the conceptual framework and the 19 influential factors on implementing GSCM practices identified in the literature. Section 3 introduces the ISM methodology, explains how we used it in this study, and presents the results of our study. Section 4 contains a discussion of the results of the study and its implications for research and management practices. Section 5 presents the limitations of our findings. Section 6 concludes the study and presents further research directions.

## 2. Background and conceptual framework

In this section we provide a brief review of the GSCM literature and identify the gaps related to the study of influential factors on implementing GSCM practices. Then, we present the framework that we use in exploring the effect of influential factors on implementing GSCM practices.

### 2.1. GSCM

GSCM has received multiple definitions (Ahi and Searcy, 2013) and literature on this topic has been reviewed often (Fahimnia et al., 2015; Sarkis et al., 2011; Srivastava, 2007; Seuring and Müller, 2008). The common understanding of GSCM is the integration of environmental issues and concerns into SCM (Mentzer et al., 2001; Stock and Boyer, 2009) in order to improve the

environmental impact of the activities of the SC while maintaining competitiveness and achieving economic and operational performance criteria (Beamon, 1999; Sarkis, 2003; Zhu and Sarkis, 2004; Rao and Holt, 2005, 2011; Srivastava, 2007; Large and Thomsen, 2011; Wang and Sarkis, 2013; Lee, 2015). For Beamon (1999), GSCM consists of extending the traditional structure of the SC to include mechanisms for product and packaging recycling, reuse, and/or remanufacturing operations, as well as the related performance measures. Zhu and Sarkis (2004) developed a conceptual framework for GSCM including four categories of GSCM practices (internal environmental management, external GSCM, investment recovery, and eco-design or design for environment) in addition to two categories of performance outcomes: environmental, and economic performance. The authors used this framework to study the relationships between operational practices and performance in Chinese manufacturing enterprises.

Similarly, Rao and Holt (2005) suggested and tested a conceptual model of GSCM that included practices related to greening the inbound phase of the SC (e.g. holding awareness seminars for suppliers, encouraging suppliers to share their know-how and problems with each other, informing suppliers about the benefits of cleaner production, pressurising suppliers to take environmental actions, choosing suppliers based on environmental criteria); greening the production phase or the internal SC (e.g. use of environment-friendly materials, environmental design considerations, reduction of wastes, use of cleaner technology processes, internal recycling of materials); and greening the outbound phase of the SC (e.g. waste management, improvement of packaging, eco-labelling, and product recovery). Considering GSCM decisions, Sarkis (2003) suggested the use of a framework that incorporates five environment-influential organisational practices (reduce, reuse, remanufacture, recycle, dispose) besides elements related to the different SC phases (procurement, production, distribution, and reverse logistics) and elements related to the product life cycle such as product design, and process improvement. Large and Thomsen (2011) focused on the effect of the nature of the relationships (assessment versus collaboration) between the firm and its suppliers on the environmental and purchasing performance. Srivastava (2007) found that most of the works in this domain could be classified as being related to the green design that takes into account the product life cycle analysis or green operations that include green manufacturing and remanufacturing (e.g. reducing energy and resource consumption, recycling, product recovery and reuse), reverse logistics (e.g. collecting, inspecting) and waste management (e.g. pollution prevention, disposal).

A growing part of the theoretical and empirical research in GSCM is dedicated to exploring the drivers (motivations or pressures) for adopting and applying GSCM practices (Tate et al., 2012). The literature suggests three types of drivers that push towards the adoption of GSCM approach and the related practices. The first type is associated with voluntary proactive strategies to gain a competitive advantage and enhance brand and/or corporate image, attract environmentally conscious customers, and develop new markets (Handfield et al., 2005; Ramus and Montiel, 2005; Rao and Holt, 2005; Ageron et al., 2012; Wang and Sarkis, 2013; Sancha et al., 2015), or to cope with anticipated stricter social and environmental regulations (Zhu and Sarkis, 2007). The inclusion of such drivers is mainly explained using Resource Based View (RBV) and Natural Resource Based View (NRBV) (Sarkis et al., 2011; Hart and Dowell, 2011).

The second type is related to the influence of non-market pressures, such as legal demands and governmental regulations in line with the growing concerns for environmental protection and social responsibility of businesses (Zhu and Sarkis, 2004; Lee and Klassen, 2008; Holt and Ghobadian, 2009; Ageron et al., 2012;

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