

SUPPLY CHAIN EVOLUTION AND GREEN SUPPLY CHAIN PERSPECTIVE

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Abstract

The intent of the study is to review the theoretical background of Green Supply Chain Management (GSCM) and its status in the present era. For this purpose, Supply chain management is defined broadly, its process, players in it; factors affecting a supply chain success or failure have been discussed. Supply chain emergence has been discussed in detail, concepts with different examples which are standard, lean, agile, hybrid and green supply chain management. Such modifications in the supply chain were made due to the rapid changes in the complex marketplace and competitive pressure. Green supply chain management being the latest form of supply chain has been explained in details with support from literature. Green

supply chain management considers the environmental effects and resource utilization efficiency in the whole supply chain. This revolutionary concept in the supply chain balances economic, societal and environmental needs with customer growth. From the support of literature cited above, it is evident that GSCM is the need of current era. It's being practiced by Multi National Companies (MNCs) but Small and Medium Enterprises (SMEs) in order to sustain them in this globalized and intense competitive market.

Keywords: Supply Chain Management (SCM), Supply Chain Emergence, Green Supply Chain Management (GSCM), Environmental Effects

CONCEPT AND BACKGROUND APPROACH OF SUPPLY CHAIN MANAGEMENT

What is a supply chain management? A supply chain management is managing the flow of information, funds and materials within a supply chain (Stevens G. C., 1989). Globalized markets were the main reason for the emergence of the supply chain management Slack, N. (1991) and Christopher, M (1992). Integrating different departments of an organization (merchandize, manufacturing, sales, and distribution) can have latent benefits (Oliver, R. K., & Webber, M. D., 1982). Firms need to become more integrative with other firms to become competitive. Such competitiveness can fulfill the customers demand quickly and with less raw resource (Wood, A. 1997; Power, D.2005).

A typical supply chain starts from suppliers providing the material to be used in the process. Manufacturer consumes raw material in order to convert it into semi-finished or finished product. Such product is then delivered to distributor or wholesaler in large quantity. Distributor or wholesaler sells this product to the retailers depending upon their demand, this quantity can be less or high in terms of their demand. Finally, the product reaches consumer in the end (Chopra and Meindl 2007).

In this whole process, every player is a supplier of something and other player is the buyer of something, that's why it is called "Supply Chain". In order to survive in this competitive world, firms have to focus not only on their products and services but also handling the whole supply chain. Managing each player of the supply chain in such a way that it increases their profit respectively. Traditionally, Ultimate objective of the supply chain was to enhance overall profit of all the players by reducing the overall costs and response time for the customers. If response time for the customers increases, there are chances that customer would not be satisfied and which would lead to sales decrease. In order to address such problems, supply

chains need to be flexible to resolve these problems faced by the manufacturers and Multi-National Companies (MNCs).

Success of any supply chain depends upon its designing and management. Examples like Dell Computer, Wal-Mart, Seven-Eleven Japan and Toyota are physical evidences of their success because they designed and implemented their supply chains effectively and efficiently. Companies like Wal-Mart invests a lot of money on their information and transportation systems which are crucial part of any supply chain and guarantees success. One of the examples of failures of e-business named “Webvan” was due to the inability to manage product, information and funds. Webvan designed their supply chain in such a way that they built huge warehouses in different cities of United States. From there, grocery was delivered to the customers using their owned transportation. Large warehouses and transporting grocery products from far away warehouse costs heavy to the company which was one of the main reason for its failure.

SUPPLY CHAIN EMERGENCE

Different supply chains emerged with the passage of the time due to changing consumer preferences, modern technologies and market demand. These different supply chains have different implications for the product and its life cycle. Variation in the supply chain is affected by the demand and design of the products. Following are the types of supply chains that emerged with the passage of time:

Standard Supply Chain

First ever supply chain was developed for fulfilling the demands of customers by providing standard products. Standard products have steady demand with little changes in the characteristics and design of the products. Purchasing of the raw material takes in bulk quantity rather than small ones (Vonderembse et al. 2006; Fisher, M. L., 1997). Such supply chains developed by different businesses were unable to fulfill requirements of logistics and production. This is when for the first time, need for suppliers occurred. Standard supply chains were designed to meet customer requirements with little flexibility and preservation of resources (Lumms, R. & Vokurka, R., 1999; Beamon, B. M., 1999).

Lean Supply Chain

This supply chain was developed for fulfilling the needs of customer (standard products) with focus on continuous enhancement, eliminating wastage and those activities which do not create any value for the customers. Lean supply chains can fulfill the requirement of standard products at all the stage of product life cycle (Fisher, M. L., 1997). These supply chains intended to

reduce time duration, reduce activities in a process, reduce waste and cost, manufacturing small quantities, quality and limited flexibility (Vonderembse et al., 2006). This kind of supply chains is suitable for catering the needs of niches, having variety in the production process with small quantities. These supply chains have the ability to satisfy different segments or niches of customers at a time. But these kind of supply chains are not much flexible to manage unexpected supply chain disruptions like seen in the 2011 Japanese earthquake and tsunami (Moore, D., & Babu, A.S., 2008). Just In Time (JIT) followed by Toyota Company is a practice that falls under the category of lean supply chain.

Agile Supply Chain

This supply chain was developed to overcome the shortcomings of previous supply chain models which were standard and lean supply chain. This supply chain was able to manage supply chain disruptions or unpredictability (Moore, D. & Babu, A.S., 2008). This supply chain was able to adapt according to the customer needs and market conditions. This supply chain was focused on managing unpredictable demand of innovative products, delivering products fastly, reducing lead time. Innovative products are ones that keeps on changing in terms of shape or features, such products require continuous contact with customers like electrical appliances. These products have shorter life cycle as compared to standard products. Customer's preferences highly impact its demand which is unpredictable at any stage of the product life cycle. New technology and customer behavior change are the main drivers of rapid change in the nature of innovative products. Unpredictable customer demand can be managed by the use of electronic data interchange (Vonderembse et al. 2006).

Hybrid Supply Chain

This supply chain was developed to fulfill the need of hybrid products. Hybrid products are the products with array of wide range of complex components. As the name suggests, such supply chain emerged as combination of both lean and agile supply chain. Form and product postponement are the common practices that comes under the umbrella of hybrid supply chain followed by Dell Company. Postponement techniques involve assembling of basic components of a product and rest of them on customer demand. As one customer demand can differ from other persons like in case of Dell laptops which are delivered to the doorstep of customers (specifications of a laptop). Dell Company reduces its cost by outsourcing the components to be used in the laptops to their suppliers and increasing their responsiveness through managing their logistics network. In this way, Dell Company uses hybrid supply chain to manage its operations.

Green Supply Chain

Latest concept i.e. Green supply chain emerged from the concept of hybrid approach with addition of fulfilling environmental requirements throughout the product life cycle of any product and in its design (Srivastava, S.K., 2007). These supply chains are developed to cater the need of green products which are considered to be most complex in nature because of not only their demand unpredictability but also certification of environmentally compliant. Such kind of supply chains focuses on hybrid approach with continuous improvement in environmental performance (Zhu & Sarkis, 2004). Such supply chain considers environmental regulations at the ideation, production, use, recycle, reuse and re-introduction phase of the product life cycle stages. Green supply chain evaluates its performance on the basis of economic, societal and environment impact called “Triple Bottom Line” (Sarkis et al, 2011; Pullman et al, 2009).

Green Supply Chain Chronological History

Very first article relevant to green supply was Navinchandra, D. (1988) article to consider green design to reduce impact of product waste. Ashley, S. (1993); Allenby, S. and Richards, D. (1994) and Zhang et al., (1997) worked on same green design and expanded its framework. Reverse logistics, a concept relevant to Green Operations also emerged from green literature. The use of plastics and bottle recycling are mentioned in some of these articles. The use of plastics and bottle recycling were mentioned in case studies and article created a standardized model for reducing electronic waste without harming the environment from Pohlen, T. L., & Farris, M. T. (1992); Stock, J. (1998); Tibben A. and Lembke, R. S. (2002).Zhu, Q., and Sarkis, J., (2004) in their study on Chinese manufacturing industry discovered that GSCM practices aimed to have positive relationship with environmental and economic performance. Hsu, C. W., & Hu, A. H. (2008) studied the role of green supply chain management in the electronic industry found that there has been little work on the validity and reliability of green supply approaches in electronic industry. The author employed fuzzy analytic hierarchy process to prioritize twenty approaches in nine electronic firms and found that companies would focus on supplier management performance for the green supply chain management.

Zhou, F. (2009) in his study on the implementation of green supply chain management in textile sector concluded that this management practice considers environmental impact and efficient resource utilization in whole supply chain. Ninlawan et al. (2010) studied the implementation of green supply chain management in electronic industry in Thailand. In his study, he took 11 manufacturers as a case study and surveyed them through interviews and questionnaire to record in depth responses on current green activities that included green procurement, green manufacturing, green distribution and reverse logistics. The Green supply

chain was evaluated on the basis of green supply chain management practices, its performance and factors that motivated it within Thai electronic industry. Wu et al. (2010) concluded that companies need to focus on effect of short term costs and benefits on knowledge transfer in order to increase green management performance.

Green Supply Chain Literature Review

Wu et al., (2012) studied the practices GSCM practices adopted by the largest companies of the world. Data were collected through review of published reports that may contain corporate sustainability practices, including social responsibility reports, corporate citizenship reports, and sustainability reports. Preventing pollution and Cost reduction were two main reasons for Multinational Corporations to adapt GSCM. Yazdani M. (2014) examined to set criteria on which green supplier can be selected from a number of suppliers available in the automobile manufacturing sector of Spain. The Green supplier selection was done through fuzzy multi criteria decision making (MCDM). Data were collected from automobile expert judgments using structured questionnaire, in depth interviews and detailed literature review. The results showed that green material and green design were most dominant factors affecting green supplier selection. Nawire et al., (2014) studied the effects of implementing GSCM on procurement performance in Kenya sugar industry. Data were analyzed by using factor analysis and regression which showed the R square value of 62.7%. The results showed that green purchasing and green manufacturing had a positive direct impact on procurement performance within sugar sector. Chiu et al., (2014) investigated the best possible solution for green supply chain with environmental concerns. Data were analyzed through fuzzy integrated logistics with transportation cost and demand fuzziness to resolve GSCM under risky environment. Outcomes of the study indicated that increase in Government subsidy also increased profits for reverse logistics.

Tippayawong et al., (2015) investigated the Positive Influence of Green Supply Chain Operations on Thai Electronic Firms' Financial Performance. Survey questionnaire was utilized for making Factor analysis and multiple regression analysis. Results showed that when factor analysis was performed then 1) green manufacturing Practice, 2) green logistics practice, and 3) green sourcing were main factors affecting GSCM. When Multiple Regression analysis was performed manufacturing practice and the green logistics practice were strongly correlated with financial performance. Souto J. E and Rodriguez A. (2015) examined the innovation obstacles and essential issues in the achievement of environmental innovation. Wilcoxon-Mann-Whitney test and binary logistic regression were used as methodology. Data were collected through literature review and interview with experts. Results showed that both cooperation in innovation

activities and public funding have a significant effect on the achievement of environmental innovations, as they help to overcome many of the barriers. Gandhi et al., (2015) examined the factors that affect GSCM implementation and critically evaluate those factors affecting GSCM and find relationship among them. The research implied a Decision Making Trial and Evaluation Laboratory (DEMATEL) to determine interdependencies among the facets through the causal diagram using a case manufacturing organization. Results showed that monetary, human resource skills and top management involvement were most dominant factors affecting successful GSCM implementation.

CONCLUSION

Present paper has given insight to the Green Supply Chain Management (GSCM) in an inclusive way. It can be concluded that GSCM is the expanded form of conventional supply chain management. GSCM considers environmental factors while achieving supply chain management objectives. From the support of literature cited above, it is evident that GSCM is the need of current era. It's being practiced by Multi National Companies (MNCs) because such supply chains not only focuses on internal efficiencies but also its impact on environment. Companies issue Corporate Social Responsibility Reports in order to show case their efforts regarding their socially responsible behavior and environment consciousness. But this practice needs to be adopted at the lower level i.e. Small and Medium Enterprises (SMEs) in order to sustain them in this globalized and intense competitive market. Thus, GSCM is more practical, systematic and holistic in approach than any of the supply chain concepts.

AVENUES FOR FUTURE RESEARCH

Focus of the current study was on supply chain emergence and green supply chain management, same research can be conducted relevant to green supplier and its selection process in details. Green supplier initiates the green supply chain process, therefore of vital importance for the businesses practicing GSCM. Future research can be conducted on sustainability and green supply chains with respect to Resource Based View (RBV) which states that organizations with rare, valuable, non-substitutable and inimitable resources have more chances of sustainability and competitive advantage over others. Other study can be conducted to find out more supply chain processes, its relevant strategies that can fulfill requirements of dynamic changes in the environment and investigate whether RBV can accommodate such changes.

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