GREEN SUPPLY CHAIN MANAGEMENT IN DEVELOPING COUNTRIES

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Abstract:
The concept of Green Supply Chain Management (GSCM) is new and a promising paradigm shift in promoting environmental sustainability. Although supply chain management as a whole is a well-known process associated with most industries, the concept of going green in supply chain management is somehow new to the business world, corporate, and construction firms. As of today, literature documents are very few on GSCM. In most corporate, construction firms and businesses the emphasis now is to raise environmentally responsible consumption and production with a view of promoting environmental quality, reduce poverty and bring about economic growth, with additional improvements in health, working conditions, and sustainability. Green Supply Chain Management (GSCM) is an environmental management tool which integrates environmental thinking into supply chain management. It has gained prominence among academics and practitioners. The aim of this paper is to briefly review the recent literatures on GSCM and also to determine the new direction of this emerging field. The review focuses on gaining understanding on different GSCM practices in developing countries. It includes literature which is relevant to environmental and social sustainability in construction management practices found in the developing countries.

Keywords: Construction Industry, Developing Country, Supply Chain Management, Sustainability

INTRODUCTION

In recent time, most organizations are going green in their businesses as concerns to environmental sustainability. They must portray the environmentally friendly image of products, processes, systems and technologies (Vachon and Klassen, 2006). Environmental impact occurs at all stages of a product life cycle from resource extraction to manufacture, use, reuse, recycle and disposal (Zhu et al., 2007).

The increase of industrialization and globalisation in developing countries creates more opportunities for manufacturing industries but concurrently increases environmental burden (Rao, 2002). The current changes in environmental requirements that influenced manufacturing activities have increased attention in developing Environmental Management (EM) strategies for the supply chain.

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Thus, the concept of GSCM arises as a new systematic approach and becoming an important factor for business activities today. Zhu et al. (2007) pointed GSCM as an environmental innovation. By integrating the green concepts to the supply chain concepts, whereby the supply chain will have a direct relation to the environment. Green Supply Chain Management (GSCM) emerges as a new systematic environmental approach in supply chain management and has been increasingly accepted and practiced by forward thinking organization. In most business and construction firms, the emphasis now is to raise environmental quality, reduce poverty and bring about economic growth with additional improvements in health, working conditions, and sustainability. The purpose of this paper is to review some of the green supply chain management practices, adoption and implementation in developing countries.

**Research Framework**

The research framework is presented in Figure 1. The research framework for this study will commence from the history and evolution of green supply chain management to extend the study about GSCM in more depth, to GSCM practice in developing countries, then narrow down to South Africa and a direction for research will be ascertained.

**Figure 1: Research framework**

**HISTORY OF GREEN SUPPLY CHAIN MANAGEMENT**

Managing supply chains gained notoriety in practice as evidenced by management and engineering literature in the early 20th century (Svensson, 2001). Some of the initial best practices of modern supply chains, such as lean and just-in-time (JIT) manufacturing can be traced to Henry Ford’s efforts to vertically integrate the automotive supply chain and organizational practices. The concept of JIT and SCM at that time focused on enhancing operational efficiency and minimizing waste (Bornholt, 1913; Faurote, 1928). The purpose of the minimization of waste was not for environmental, but economic reasons. Waste means greater economic loss (Lai and Cheng, 2009). During these early periods, industrial pollution was not a major topic of investigation for management or economics scholars. In economics, the use of taxes for managing externalities such as industrial pollution was proposed (Pigou, 1920). However, the debate of taxing for environmental pollution caused by industrial activities was essentially the limit of the discussion at the time. Philosophical developments during this period
were occurring with discussion on whether the natural environment deserved its own rights and had its own intrinsic value (Leopold, 1933).

Some of the earliest work that can be tied to today’s greening of the supply chain, occurring even before the formation of the United States Environmental Protection Agency, can be traced to Ayres and Kneese (1969). This work presented some of the earliest issues related to reconciling industrial metabolism and material balancing as well as the roles of production and consumption in the supply chain. Although, their work focused on a linear relationship from extraction to disposal, some loops were incorporated into the evaluation and there were concerns about the possibility of integrating ‘residuals’ back into the system. Interestingly, not only were solid and water pollution waste included in the discussion, but warnings of global climate change due to carbon and other greenhouse gas emissions was also prevalent in the argumentation on evaluating the roles of inter-organizational relationships. Further refinement of the industrial metabolism and material flow balance ideas occurred throughout the 1970’s (Ayres, 1978).

Discussion on how to utilize the mass balance for organizational and governmental decision making was also introduced in the early 1970’s through “a process-chain evaluation model estimates the cumulative costs (direct and hidden) of various processes or steps that form ‘chains’ leading from a set of raw material inputs to a marketable output such as semi-finished or consumer products” (Stern et al., 1973). Also, concurrently, the further refinement of the industrial eco-systems philosophy (Jelinski et al., 1992) and further acknowledgement of the supply chain concept as a strategic competitive weapon was occurring (Bhote, 1989).

**Evolution of Green Supply Chain Management**

The environmental movement in the United States was catalysed in the late 1960s due to the increased consumer concern about degradation resulting in the formation of the environmental protection Agency in the early 1970s, with the directives of enforcing regulations covering industrial manufacturing of all firms along supply chain (Sarkis, 2012). These resulted in an increasing need for the application of environmentally-sound decisions in supply chain management (SCM), shifting planning from reactive to proactive. Consequently, environmental performance standards have become increasingly incorporated into contracts guidelines for supply chain partners (Simpson and Samson, 2007). A firm’s response to the environmental requirements of external stakeholders is directly influenced by their level of commitment related to both environmental awareness and performance. In such environmentally – based scenarios the supplier customer relationship is impacted by both existing transaction cost requirements as well as environmental commitment of both entities. Responding to growing needs for environmental compliance, GSCM evolved, reflecting an integration of environmental thinking. GSCM entails a comprehensive perspective, including product design, material sourcing and selection, manufacturing processes, delivery of final products to the consumers, as well as end-of-life management of the products (Strivastava, 2007). According to the Strivastava and Lu et al., 2007, GSCM is growing in importance and driven by increasing environmental degradation, diminishing natural resources and rising pollution level.

**GREEN BUILDINGS**

In most countries, buildings are the largest driver for both energy use and CO2 emissions. Europe’s buildings use over 40%, the continent’s energy and are responsible for 40% of its
carbon emissions (BPIE, 2011). Among developing countries, the share of the building in total energy use and emissions is much lower with china buildings for example, representing a 10% share of that nation’s energy use. But rapid economic growth and industrialization in these countries is pushing a booming construction sector. As a result, by 2030, Asian countries are expected to contribute a third of worldwide GHG emissions. Consequently, the challenge to reduce the energy and GHG footprint of new existing buildings is a very serious one.

Sustainability management in buildings consist of construction, lifetime use and decommissioning. Throughout these stages, the main objective is to be efficient in the use of resources of the occupants’ health and well-being and reducing the negative impacts, such as waste and pollution.

**ROLE OF SCM TO THE CLIENT**

SCM is a philosophy that describes how companies should manage their supply chains to achieve strategic competitive advantages. Its objective is to synchronize the client requirements with the materials and information flows along the supply chain, until reaching a balance between client satisfaction and cost. It refers to the coordination of the activities of all the participants of the supply chain, to knowing the production requirements with the purpose of satisfying the client, to delivering products of higher value and to reducing the cost of the firm that apply these principles (Serpell and Heredia, 2006).

Though the construction process is different from production processes in factories, SCM can be useful and effective in construction (O’Brien, 1999). When working effectively and efficiently modern supply chains allow goods to be produced and delivered in the right quantities, to the right places, at the right time and in a cost effective manner (Christopher and Peck, 2004).

**PAST RESEARCH ON GSCM IN DEVELOPING COUNTRIES**

According to the United Nations (UN), a developing country is a country with a relatively low standard of living, undeveloped industrial base, and moderate to low Human Development Index (HDI) (Education pathways international, 2010). Several studies have been conducted on GSCM in developing countries. Some of the studies will be reviewed in this section.

Lee (1994) undertook an audit of practices on construction sites in Singapore, to assess the use of Environmental Management System (EMS), approaches towards energy conservation, and the use of ‘harmful or non-recyclable materials. She found that a high level of awareness of, and commitment of contractors to the need to protect the environment. She found that inefficiencies in the usage of materials were common, leading to high wastage levels, even on sites run by construction firms implementing ISO 9002 in which materials management is enshrined. She suggested that the government should provide leadership by increasing awareness of environmental protection as it had done for quality, and encouraging firms to adopt elective materials management and utilize the ISO 14000 EMS. Her suggested measures include education to enhance environmental awareness at all levels; introduction of voluntary standards; offering of financial incentives; demonstration projects on sustainable buildings; a product certification scheme for building materials, and eco-labelling; encouraging innovative technology; and developing a building assessment system for Singapore.
Zhu and Sarkis (2004) in their study on Chinese manufacturing industry discovered the following:

- GSCM practices tended to have win-win relationship in terms of environmental and economic performance.
- Quality management was a positive moderator in that quality programs along with GSCM practices performed better especially with respect to external GSCM and internal management programs, organizations seriously considering implementing GSCM practices could benefit greatly with introduction of quality management practices.
- JIT programs with internal environment management practices may cause further degradation of environmental performance and came from environmental perspectives, care should be taken when implementing GSCM programmes in manufacturing organization with JIT philosophies in place.

Ofori (2000) in his study on greening the construction in Singapore concluded that SCM should be implemented in the Singapore construction industry, embracing all the parties involved in a project to realize its full potential. Environmental purchasing should be an integral element of the form of SCM which is applied in Singapore.

Eleven barriers to implement GSCM in Indian automobile industry were identified by Luthra et al. (2011). Market Competition and Uncertainty; Lack of Implementing Green Practices; Cost Implications; Unawareness of Customers and Supplier Reluctance to Change Towards GSCM was identified as dependent variables. Lack of Government Support Systems; Lack of Top Management Commitment and Lack of IT Implementation have been identified as the driver variables. Resistance to Technology Advancement Adoption; Lack of Organization Encouragement and Poor Quality of Human Resources have been identified as the linkage variables. No barrier has been identified as autonomous variable. Market competition and uncertainty; lack of implementing green practices; cost implications; unawareness of customers have been identified as top level barriers and lack of government support systems as most important bottom level barrier. Removal of these barriers will help in implementing GSCM in Indian automobile industry.

Zhu in 2006 studied GSCM: pressures, practices and performance within the Chinese automobile industry in which they observed that increasing pressures from a variety of directions have caused the Chinese automobile supply chain managers to consider and initiate implementation of GSCM practices to improve both their economic and environmental performance. Expanding on some earlier work investigating general GSCM practices in China, authors explores the GSCM pressures / drivers (motivators), initiatives and performance of the automotive supply chain using an empirical analysis of 89 automotive enterprises within China.

Hsu in 2008 studied the green supply chain management in the electronic industry in which they mentioned that there are various approaches for implementing green supply chain management practices that has been proposed and recognized in previous literatures. According to the author, there is yet no investigation that identified the reliability and validity of such approaches particularly in the electronic industry. The author employed the fuzzy analytic hierarchy process method to prioritize the relative importance of four dimensions and twenty approaches among nine enterprises in the electronic industry. The findings indicate that these enterprises would emphasize on supplier management performance in the crucial role of implementing green supply chain management.

Zhou in 2009 study on the implementation of GSCM in textile enterprises in which according to the author, the green supply chain management is a sort of modern management
mode which could comprehensively consider the environmental influence and resource utilization efficiency in the whole supply chain. In another study, Ninlawan et al. (2010) worked on the implementation of green supply chain management practices in electronics industry in which they aimed to survey current green activities in computer parts’ manufacturers in Thailand to evaluate green supply chain management and they conducted survey on current green activities in computer parts’ manufacturers in Thailand, 11 manufacturers were used as case studies who provided in depth responses to the interviews about green procurement, green manufacturing, green distribution, and / or reverse logistics. To evaluate green supply chain management, the questionnaire related to investigate the GSCM practices, measure GSCM performance, and explore GSCM pressure / driver within the Thai electronics industry was used to obtain the survey results. Also Seman et al. (2012) in their study concluded that there are still little research about GSCM implementation and adoption in developing countries especially Malaysia and recommended further study for more understanding toward the adoption and implementation of GSCM and also the organization awareness level on environmental problems that are caused by their business operations.

Zelani et al. (2012) results proved that sustainable supply chain management practices have a positive effect on sustainable supply chain performance, particularly from the economic and social perspective. Firms need to collaborate in advocating sustainable supply chain management practices as a route for firm’s commercial success rather than as a moral obligation. Also, Wu et al. (2010) findings revealed that firm should realize the effect of short term costs and benefits on knowledge transfer in order to enhance green management performance.

REVIEW ON GSCM PRACTICES IN SOUTH AFRICA

South Africa’s logistics sector has much to contribute as the country focuses more internally on issues of sustainability. Supply chains hold substantial potential to contribute to the achievement of vision 2025 which aims to improve South Africa energy mix by having 30 percentage of clean energy by 2025 (Annual Performance plan 2012 / 2013). The case study on Green Supply Chains is highly attractive, by addressing the problem of Carbon emission and environmental pollution; companies not only limit carbon footprint and waste, but strive to optimise supply chain performance.

The country’s top green organisations and individuals were honoured for their committed efforts at the 4th annual Green Supply chain Awards – the only awards in South Africa dedicated to greening the supply chain. It’s a joint initiative of the Chartered Institute of Logistics and Transport: South Africa (CILTSA) and the Consumer Goods Council of South Africa (CGCSA). Presently GSCM practices are adopted in Transport, automobile and Consumer goods in South Africa (Ittman and King, 2010).

Woolworths, for example are offering environmentally-friendly products, and are charging premium prices for them. They are also able to charge higher prices for organic food, since people are willing to pay for organically grown food. Sustainability can offer a company a distinct competitive advantage. Creating a sustainable supply chain creates an opportunity to save a lot of money that would have been spent on disposing of waste materials and harmful by-products. It decreases the amount spent on scrap by making money out of it, and not having to waste resources spent on obeying regulations. Companies have begun to generate money from the by-products they used to throw out. They use sustainability as a tool to increase their competitive advantage (Mazumder, 2010).
FINDINGS AND DISCUSSION

The findings from this study revealed that GSCM is now gaining momentum in developing countries. Although, GSCM approaches are still relatively new in developing countries, it has been implemented in manufacturing firms and few construction firms. The findings revealed that not much literature are available in GSCM of the construction industry, but there are several literature review in manufacturing firms, the strategy used can be adopted to get results in construction firms. Also, the author identified that GSCM is not new in transport and food industry in South Africa, but the practice is relatively young in South African construction firms.

CONCLUSIONS AND FURTHER RESEARCH

This paper looked at the genesis of GSCM, how it began and transcended to developing countries. It was found that GSCM is mostly practiced in manufacturing industries and few in the construction industries. GSCM has been tested in some developing countries like Singapore, India, China, Hong Kong, Malaysia and South Africa. However, construction companies in South Africa are still chasing behind in the adoption of Green Supply Chain Management (GSCM). In conclusion, this has given a path for adoption of GSCM in South Africa construction industry because GSCM is a process of using environmentally friendly inputs and transforming these inputs into outputs that can be reclaimed and re-used at the end of life cycle thus creating a sustainable supply chain. As a well-known fact, materials are made from nature, thus needs to be ‘environmentally friendly’. Hence, there is a need for campaign awareness in the construction industry, which is a major issue the authors are addressing in their current research study.

Acknowledgement

This study is supported by the research fund of University of Johannesburg.

REFERENCES


