

A Study on the Concept of Green Supply Chain Management

Manikee Madhuri Sharma¹

¹Assistant Professor, Acharya Institute of Management & Science, Peenya, Bangalore. Author can be contacted at Email-id: manikeesharma@gmail.com

ABSTRACT

The top companies from everywhere the world practice a powerful novel source of competitive advantage. It is called the Supply Chain Management and it embraces all of those integrated actions that bring product to market and craft satisfied customers. The Supply Chain Management Program assimilates topics from manufacturing operations, purchasing, transportation, and physical distribution into a cohesive program. Successful supply chain management, then, synchronizes and integrates all of these activities into a unified process. It holds and links all of the partners in the chain. In addition to the departments within the organization, these associates include vendors, carriers, third party companies, and information systems suppliers. Within the organisation, the supply chain denotes to a wide assortment of functional areas. These include Supply Chain Management-related activities such as inbound and outbound conveyance, warehousing, and inventory control. Obtaining, procurement, and supply management fall beneath the supply-chain umbrella, too. Estimating, production planning and scheduling, order processing, and customer amenity all are part of the process as well. Importantly, it also exemplifies the information systems necessary to monitor all of these activities. The paper accentuates upon the application of Supply Chain Management and adding the `Green` element to it so as to emphasize upon the need of environment friendly systems. The growing significance of GSCM is motivated mainly by the mounting deterioration of the environment. The waste and discharges caused by the supply chain have become one of the foremost sources of stern environmental problems including global warming and acid rain. One of the crucial aspects to green supply chains is to improve both economic and environmental performance concurrently throughout the chains by creating long-term buyer-supplier relationships. Exertions have been made by the authors to study the supply chain of the systems with the focus on its optimization and execution. Thus it becomes of utmost importance from the organisation's point of view to follow the green supply chain management procedures to safeguard the environment.

Keywords: Green supply chain management (GSCM), Environmentally Preferable, Environmental Impact, Reverse logistic, Eco-design (ECO), Investment Recovery (IR).

1. INTRODUCTION

In today's competitive world, it is very important for companies to constantly and consistently thrive for retaining their market share. Supply Chain comprises of the stream of products and services from the main manufacturer to the final end consumer or customer. A supply chain has several components which can be as follows:

- ◆ Raw materials manufacturers
- ◆ Component and intermediate manufacturers
- ◆ Final product manufacturers
- ◆ Wholesalers and distributors
- ◆ Retailers

A Supply Chain is well connected by transportation and storage activities and is integrated through information, planning and other integration activities. In this era of globalization, many large firms are moving away from their in-house vertically integrated structures to a crisp and composed Supply Chain Management. A company in a supply chain focuses on activities in its area of specialization and enters into voluntary and trust-based relationships with supplier and customer firms.

The concern for the environment has become of utmost importance due to factors like global warming, toxic substance usage, and decrease in non-replenish sources etc. Hence organizations are now coming up with a concept called "*The Green Supply Chain Management*". Green Supply Chain Management is gaining interest among researchers and practitioners of supply chain

management. It is driven mainly by the escalating deterioration of the environment. The applications of green supply chain are beneficial to the organization's environmental and financial performance. Green Supply Chain Management ranges from green purchasing to integrated supply chain. Sometimes some companies may use materials consistently rather than wasting them. This becomes what is known as the Circular Economy. This type of an economy implies the saving of raw materials and energy of the input side and of landfill capacity on the output side. This in turn creates economic and ecological efficiency of the various organizations. This generates advances towards sustainable development and also that of cost reduction. There are variety ways, how

organizations can come up with the concept of green supply chain management viz;

- ◆ **Re-duce**
- ◆ **Re-use**
- ◆ **Re-work**
- ◆ **Re-furbish**
- ◆ **Re-claim**
- ◆ **Re-cycle**
- ◆ **Re-manufacturer**
- ◆ **Re-verse logistics etc.**

2. REVIEW OF LITERATURE

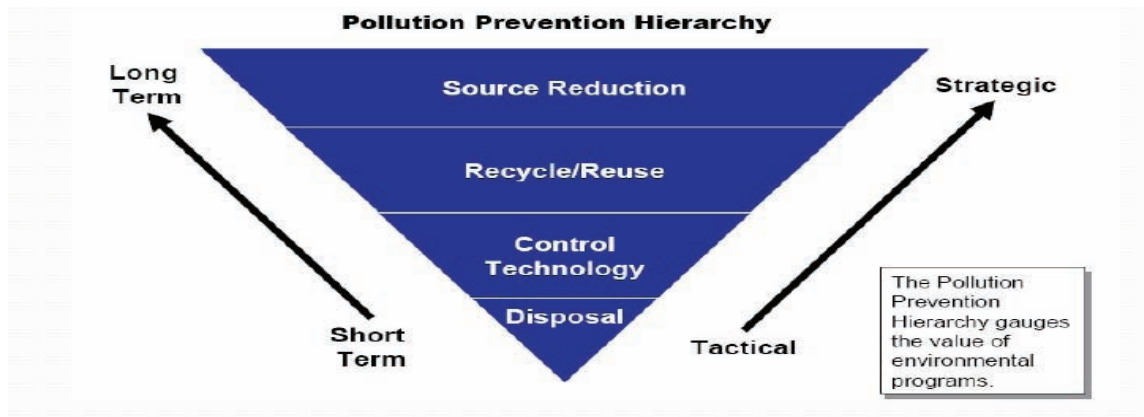
It is through a literature review that we can understand the broader concept of sustainable development and it finally outlines how and why should lay more emphasis on environmental and social issues in the supply chain. The review gives an impression that it is mainly due to the pressure from the stakeholders to augment the company's reputation and also to leverage its core competency thereby escalating the competitive advantage of the organization. In Earth Summit-1992, 'Sustainable Development' was the key concept and governments and international organizations take action to protect the environment as in integral part of long-term economic development (Bhateja, et al., 2011). Researchers (Zhu et al., 2005, 2007; Ninlawan et al., 2010;) studied Green supply chain management: pressures, practices and performance within the Chinese automobile industry and Thailand electronics industry. They understood that the increase in the pressure from different directions improves both the economic and environmental performance. *Zhu et al.*, (2005, 2007) also focused on diverse extents of practices including green procurement, internal

environmental management, eco design, customer cooperation, and investment recovery. *Hsu, and Hu* (2008) studied the green supply chain management in the electronic industry in which they stated numerous approaches for applying green supply chain management practices. *Shang et al.* (2010) and *Walton et al.* (1998) carried a Green Supply Chain Management study based eco design, green engineering and packing, environmental contribution, green promotion, stock and suppliers. Firms following green manufacturing reported to have successful competitors than rivals. The researcher (*Mudgal et al.*, 2009, 2010; *Sarode, and Bhaskarwar*, 2011) had identified the various variables which help in greening the supply chain of Indian manufacturing sector. They laid emphasis top management commitment, societal concern for protection of natural environment, regulations, supplier involvement, customer satisfaction, EMS, employee involvement/empowerment, green product development, green procurement practices, availability of clean technology, green disposal, green transportation, 3R-reduce/remanufacture/recycle, lean manufacturing practices, economic interests, eco labelling of products, reverse logistics practices, competitiveness and corporate image.

Literature review gives a clear understanding of the various investigations that has proposed different slantsto implement Green Supply Chain Management (*Lamming and Hampson*, 1996; *Lippmann*, 1999; *US-AEP*, 1999; *Bowen et al.*, 2001; *Yuang and Kielkiewicz-Yuang*, 2001; *Rao*, 2002; *Evans and Johnson*, 2005; *Zhu et al.*, 2005). However, there havebeen a minimal research on identifying the consistency and precedenceapproaches to Green Supply Chain Management implementation with the systematic analysis manufacturing industry. This is because the complexity of GSCM practices, customer and cost pressures and regulation uncertainty. Implementing GSCM is considered as a thankless task that increases overall product cost.

3. THE CRITICAL SUCCESS FACTORS TOWARDS GREEN SUPPLY CHAIN MANAGEMENT

Every organisation manufacturing an offering either in the form of a product or a service needs to have a crisp and a unique selling proposition. This unique selling proposition through continuous improvement becomes the core competency of an enterprise. This core competency with the help of a holistic support from all



Source: www.dlinkgreen.com

Figure 1: GSCM: A Strategic Analysis Tool

aspects of the organization becomes the competitive advantage for the company. As environment protection is of prime importance for every organization in today's competitive scenario, so there has to be certain factors which need to be thoroughly fulfilled in order to meet environmental concern measures. The following are a few critical success factors towards achieving green supply chain management practices, namely;

- ◆ Top Management Commitment.
- ◆ Support of top management for long-term green supply chain management processes.
- ◆ Support of top management towards green supply chain initiatives over budget schedule.
- ◆ Top management assumes that green supply chain management is a way to increase profits.
- ◆ Top management plays key role for resource allocation for green supply chain initiatives.
- ◆ The readiness to accept change by the top management in order to facilitate green supply chain management processes.
- ◆ Government policies and regulations.
- ◆ Government should take stern steps towards the adherence of green supply chain procedures in organisations and there may be possibility of firm to be thrown out of business if not comply with the regulation or deny it.
- ◆ Literacy towards eco-protection amongst supply chain partners or team responsibility for green supply chain management.

- ◆ Dedicated green supply chain management teams are needed for green supply chain initiatives.
- ◆ Supplier involvement.
- ◆ ISO 14000 suppliers should be given preference.
- ◆ Proper workplace and employee involvement management.
- ◆ Green product development.
- ◆ Availability of clean technology.
- ◆ Green packaging and eco-labelling of products.

4. GREEN SUPPLY CHAIN MANAGEMENT AS A STRATEGIC ANALYSIS TOOL

GSCM can be regarded as a holistic view of the entire supply chain management concept. The below figure gives us an understanding of green supply chain as a tool for strategic analysis from source reduction to disposal every aspect taking into account with the concern for the environment. The pollution prevention hierarchy gauges the value of environmental programs.

4.1 Drivers for GSCM

In every company there is always a pressure for the management to come up with innovative ideas in order to meet up customer satisfaction and delight. Basically GSCM has two drivers external and internal. The external drivers are the pressures from outsiders like government, NGOs or consumers to the company to implement green supply chain management. And internal drivers are the intrinsic motives pertaining to a company to implement

green supply chain with the need to have efficient supply chain management practices or to attract green customers.

4.2 Practices towards Green Supply

There are two main practices towards green supply management. They are *Green Design* and *Green Operations*. Green Design is in the direction of systematic environmental consideration in the product design and *Green Operations* is related to all aspects of supply chain management operations.

Green Design: There are two aspects related to green design:

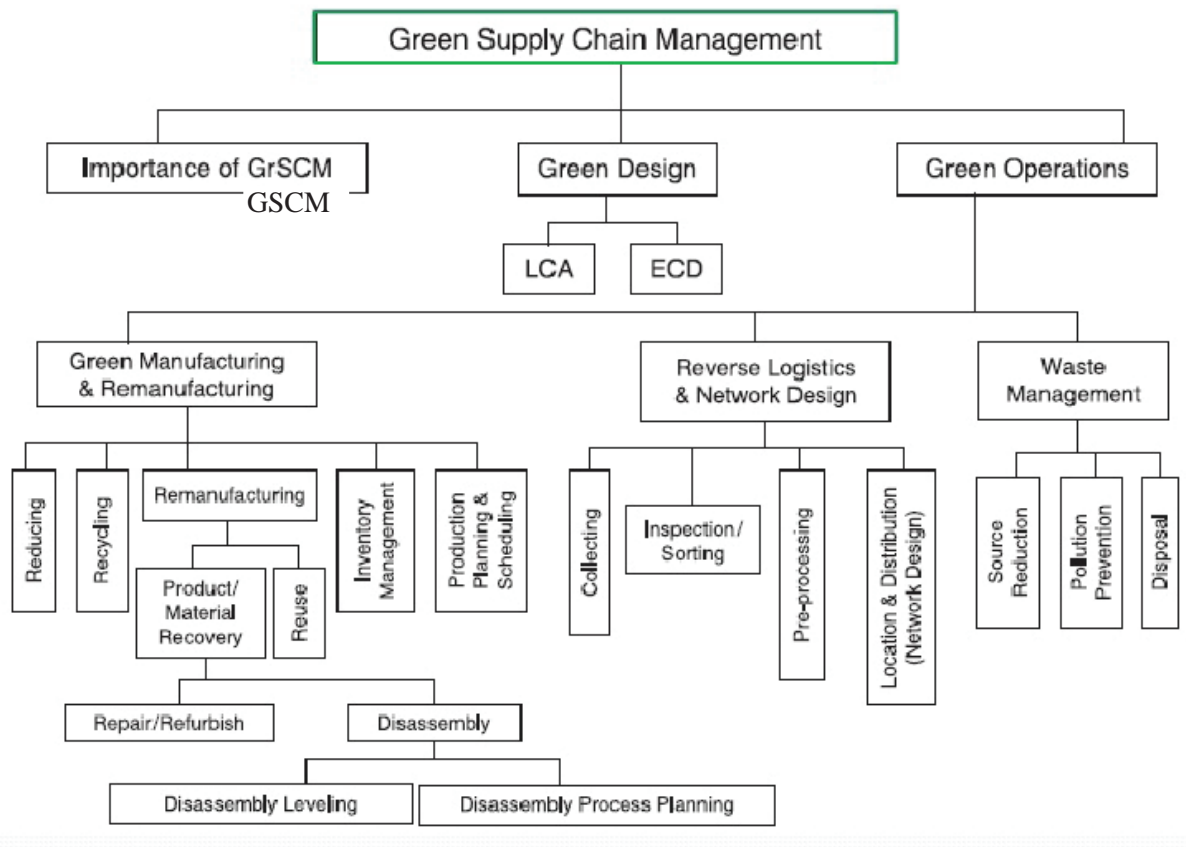
1. Environmentally Conscious design (ECD) is process of understanding the ways and means to develop concern over of how design decisions affect a product’s environmental compatibility.
2. Life-cycle Assessment/Analysis (LCA) is to analyse, assess and evaluate the conservational, pro-

fessional health and resource-related concerns of a product through all the stages of its life cycle.

Three Types of Green operations

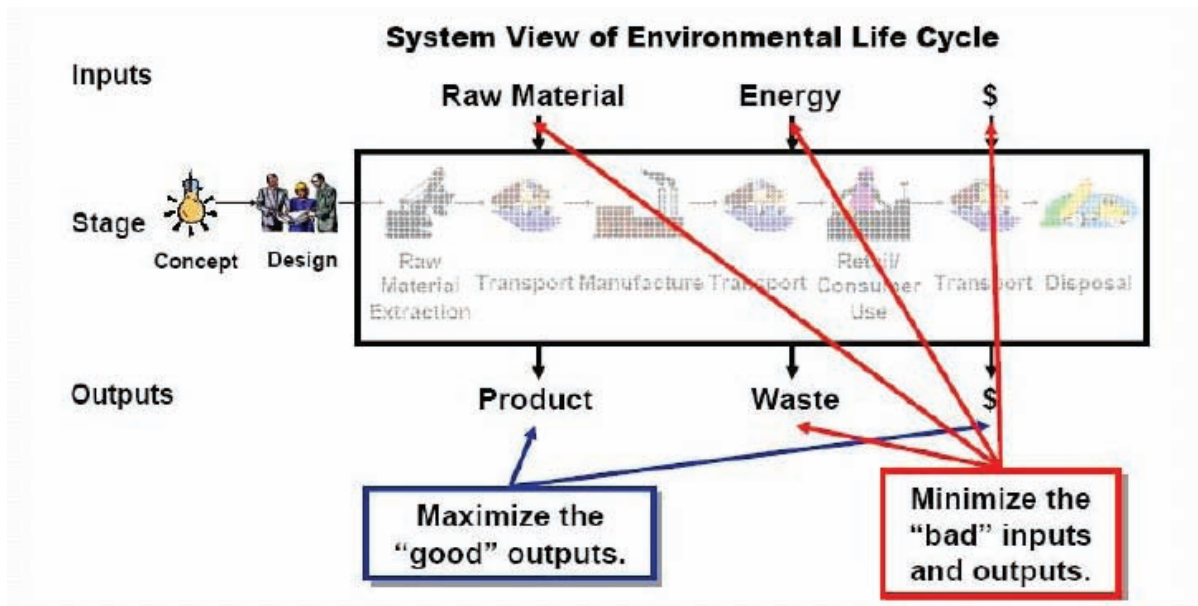
1. Manufacturing and Re-manufacturing
2. Reverse Logistics and Network Design

Green manufacturing is about using appropriate material and technologies and thereby saving most of the resources which are on the verge of being exhausted. Remanufacturing is to utilize the waste products in the process of manufacturing to re-use them for manufacturing new valuable products. Recycling is done to regain the material content of used and non-functioning goods. Reverse Logistics (RL) is the process of scheduling, applying and monitoring the well-organized, economical drift of raw materials, in-process catalogue, finished goods and associated information from the point of ingesting to the point of source for the purpose of recollecting value or proper discarding. Collection being the first stage in the retrieval process is followed by sorting of used products. It is through the umpteen



Source:www.dlinkgreen.com

Figure 2: Green Supply Chain Management System



Source: gatlininternational.co.uk

Figure 3: Indemnify "good" and "bad"

numbers of ways like redesigning logistics, green network to accommodate product returns, remanufacturing and re-use helps to minimize the operation cost.

4.3 Waste Management

Waste management can be said as the reduction of perilous waste which is generated as a by-product of the production process and operations and subsequently treated, arranged or disposed off. Waste reduction can be done at source or prevention of pollution at every step of the organization's procedures. Waste management helps to prevent the formation of waste rather than managing it after it is generated.

5. STRATEGIES OF GREEN SUPPLY CHAIN MANAGEMENT

Strategy is the approach that is being taken up by the top management of an organization towards the vision of an enterprise. In the case of green initiatives, there has to be a strategic approach by the management in order to safeguard the environment by taking and initiating green ventures.

Risk-based Strategies: This type of a strategy involves the inclusion of basic clauses towards purchasing contracts for suppliers to meet all pertinent environment regulatory

requirements. To implement green supply chain there has to be set instructions and processes that should be well notified to enterprises to follow environment-friendly based methods for all company's operations.

Efficiency-based Strategies: Green supply chain managerial practice creates an environment of being generous towards the environment by minimal waste generation. This type of strategy involves in meeting operational efficiency objectives like quality standards. Companies should adhere to proper quality control measures in order to meet up to tackle environmental ill-effects.

Innovation-based Strategies: Innovation at every step of supply chain structure is necessary in order to differentiate a company's unique selling from its competitors. Such a strategy involves more inclusive product life-cycle managerial deliberations for consumers of their products during the designing stages.

Closed-loop Strategies: Closed-loop economy is significant in implementing green initiatives. This type of a strategy involves product designing through artefact take-back and reverse logistics implemented in the supply chain components for waste reduction.

The Twelve Steps to a Greener Supply Chain

1. Step 1: Redesign of the product
2. Step 2: Reconfiguration in manufacturing

3. Step 3: Shifting to green suppliers
4. Step 4: Shortening the distances
5. Step 5: Altering service level settlements
6. Step 6: Shrinkage in packaging
7. Step 7: Plan for inverse supply chain activity
8. Step 8: Consolidation of shipments
9. Step 9: Planning for shorter routes
10. Step 10: Coordination with partners
11. Step 11: Taking a holistic lifecycle view
12. Step 12: Starting early and if required starting Now

6. BENEFITS OF GREEN SUPPLY CHAIN

Economic benefits from increased efficiency: Green supply chain management helps in reducing wastes. Companies with such initiatives decrease handling costs and even expensive inputs. The company gains competitive advantage through green supply chain management methodologies.

Competitive advantage through innovation: Efficient production is enhanced through the use of cleaner technologies, process innovation, and waste reduction. Reduction in wastes equals dollars earned. If we take the example of Arvind Eye Care, we can witness the true level of process innovations done in order to come up with competitive advantage. The eye care has welfare of eradicating blindness from a place like rural India and hence it follows certain ways like increasing the efficiency of doctors to operate more number of patients if there is innovation in the set procedures and processes.

Improved product quality: Supply chain partnerships help maintain associations between and suppliers leading to increased command and control over product design and quality.

Consistent corporate environmental goals: In an era of complex, non-vertical manufacturing, companies include supplier outreach to address corporate environmental goals.

Improved public image: Consumers, stakeholders and personnel react confidently to companies with a status for decent environmental performance.

Some Successful Cases

- ◆ In the early 1990s Xerox launched a new initiative

to take back used copiers as a source of material for new machines. Customers liked the program because they no longer worry about machine disposal. Xerox estimates several hundred million dollar savings annually. 144 million pounds diverted from landfills (2003) and 70-90% (by weight) of machines reused.

- ◆ The Dutch Flower Industry: Netherlands produces 655 of the world's cut flowers, yet has limited land. Mass cultivation in a confined area resulted in fertilizers, herbicide, and pesticide contamination. To correct the problem, growing was shifted to rock wool and water instead of soil. Fertilizer in the water is recycled through the system to reduce waste. Water based growth also reduces the risk of infestation by weeds and pests, reducing the need for chemical treatments. The new system also greatly reduced variations in growth conditions, greatly improving the predictability of output. Producers were able to increase output per space and further innovate to reduce costs.

7. CONCLUSION

Green Supply Chain Management as understood from the above inferences and analysis of various literature reviews improves the operations of an organization by employing environmental solutions like

- ◆ Improvement in agility as it helps mitigate the risks and hence augments up innovations,
- ◆ Increased adaptability as green supply chain leads to innovative processes and continuous enhancements,
- ◆ Promoting alignment as green supply chain management deals in the negotiating policies with suppliers and customers who in turn lead to better alignment of organization processes and principles.

Sustainability is an important consideration to supply chain management executives and it is through going green concept that companies gain recognition in competitive global markets. Most companies are still struggling with obtaining verifiable consistent data to measure value chain effectiveness and environmental responsibility as because nowadays it is the value that is been created in a supply chain that matters most in supply chain management. Consumer awareness and increased regulation will put added demands on companies to drive green initiatives and efficiencies in the supply chain as consumers have access to a lot of information and understand the impacts of green initiatives. Organizations require the sustainability

through green supply chain managerial practices that becomes woven into the core strategies of companies and public sector organisations. After companies gain motivation and start initiating green strategies, supply chain managers need to emphasize on the following three most pivotal aspects:

1. Greener product and packaging design.
2. Compliance of supply network.
3. Reverse logistics.

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