Int. J. Production Economics ∎ (∎∎∎∎) ∎∎∎–∎∎∎

Contents lists available at ScienceDirect

Int. J. Production Economics

journal homepage: www.elsevier.com/locate/ijpe

Green supply chains: A perspective from an emerging economy

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ARTICLE INFO

Article history:
Received 20 April 2014
Accepted 2 December 2014

Keywords:
Future green supply chains
Supply chain key trends
Environmental sustainability
Sustainable supply chains
India

ABSTRACT

We use grounded theory arguments and field data to support a model that links environmental government policies to customer actions and firm sustainability strategies. A firm's sustainability strategy in turn influences the design and deployment of green supply chain management strategies. Specifically, green design, product recovery and reverse logistics were found to be key facets of green supply chain management strategies. Our focus on the emerging economy of India and the unique insights of this qualitative Delphi study that relies on grounded theory makes key contributions to theory building and managerial practice in the area of sustainable supply chain management.

1. Introduction

Environmental sustainability has been receiving immense academic and industry attention in recent years. Increasing carbon emissions and the associated global warming have been raising numerous questions on the efforts required to make businesses more sustainable environmentally. In a globalized world, where manufacturing is increasingly getting concentrated, transportation of products over long distances is a reality. Increasing consumption, richer lifestyles and supply chain issues such as higher levels of logistics and transportation coordination have led to higher carbon emissions thereby raising important questions on environmental sustainability. On a parallel basis, customers are becoming more environmentally conscious and are making procurement choices with an eye on environmentally friendliness of its ingredients. Examples of this are environmental logistics (goods moving shorter distances), use of environmentally friendly logistics modes (like inland waterways) and environmentally friendly packaging choices (Yang et al., 2013; Sheu et al., 2005).

The theme of supply chain integration in global supply chain management has occupied significant attention among several researchers (Danese et al., 2013; Jayaram and Tan, 2010; Narasimhan and Jayaram, 1998). Indeed, there has been a recent meta-analysis that summarized the effects of supply chain integration on firm performance by empirically examining this relationship across a wide cross section of studies (Leuschner et al., 2013). This body of literature while significantly emanating out of works done in USA and Europe has since expanded to address supply chain integration in the context of emerging economies such as China, Hong Kong, India and other similar evolving economy contexts like Turkey (Zhang and Huo, 2013; Yu et al., 2013; Jayaram et al., 2011; Lam and Postle, 2006; Cetindamar et al., 2005; Sahay et al., 2006; Sahay and Mohan, 2003). India in particular has become a vital cog in the supply chain functioning of many global firms. The context of India as a source of products and services as well as knowledge capital makes it a pertinent choice to study trends in supply chain practices there. Indeed, in the Indian context, there have been empirical studies that have examined the extent of use of supply chain management practices amongst Indian companies which is in sharp contrast to what has been practiced among companies in the developed world (Sahay and Mohan, 2003; Sahay et al., 2006; Joshi et al., 2013). For example, greening initiatives is especially important in India given the lower purchasing power of consumers and shortages in electricity supplied from the grid (Jayaram and Avittathur, 2012). These initiatives include eco design of products to accommodate the lower purchasing power as well as need for products to be high on energy conservation given the scarcity of energy during certain parts of the year and in non-urban areas. Therefore, the leap from supply chain management to green supply chain management has been relatively rare in the Indian context, although there has been an emerging interest in reporting case study research studies (Kumar et al., 2012) and other large scale empirical studies in the Indian context (Mitra and Datta, 2014; Mohanty and Prakash, 2013; Kumar et al., 2013).

In contrast to many studies that have looked at trends in sustainability in the developed countries (Carter et al., 2000; Carter and Jennings, 2002) there have been recent attempts to examine these trends in emerging economies like India (Gupta et al., 2013; Jayaraman et al., 2012; Ishaswani and Datta, 2011; Ashraf et al., 2009; Motwani et al., 1998), China and Taiwan (Ye et al., 2013; Zhu

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http://dx.doi.org/10.1016/j.ijpe.2014.12.003
0925-5273/

et al., 2011, 2013; Cheng, 2011; Chiou et al., 2011; Christmann and Taylor, 2001) and the Middle East (Abbasi and Nilsson, 2012; Brik et al., 2013).

We contribute to this stream of literature with a focus on India by reporting on *expected* changes in the design and deployment of environmental supply chains in the future from the perspective of senior supply chain management managers in India. We use survey data and a grounded theory approach using the input from manufacturing executives who have a vast experience base in supply chain management of Indian firms with a global footprint. These executives have worked or are currently working for firms in India that have a global footprint. In many cases, these executives having acquired practical and academic experiences that are advanced in terms of supply chain training. Accordingly, the basis of this research is well founded in terms of an enriched background of the respondents in the general area of supply chain management and specifically, in the area of green supply chain management. We use the survey findings to understand the expected changes to supply chains from an emerging economy and from a global perspective.

2. Developing the green supply chain framework

Environmental issues have received fair attention in literature in the last 40 years. However, relating them to consumer behavior changes, firm level changes and supply level changes have evolved only in the recent years. We survey literature regarding these linkages under three sub-sections namely customer issues, sustainability strategies and expected changes to green supply chains. A summary of this literature is presented in Table 1. Table 1 has two parts; the first part summarizes the different theories that have been employed in the sustainability literature. As can be seen from this table, a variety of perspectives can be used to promote common themes in green SCM. Arguably this has resulted in a 'scattered' approach of understanding the different theoretical lens that can shed light on our phenomenon of interest. Therefore, a consideration of past theories coupled with the grounded theory approach appears to be more pertinent in the emerging context of India.

One noticeable lacuna in the summary of the past studies is a synthesis of studies using a grounded theory approach which is an important but neglected theoretical lens, especially in the domain of green supply chain management. The use of grounded theory to complement existing theories has been common in operations and supply chain management as well. For example, Binder and Edwards (2010) used a grounded theory approach to study inter firm governance mechanisms. Also, Narasimhan et al. (2010) used this approach in the strategic outsourcing context and examined the influence of integrative supply management practices. Dowlatshahi (2005) used this approach in the context to remanufacturing in the reverse logistics context. Closer to the theme of this paper, Koh et al. (2012) examined the multitier influence of implementation of directives and standards such as WEEE and ROHS on the supply chain. A similar approach was taken by Teixeira et al. (2012) in the context of the Brazilian green supply chains although the issue of interest was not on overall green supply chain management but on environmental training programs in Brazil. Taken together, these studies form an essential core that support our approach as well.

Table 1a
Relevant theories on sustainability[a].

Name of theory	Source	Comments
Complexity theory	(Crozier and Thoenig, 1976)	Takes a macro-policy view.
Ecological modernization theory	(Janicke, 2008; Murphy and Gouldson, 2000)	Promotes partnerships between public and private enterprise.
Information theory	(Simpson et al., 2007)	Uses a micro-data based approach
Institutional theory	(DiMaggio and Powell, 1983)	Takes into account drivers from institutions.
Resource based view	(Barney, 1991)	Brings into the scarcity of resources perspective.
Resource dependence theory	(Pfeffer and Salancik, 1978)	Points out the dependence equation between supply chain partners.
Social network theory	(Jones et al., 1997; Wuyts et al., 2004)	Similar to the resource dependence view, uses sociological lens to probe GSCM.
Stakeholder theory	(Freeman, 1984)	Similar to the institutional theory view, this view points out the multifarious interests surrounding green SCM.
Transaction cost economics	(Williamson, 1981)	Takes a micro-approach similar to information view but focuses on transaction as the unit of analysis.
Grounded theory	(Glasser and Strauss, 1967)	Points to a contextual view.

[a] Adapted from Sarkis et al. (2011).

Table 1b
Main studies on green supply chains.

Themes	Source	Comments
Customer related issues	(Mobley et al., 1995; Essousi and Linton, 2010; Wang et al., 2013; Scarpa and Willis, 2010; Herring, 2006; Young et al., 2010; Bai and Sarkis, 2010; Nishitani, 2010)	Both industrial and consumer based customers influence sustainability.
Sustainability strategies	(Hart and Dowell, 2011; Lin, 2012; Lubin and Esty, 2010; Ameer and Othman, 2012; Galbreth and Ghosh, 2012; Arnold and Hockerts, 2011; Curkovic and Sroufe, 2011)	The varied nature of sustainability strategies at the centralized head quarter level has important implications for the design of green supply chains.
Product recovery	(Carter and Jennings, 2002; Chiou et al., 2011; Gavronski et al., 2011; Gunasekaran and Spalanzani, 2012; Zhu et al., 2013)	Recovery of products and materials is an integral element and benefits associated with Green SCM.
Reverse supply chains	(Thun and Müller, 2010; Chiou et al., 2011; Gavronski et al., 2011; Gunasekaran and Spalanzani, 2012; Zhu et al., 2013)	Trends pertaining to forward flows in green SCM should be concomitantly examined along with reverse flows from customer back to the OEM manufacturer.
Green designs	(Chiou et al., 2011; Gavronski et al., 2011; Gunasekaran and Spalanzani, 2012; Zhu et al., 2013)	An important facet of the influence of sustainability strategies is in the design of products and processes from an environmentally friendly point of view.

Please cite this article as: Jayaram, J., Avittathur, B., Green supply chains: A perspective from an emerging economy. International Journal of Production Economics (2014), http://dx.doi.org/10.1016/j.ijpe.2014.12.003