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An Investigation of Green Supply Chain Management in Indian Construction Sector

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Abstract: ***Under the scenery of globalization, Green supply chain management (GSCM) is identified as a direct and effective mechanism to address environmental problems along the global value chain. The concept of GSCM is to integrate environmental thinking into supply chain management. GSCM not only improves environmental performance but also helps reduce cost, improves efficiency and speeds up innovation. The objective of this paper is to study significance of GSCM as wellits drivers and challenges that the construction sector in India is experiencing for its implementation. Innovative sustainable ideas can help organizations become profitable while helping the environment.***

Key words: Green supply chain management (GSCM), construction, environmental performance, drivers and challenges

1. Introduction

Environmental issues across the world ranging from extreme weather to scarcity of water have affected 40% of world‟s population for several decades. Construction has been described as a major exploiter of natural resources both physical and biological (Spence and Mulligan, 1995). More recently, the focus has expanded to broader topics such as sustainability and has forced nations to identify the causes and solution to global warming before it is too late to end it.

Aside from nations actively participating in reducing climate change, many consumers, shareholders and businesses are becoming more attuned to and involved in growing green movement. With customer loyalty shifting towards environmental friendly products, businesses are increasingly trying to make their supply chains greener by introducing sustainability strategies throughout their organizations and supplier relationships. The focus on sustainability has resulted in a growing need for integrating environmentally sound choices into supply chain management research and practice. The trend towards developing green supply chain is now gaining popularity among different industries.

GSCM integrates environmental thinking into supply chain management (SCM). SCM was born in the manufacturing industry in the 1990‟s with the Just In Time (JIT) delivery system implemented in Toyota (Vrijhoef and Koskela, 1999), with the main aim of reducing inventories and regulating suppliers interaction with the production line. This includes introducing technical and innovative processes into materials sourcing and selection, delivery of the final product to consumers, and end-of-life product management. The intended result is to improve a business, environmental impact while increasing efficiency and growth within its own supply chain.

GSCM integrates green practices such as green design, green purchasing, green manufacturing, green transportation, recycling and reverse logistics (Srivastava, 2007). These practices are merged with the three dimensions of GSCM, which are environmental performance, economic performance and operational performance.

The present study is significant to identify the various practices of GSCM, drivers and barriers faced by the Indian construction industry in implementing it.

2. Literature Review

An analytical review of articles was carried out. The objective of the review was to identify the importance of GSCM, its practices and association on how to authorize it to the construction sector.

Green supply chain management (GSCM) has been adopted as an antidote for a best practice in the construction industry. Green supply chain management aims to maximize the overall environmental profit by adopting a life cycle approach through product design, material selection, manufacturing, and sales and recovery. Therefore, it helps the firm to realize its sustainable development and improvement (Shi et al., 2012).

Commitment to improve environmental performance is an internal organizational driver in which environmental performance is considered as a major agenda in the company policy (Simpson et al., 2007).

Internal environmental management (IEM) is a prerequisite for all GSCM practices. Internal environmental management is the practice of developing green supply chain management as a strategic organizational imperative through commitment and support from senior and mid-level managers (Zhu et al., 2008).

GSCM is related with any attempt of improving the environmental performance of the purchased products/services or the suppliers that provide them (Bowen et al., 2001a). The main aims of GSCM are to identify

benefits, costs and risks associated with environmental performance (Hanfield et al., 2005)

The classification of drivers is based on a survey carried out by Rao (2005), in which two main factors were identified as the most significant, sustainability motivators and economic motivators. Sustainability motivators refer to the improvement in management practices to prevent significant environmental impacts as well as develop new environmental solutions (Rondinelli and Vastag, 2000). Economic Motivators refer to the reduction in energy use, raw materials, increase market share or any strategy that could be translated into financial capital (Morrow and Rondinelli, 2002).

Lack of resources is probably the most important barrier identified because the sources needed have to compete with other company‟s priorities (Stoesser, 1997). In addition, the costs and efforts involved in the design, development, documentation, implementation and certification of an EMS usually discourage smaller companies in which financial resources are restricted (Rondinelli and Vastag, 2000). Furthermore, costs have to be incurred on the short term whilst the benefits can take years and often can be difficult to associate with the measures taken (Freimann and Walther, 2001). Finally, lack of markets for recyclable materials can become a barrier for companies trying to implement product-based strategies (Rao, 2005).

Top-management commitment needs to understand the value, efforts and support required to implement GSCM strategies successfully (Lippmann, 1999). On the other hand, middle management commitment, knowledge and awareness towards legislation and environmental impacts are a crucial step towards the successful implementation of GSCM strategies (Bowen et al., 2001a). Another barrier identified is the internal communication within a company.

Organizations need to communicate effectively their environmental goals to their own personnel as well as their stakeholders and make clear how these goals relate with their regular functions (Lippmann, 1999). Lack of appropriate organizational structures and widespread ignorance of supply chain philosophy are also barriers identified for the implementation of GSCM (Akintoye et al., 2000).

For Small and medium Enterprises, lack of knowledge about environmental impacts or underestimation of the environmental impacts is usual, one reason is that legal thresholds are usually bigger (Hillary, 2000). Lack of technical knowledge and skills on SMEs are also common. In the absence of other capabilities (such as quality control, inventory control management or pollution prevention) the concepts of continual improvement, lean production practices as well as avoiding the focus on “end of pipe technology” are more difficult to understand and achieve (Darnall and Edwards, 2006).

Finally, the lack of government legal enforcement (Shen and Tam, 2002) or compliance with different types of legislation (local, national or even international legislation depending on the size) can be considered as a barrier to SMEs (Hillary, 2000).

From above analysis the most critical factors for implementation of GSCM can be concluded as lack of resources, short term planning and lack of markets for recyclable materials, cost and efforts involved, top management commitment, lack of knowledge, lack of information and lack of support

3. Objectives

The construction industry is one of the most important sectors for the human civilization by improving society‟s physical environment but it always has a significant and irreversible impact on the environment. The idea of GSCM is to eliminate or minimize waste along supply chain. GSCM has emerged as an important new innovation that helps organizations develop “win-win” strategies that achieve profit and market share objectives by lowering their environmental risks and impacts, while raising their ecological efficiency (Ninlawan C et al 2009)

Studies reveal that large number of businesses understands the importance of GSCM, but the number of firms that actually engage in such practices is significantly low. The research is aimed to identify factors such as:

- Significance of GSCM in construction sector.
- Barriers and expectations about the economic impacts for implementing GSCM practices.
- Identification of the main drivers to implement GSCM practices.

4. Methodology

- Literature Collection
- Study of Literature
- Assimilation of factors
- Data Collection (Design of Questionnaire)
- Analysis of Data
- Preparation of Optimization model

5. Green Supply Chain Management

Green Supply Chain Management (GSCM) is defined as "the process of using environmentally friendly inputs and transforming these inputs into outputs that can be reclaimed and re-used at the end of their lifecycle thus creating a sustainable supply chain.” It is not astounding that GSCM finds its clarification in the supply chain management. Green component along with supply chain management involves addressing the influence and relationships of supply chain management to the natural environment.

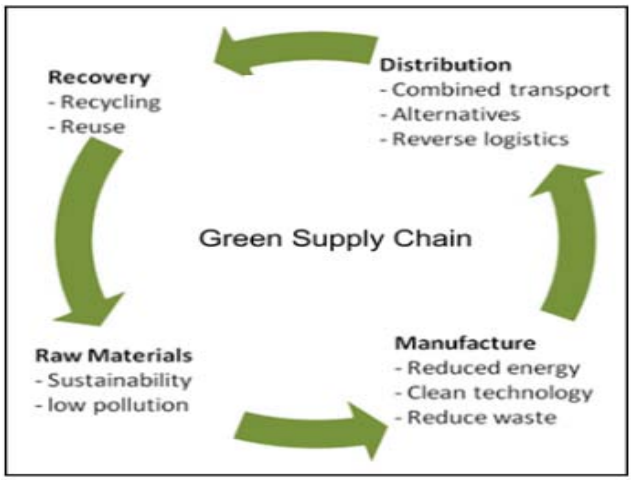

Figure 1: Green Supply Chain

GSCM focuses on [1] reduction of cost and maximize economic benefits [2] Inclusion of environmental performance I the enterprises internal and external management [3] low carbon and environment protection. In GSCM product flow is circular and reversible and all products must be managed throughout the entire life cycle and beyond that waste finds a second life or becomes raw material available for new production or other purposes. Green supply chains can be promoted through green procurement, corporate social responsibility and sustainable consumption education and practices.

6. Data Analysis

To analyze data various researches use RII (Relative Importance Index) to determine importance of green supply chain management to the construction industry. The option with the highest RII for a question is the preferred option for that question. To evaluate green supply chain management, the questionnaire related to investigating GSCM practices, measure GSCM performance, and explore GSCM pressure are prepared. Before using this questionnaire, working with experts in environmental management is done along with validity and reliability assessment of questionnaire. According to study 36% of manufacturing industries have plans to implement GSCM initiatives within 2 years as well 40% of companies use electronic processes to create efficiencies in sourcing and procurement.

7. Conclusion

The above study gives a vision on the importance of green supply chain management and identifies the various drivers and challenges in implementing GSCM practices to construction industries. In terms of the barriers the most significant were lack of resources and short term planning, followed by problems on access to information and expertise, together with lack of government pressure. Keeping these factors aside there are some positive factors like cost benefit, image improvement, reduction of environmental risks, reduction of waste that can help implement GSCM practices to the construction industry

8. Recommendations For Future Work

More research to be done on green supply chain management in the construction industry. The concept of GSCM should be continuously promoted thus increasing public awareness. There is an urgent need to introduce green supply chain management in various sectors. It would be useful to analyze in detail the suppliers, specifically their attitudes and resources to implement GSCM practices, the knowledge and internal capacity to respond to their customers‟ pressures and finally the strategies to overcome the barriers faced.

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