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RESEARCH ARTICLE

Green Supply Chain Management in India: An Overview.

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Abstract

The green supply chain management (GSCM) is a very influential way to distinguish or separate an organization from its competitors and it can have significant impact on the success plan of the organization. With increased responsiveness to corporate social responsibility and the requirement to meet the terms with eco-friendly policy, green supply chain management (GSCM) is becoming increasingly important for Indian industries. The Companies that have adopted GSCM practices with a focus on distribution activities have successfully improved their business and environmental performance on many levels. This paper focuses on the major barriers in the implementation of Green Supply Chain management in Organization.

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Introduction:-

Business activities can cause a considerable risk to the environment in terms of carbon monoxide emissions, discarded packaging materials, scrapped toxic materials, traffic congestion and other forms of industrial pollution. Green supply chain management (GSCM) is considered as an environmental innovation. The “Green supply refers to the way in which innovations in supply chain management and industrial purchasing may be considered in the context of the environment”. Also Green SCM is all about integrating environmental thinking into a supply chain management, including product design, material resourcing and selection, manufacturing processes, delivery of the final product to the consumer as well as end-of-life management of the product after its useful life. Thus, the definition and scope of Green Supply Chain Management (GSCM) in the literature has ranged from green purchasing to integrated green supply chains flowing from supplier to manufacturer to customer, and even reverse logistics. Mathematically, Green Supply Chain Management is
GSCM= Green purchasing + Green manufacturing/materials management + Green Distribution / marketing + Reverse logistics.

The concept of GSCM is to integrate environmental thinking into supply chain management (SCM). GSCM aims to minimize or eliminate wastages including hazardous chemical, emissions, energy and solid waste along supply chain such as product design, material resourcing and selection, manufacturing process, delivery of final product and end-of-life management of the product. Thus SCM plays a vital role in influencing the total environment impact of any firm involved.

A supply chain is a network that consists of all parties involved i.e. supplier, manufacturer, distributor, wholesaler, retailer, customer, etc., directly or indirectly, in producing and delivery products or services to ultimate customers – both in upstream and downstream sides through physical distribution, flow of information and finances.

According to Chopra and Meindl a typical supply chain includes the following five stages: component/raw material suppliers, manufacturers, wholesalers/distributors, retailers and customers. These five stages are connected through flows of products, information and money. Managing a supply chain network is complex and difficult since the network involves various sub-systems, activities, relationships and operations. SCM practices include a set of approaches and activities utilized by a firm to effectively integrate supply and

demand for improving the management of its supply chain. By adding a “green” component in the SCM practices, GSCM practices encompass a set of green activities in procurement, manufacturing, distribution and reverse logistics.

The primary aim of supply chain management is to provide the right product to the right customers at the right time in the right quality at right cost and in the right form. The SCM also focuses on to reduce the inventory and cycle time. The benefit of reducing the inventory is that the capital is not blocked which in turn helps in increasing productivity. The SCM also helps in increasing the profits in the long run by reducing the cost of the entire supply chain and maintaining an accurate forecast.

Review of Literature

Green Supply Chain Management is all about delivering products and services from suppliers, manufacturers to end customers through material flow, information flow and cash flow in the context of environment. Traditional Supply Chain Management focuses on Total Quality, optimum Cost and best service which in some way contributed to environment. Today's Green Supply chain management mandates to incorporate the environmental idea in each and every stage of the product and service in a Supply Chain. Hence Supply chain managers have a great role in developing innovative environmental technologies to tackle the problems faced by the economy on environmental problems and communicate this to every stake holder in the chain.

Green supply chain management (GSCM) involves traditional supply chain management practices integrating environmental criteria or concerns into organizational purchasing decision and long term relationships with suppliers (**Gilbert 2000**). A green supply chains aims at confining the wastes within the industrial system in order to conserve energy and prevent the dissipation of dangerous materials into the environment (**Torres, Nones, Morques, & Evgenio, 2004**), GSCM is the summing up of green purchasing, green manufacturing, green packing, green distribution and marketing. GSCM is to eliminate or minimize waste in the form of energy, emission, hazardous, chemical and solid waste (**Olugu, Wong & Shaharoun 2010**). Today, in order to have a competitive product in the marketplace, it is fundamental to have a competitive supply chain integrated with lean, agile, resilient and green (LARG) philosophies (**Cabral, Grilo, and Cruz-Machado 2012**).

Across regions, the progress on GSCM practices varies considerably (Friedman 2008; Jabbour et al. 2013). Government regulations in Europe over the last half decade – including REACH (dealing with the Registration, Evaluation, Authorisation and Restriction of Chemical substances), RoHS (dealing with Restriction of Hazardous Substances Directive) and the emission trading scheme – are driving strategic attention to sustainability (Liu et al. 2011, 2012)

Many researchers (**Zhu, Sarkis, and Geng 2005; Linton, Klassen, and Jayaraman 2007**) consider the discussion and investigation of GSCM in the literature to be in the developmental stage where hardly adequate theoretical base to study the linkages of GSCM have been explored.

Indeed, much of the research in the area of GSCM is more prescriptive, rather than explanatory or predictive in nature. Various academics have suggested various perspective about GSCM.

Works such as Srivastava (2007) discussed reverse logistics, whereas Birou, Fawcett, and Magnon (1998), and Stonebraker and Liao (2006) discussed lifecycle analysis. But the key themes that came out of the GSCM literature over the last 20 years are the concepts of green design, green operations, reverse logistics, waste management and green manufacturing (Srivastava 2007). GSCM is grounded on the framework of traditional supply chain management (SCM).

TABLE I: Concepts and models related to environmental issues have been suggested by different

researchers is summarized in the following table

(Source: Kshitij Dashore and Nagendra Sohani, April 2013)

Year	Title	Author	Description
2012	An Overview of Green Supply Chain Management in India	Nimawat Dheeraj & Namdev Vishal	The paper seeks out environmental performance index (EPI) of India and four activities of the green supply chain management; namely green purchasing, green manufacturing, green marketing and reverse logistics.
2012	Examining Green Production and its Role within the Competitive Strategy of Manufacturing	Tim Banies, Steve Brown, Ornella Benedettini, Peter Ball	It relates and summarizes the core knowledge on green production, aligns to production and operations management prospective.
2012	A Hierarchical Framework of Barriers to Green Supply Chain Management in the Construction Sector	Sreejith Balasubramanian	In this paper barriers are identified and then they are classified as external and internal barriers to the organization which help policy makers to focus on specific barriers important to the adoption of GSCM in the UAE construction sector.
2012	Modeling the Knowledge Sharing Barriers using an ISM Approach	B. P. Sharma, M. D. Singh and Neha	Variables which resists knowledge sharing (KS) in the organizations are known as Knowledge Sharing barriers (KSBs) were identified and ISM model is proposed showing solutions.
2011	Barriers to implement Green Supply Chain Management in automobile industry using Interpretive Structural Modeling (ISM) Technique – An Indian Perspective	Sunil Luthra, Vinod Kumar & Abid Haleem	An industry based approach was used to develop a structural model of the barriers to implement green supply chain management.
2011	An Analysis of the Drivers Affecting the Implementation of Green Supply Chain Management	Ali Diabat & Kannan Govindan	A case study approach is used to identify various drivers of green supply chain management for a manufacturing firm.
2011	Drivers of Green Supply Chain Management Performance: Evidence from Germany	Large, R.O. & Thomsen, C.G.	The paper seeks to evaluate two practices – green supplier assessment and green collaboration which impacts purchasing department and environmental commitment of the firm. Out of this commitment influences green assessment directly and environmental performance impact purchasing performance directly.

2011	The Influence of Greening the Suppliers and Green Innovation on Environmental Performance and Competitive Advantage in Taiwan	Chiou, T.Y., Chan, H.K., Lettice, F., & Chung S.H.	The paper aims at providing empirical proofs to encourage companies to implement GSC and green innovation in order to improve their environmental performance, and to enhance their competitive advantage in the global market and uses Structural Equation Modeling that verifies the significance of the proposed relationships among the selected variables.
2011	Sustainable Production: Practices and Determinant Factors of Green Supply Chain Management of Chinese Companies	Xianbiag Liu, Jie Yang, Sixiao Qu, Leina Wang, Tomohiro Shishime and Cunkuan Bao	A special emphasis is laid on companies' overall green supply chain practices, which is measured by using data from various respondents in a questionnaire survey.
2011	Research on the Performance Measurement of Green Supply Chain Management in China	Yan Li	The paper tries to improve the environmental performance by implementing a variety of GSCM practices in additionally top level manager's commitment is necessary for development of any GSCM program.
2010	Evaluating Green Supply Chain Management among Chinese Manufacturers from the Ecological Modernization Perspective	Zhu, Q., Geng, Y., Sarkis, J., & Lai, K.H.	The study includes a comparison between Chinese manufacturers and Japanese manufacturers which implies more significant improvements made in environmental and financial performance and additionally four other GSCM practices were implemented.
2009	Opportunities in Green Supply Chain Management	Jonny C. Ho, Maurice K. Shalishali, Tzu-Liang Tseng and David S. Ang	A comparison is performed between traditional and green supply chain. It includes several important opportunities in green supply chain management, including those in manufacturing, bio-waste, construction, and packaging.
2009	An Empirical Study of Green Supply Chain Management Practices Amongst UK Manufacturers	Daine Holt and Abby Ghobadian	The paper identifies various operational activities within a supply chain and also suggests the factors which are driving these operational changes.
2008	Environmental Management System and Green Supply Chain Management: Complements for Sustainability?	Nicole Darnall, G. Jason Jolley and Robert Handfield	The paper evaluates a relationship between environmental management system (EMS) and green supply chain management (GSCM) practices.

2008	Influences, Practices & Opportunities for Environmental Supply Chain Management in Nova Scotia SMEs	Raymond P.C., Lopez J., Marche S., Perron G.M. & Wright R.	This paper demonstrates that opportunities exist to reduce greenhouse gas emissions and solid waste within supply chains using environmental performance and environmental issues as working variables.
2008	Drivers for the Participation of Small and Medium-Sized Suppliers in Green Supply Chain Initiatives	Su-Yol Lee	The paper shows that buyer's GSC practices, readiness and participation, also government support plays a vital role in motivating small and medium-sized suppliers towards GSCM practices.
2008	Knowledge management barriers: An interpretive structural modeling approach	M. D. Singh and R. Kant	The paper identified KM barriers to the organization and a relationship among them is made, further giving solutions by using ISM methodology.

GSCM Vs Conventional SCM:-

The conventional or the conservative supply chain management is different in many aspects as compared to green supply chain management. The main idea with conventional SCM is usually the focus on the economy or the financial systems whereas GSCM has the focus on both the environment as well as economy or financial systems. The GSCM is green, integrated and ecologically optimized whereas the traditional SCM neglects the harmful effects on human beings (Beamon, 1999; Gilbert, 2000; Ho Johnny, Shalishali, Maurice, Tseng, & Ang, 2009). Also the traditional SCM focuses more on the end product without taking into consideration the harmful effects to the human beings during its production and distribution. Ecological requirements are key criteria for products and productions and at the same time the company must assure its economic sustainability by staying competitive and profitable (Ho Johnny, Shalishali, Maurice, Tseng, & Ang, 2009).

Barriers for GSCM Implementation:-

The issues related to environment are more significant in India thus the manufacturing companies need to concentrate on the energy and resources for having green and sound supply chain. The various barriers for implementation of GSCM in Indian automobile industry from the literature reviews and expert opinions have been found. The barriers are as

Lack of IT Implementation:-

The strong and efficient information and technology system is very essential for favoring Green SCM at various stages of the product life cycle. Efficient information systems are needed for tracking and tracing the returns of product, linking with the previous sales (Ravi & Shankar, 2005) Information support is necessary for developing linkages to achieve efficient GSCM in automobile industry. It is required to handle information's flows associated with both forward and backward flow of materials and other resources to manage green SC efficiently (AlKhidir & Zailani, 2009). Moreover Information and Technology usage helps in reduction of lot of paper usage, which supports GSCM philosophy. So, lack of IT implementation is an important barrier to achieve efficient GSCM.

Resistance to Technology Advancement Adoption:-

The advancement in technology is a kind of knowledge. Any organization in which the knowledge can be shared faster and easily will have a competitive edge (T Sai & Ghoshal, 1999). High-tech development can be achieved by higher transferability. It is easy to share technological transfer or share technological knowledge with higher explicitness (Cooper, 1994). Resistance of organizations to technology advancement adoption is the resistance to change. An organizational barrier means difficulty of implementing fundamental change in the organization. This is especially true when there are changes in the core features of organizations like organizational goals, forms of authority, core technology, operational strategy and market strategy (AlKhidir & Zailani, 2009). Therefore, resistance to technology advancement adoption is important barrier to implement GSCM in industry.

Lack of Organization Encouragement:-

Casual connections and improved communications or statement helps the company or organization to opt green practices. (Yu Lin & Hui Ho, 2008). Training and education are the prime requirements for achieving successful implementation of GSCM in any organization (Ravi & Shankar, 2005).

Market Competition and Uncertainty:-

In today's scenario market uncertainty is very high due to global competitiveness, and customer's requirements (Yu Lin, 2007). The external environment in which a firm conducts its business will also influence the innovative capability as well as intention to adopt innovations (Hosseini, 2007). We assume that market competition and uncertainty is most important barrier to achieve GSCM in Indian industries.

Lack of Implementing Green Practices:-

Innovative green practices involves hazardous solid waste disposal, energy conservation, reusing and recycling of materials. Innovative green practices promote innovative design, new market opportunities and makes their quality better than others. However, due to market competition and cost implications, organizations try to save cost. Implementing GSCM practices initially involves high investment. Financial constraints also lead to resistance to implementing green practices (Ravi & Shankar, 2005). Thus we expect that lack of implementation of green practices is the most important barrier to implement efficient GSCM in

Lack of Top Management Commitment:-

Top Management support is especially useful for environmental practices such as GSCM. Top management has significant ability to influence, support actual formation and implementation of green initiatives across the organization (Sarkis, 2009). Top management provides continuous support for GSCM in the strategic plans and action plans for successfully implementing them (Ravi & Shankar, 2005). Therefore, we assume that lack of top management commitment is one of the barriers to implement GSCM in industries.

Conclusion:-

The cost and complexity are perceived as the biggest barriers for implementing Green SCM, which highlights the need for cost effective and easy to implement solutions. Brand building is one of the top incentives for green SCM, highlighting the importance of public perception of how companies operate. Recycling of raw materials and component parts are the top green manufacturing and production focused initiatives Adoption of green practices is highest in those areas of the supply chain where there is a direct relation to cost savings and efficiency, for example in inventory reduction, recycling of raw materials.

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