



GREEN SUPPLY CHAIN MANAGEMENT

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Declaration by the Guide

This is to certify that the Mr. Bidyut Kumar Koley, a student of (MBA, LSCM), SAP ID 500066782 of UPES has successfully completed this dissertation report on “Green Supply Chain Management” under my supervision.

Further, I certify that the work is based on the investigation made, data collected and analyzed by him and it has not been submitted in any other University or Institution for award of any degree. In my opinion it is fully adequate, in scope and utility, as a dissertation towards partial fulfillment for the award of degree of MBA.



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Executive Summary/Abstract:

Integrating environment thinking into supply chain management, including product design, material sourcing and selection, manufacturing process, delivery of the final product to the consumers, and end-of-life management of the product after its useful life is known as Green Supply Chain Management.

The green supply chain management (GSCM) is a powerful tool to differentiate a company from its competitors. With increased awareness in environmental policy, green supply chain management (GSCM) is becoming increasingly important for Indian manufacturers. Companies that have adopted GSCM practices, have successfully improved their business and environmental performance. Companies who have not adopted green supply chain management, are also trying to change their awareness and concept on environmental performance index for improving their business. Today's environmental performance index (EPI) of India is improving by adopting the major four activities of the green supply chain management; namely green purchasing, green manufacturing, green marketing and reverse logistics.

Chapter 1: Introduction:

The term green or sustainable supply chain management enables the idea of integrating sustainable environmental processes into the traditional supply chain management. This is including processes such as selection of supplier and material purchasing, product design, product manufacturing and assembling, distribution and end-of-life management. Instead of mitigating harmful impact of business and supply chain operations, green supply chain involves value addition and value creation through the operations of whole supply chain. Reducing air, water and waste pollution is the main goal of green supply chain, while green operations also enhance firms' performance in terms of lowest waste manufacturing, reuse and recycling of products, reduction in manufacturing costs, greater efficiency of assets, positive image building, and greater customer satisfaction. Figure 1 displays a green supply chain management framework as an example.

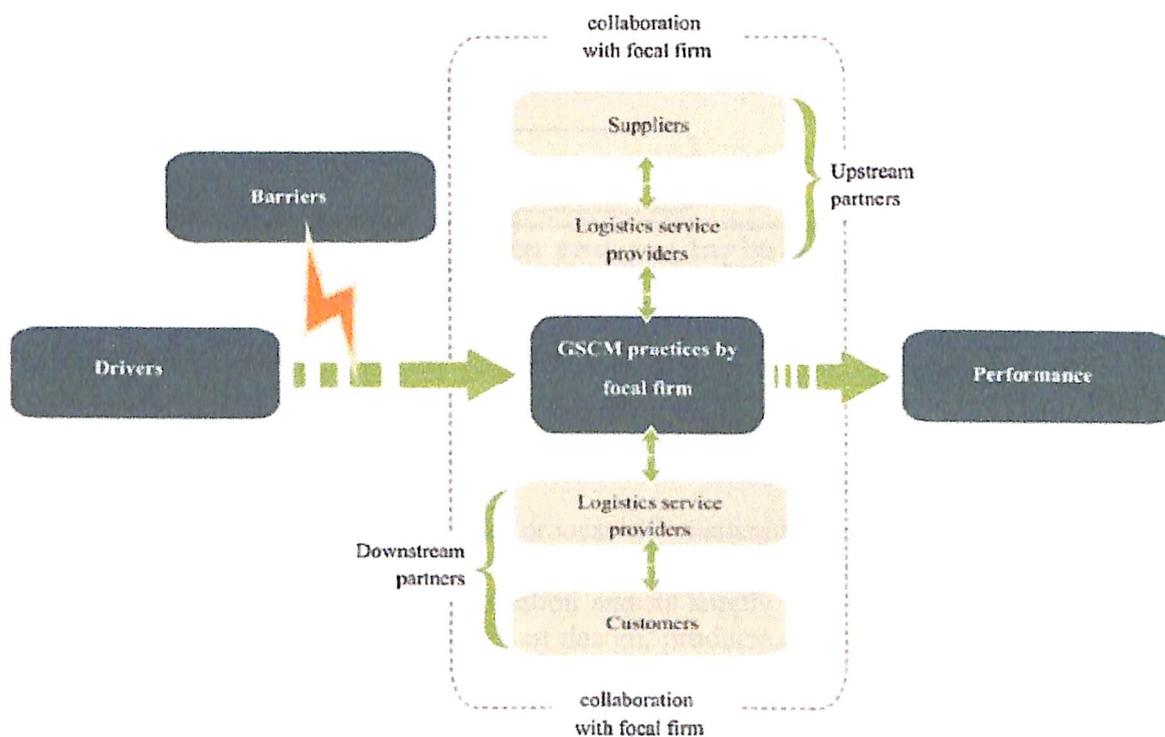


Figure 1 Green Supply chain Management Framework

Green supply chain management makes the applications of the key sustainable development strategy stand out. It emphasizes how green practices can be adopted in firms to mitigate environmental degradations and improve the economic and operational performance of firms, and these have been done by implementing green purchasing, green manufacturing and green distribution.

The concept of SCM addresses the issues relating to efficiency and effectiveness of the entire chain of the business entities with least concern to environmental issues. Now when environmental sustainability has become an important national and global concern, governments have started framing rules and business firms have started making their supply chains greener by introducing sustainability strategies throughout their organizations and supplier relationships. Green Supply Chain Management (GSCM) seeks to integrate environmental thinking into SCM, including product design, material sourcing and selection,

manufacturing process, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life. Figure 2 illustrates a simple model of green supply chain management.

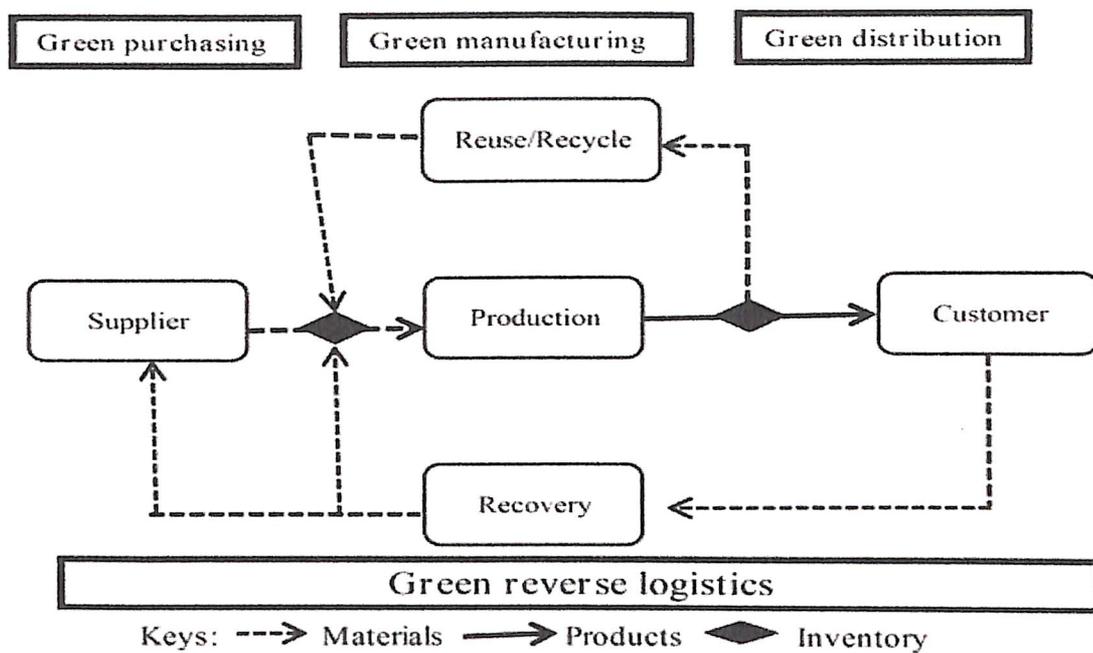


Fig.2 Simple model of green supply chain management.

Chapter 2: Literature Review:

Best definition for GSCM is that the process of managing the SCM activities with consideration for environmental, economical and social issues for enhancing the long-term economic goals of individual organization and its supply chain management. The GSCM activities which involve in the sequence of design, production, marketing, transportation and purchasing are summarized in figure3.



Fig. 3 GSCM Activities

Green Design and Packaging:

The first activity in implementing GSCM is developing sustainable design strategies for the product and for the package. This activity also includes designing products in a way that could be recycled or remanufactured.

Green Production:

Production is the second activity that is important in developing GSCM. Environmental production can be achieved by using clean production method, new technology, and

reducing raw materials and resources to reach low input, high output and low pollution . Lean manufacturing or the Just-in-time technique is the first production strategy that achieved environmental goals.

Green Marketing:

Marketing is a very important activity in developing and implementing GSCM. To achieve sustainable marketing, Organizations should keep biological balance and pay more attention to environmental protection, enhance their relationship with customers, suppliers, and other partners.

Green Transportation:

Green transportation is another important element in developing effective GSCM. Many factors including fuel sources, type of transport, infrastructure, and operational and management practices should be considered in developing environmental-friendly transportation systems.

Green Purchasing:

Developing GSCM requires implementing green purchasing strategies. Green purchasing leads to reducing waste and hazardous materials by using environmental raw materials.

Problem Statement:

Implementing GSCM strategy faces a number of difficulties. Many studies have explored these problems. The high cost of environmental programs is the main difficulty in developing GSCM.

Objective:

To Managing environmental risk, helping organizations in achieving their environmental goals, commitment to environmental improvement, improving business performance, and improved community relations.

To study the impact of green supply chain management practices adopted by Indian IT industry.

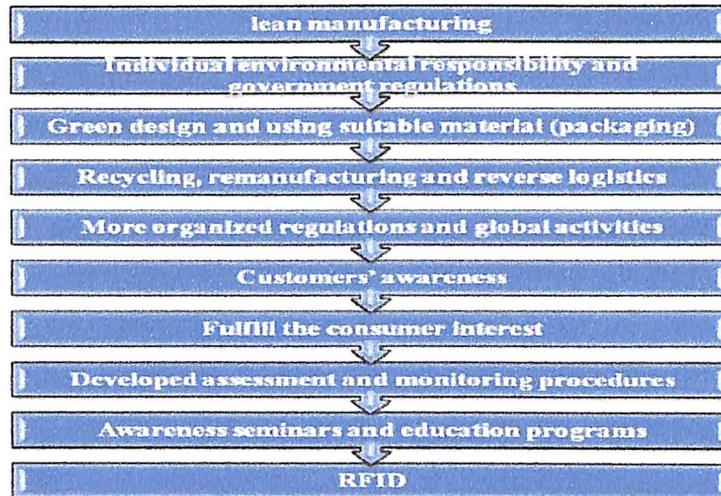
Chapter 3: Research Design, Methodology and Plan:

The type of research adopted here is descriptive. The data will be taken from the studies and researches carried out earlier and available literature review. Further books, magazines, journals and internet data has been adopted.

Reviewing previous studies helped in understanding the stages of developing GSCM over the past twenty years. The starting point for GSCM is lean manufacturing that has helped in cutting costs and improving the production quality. Then, individual environmental responsibility with forcing from government regulations is the second stage of the GSCM activates. Sustainable design and using suitable material for packaging are the third stage of

developing GSCM. Then, recycling, remanufacturing and reverse logistics have been developed in 1999. After that, more organized regulations and global adopt sustainable strategies and it moved the GSCM strategies to fulfill the consumer interest in the sustainability.

The following chart summarizes the sequence of developing GSCM over the past twenty years.



Sequence of developing GSCM

Chapter 4: Findings & Analysis:

To study the impact or effects of implementing GSCM in various Indian IT Industry such as HCL, TCS and Dell, discussed below

HCL Case1:

HCL Info Systems Ltd. is India's premier hardware, IT services and Integrated Circuit System & Consulting Company, which offers a wide spectrum of ICT products that include computing, storage, networking, security, telecommunication, imaging and retail solutions. It is India's largest vertically integrated computer manufacturing company which has four hardware manufacturing plants, two in Puducherry and one in Chennai in South India, and one in Rudrapur in North India. Computers are shipped to locations all over India with an extensive network of professional logistic support partners. There is also a customer satisfaction cell in the plants to take care of problems reported from the field. HCL has India's largest distribution and retail network with 27 warehouses across 24 states, 700 plus redistribution stockists, 93,000 outlets in 11,000 plus towns in India.

HCL always focused on developing a sustainable future through environment friendly ICT products and services. With regard to various initiatives, HCL has been recognized as one of the greenest companies among Indian ICT manufacturing companies. The company launched 'HCL ecoSafe' program which ensures that all HCL products are matching standards and compliances. This led to the introduction of Green desktops, equipped with the unique Dynamic Energy Saver (DES) technology, that cut overall power consumption by 20-35%. It also developed RoHS-compliant desktops, servers and laptops and enjoys being a leader in Green Integrated Circuit Technology (GICT) manufacturers.

The company has also taken the following initiatives to conserve energy:

- Use of recyclable packing materials in PCs and monitors.
- Made S3 as the default sleep state in all products shipped with Microsoft Windows OS, so that the product automatically switches to standby mode after a specified amount of system inactivity.
- Compliance with MPR-II certification for CRT monitors.
- Compliance with TCO'03 certification for LCD monitors.
- Initiated actions for moving to SMPS7 with active or passive power factor correction.
- Initiated actions for moving into 80 plus high-efficiency SMPS as option.
- Safe usage and disposal of asbestos cement sheet.

HCL believes that its eco product requirement can be fulfilled only by maintaining a green supply chain. Suppliers are selected on satisfying detailed quality, cost and environment requirements. HCL also has a comprehensive e-waste recycling policy, wherein it facilitates its consumers to recycle/dispose their 'end-of-life' products manufactured by HCL in an environmentally-safe manner. The HCL initiatives for green manufacturing, recycling and safe disposal of unused ICT products, have helped the supply chain to be more environment-friendly.

TCS Case 2:

Tata Consultancy Services (TCS) Limited is one of the best Indian IT services, consulting and business solutions organizations TCS is considered a 'Big Four' global IT Services company, being ranked in the topmost tier of its industry in terms of market capitalization, employees, profitability, brand value, and customer satisfaction worldwide.

To minimize the ecological footprint of the company and mitigate the impact of environmental damage through its operations, TCS has developed an environment policy that guides its key activities. The basic foundation of the policy is:

- Leadership, going beyond mere compliance.
- Climate change mitigation through commitment to reduce Greenhouse Gas (GHG) emissions and corresponding carbon footprint.
- Green procurement.
- Reduce, reuse, recycle.
- Resource efficiency.
- Green infrastructure – green buildings.
- Green IT.
- All TCS sites are compliant with all relevant environmental laws, acts, rules and guidelines.

Green Internal IT: TCS has undertaken a series of initiatives to reduce the energy footprint of data centers and computer workstations.

Green Procurement: TCS has integrated environmental performance considerations into its procurement process, including planning, acquisition, use and disposal.

E-Waste Management: TCS reduces the environmental impact of operations through environment-friendly material management practices. These are achieved through:

- Reduction of Waste at Source:
- Reuse of Material Wherever Possible:
- Recycling:

- **Purchasing Products with Recycled Content:**

Dell Computer India Private Limited Case 3:

Dell Computer India Private Ltd. was established in Bangalore, India, in the year 1996, and it has been among the fastest growing technology companies in India and continues to be among the top three IT companies. Dell manufacturing (India Customer Center – ICC) facility was inaugurated in Sriperumbudur, near Chennai, in Tamil Nadu, in 2007.

As a strategy for reducing its carbon footprints, the company has taken several initiatives to make the processes more environment-friendly. Some of these initiatives are as follows:

Optimizing Transportation Networks: The Company has reduced the waste considerably by continually refining its global processes and tools to find the most efficient use of air, land and sea transportation for every occasion,

Recycling: The company has driven many innovations in the packaging arena through its 3Cs (Cube: reduce packaging size, Content: use recycled or sustainable materials, Curb: make packaging easily recyclable). the use of bamboo packaging for lightweight consumer products and mushroom-based packaging for heavier products. Bamboo has become a popular choice as packaging material at Dell because it contains grass's natural properties. The company plans to reduce desktop and laptop packaging materials by approximately 10% worldwide, increase sustainable content in cushioning and corrugate packaging by 40%, and ensure that 75% of packaging components are curbside recyclable within one to two year.

Reverse Logistics: Dell also prevents waste by cutting down on returns and dealing with returned products efficiently. It tries to eliminate the root causes of returns, and then make more than 90% of returned assets available for resale through Dell outlet. The remaining 10% of returned Dell products are resold for parts or recyclable materials (metal, glass, and plastic).

Chapter 5: Interpretation of Results:

For effective GSCM organisations need to optimise their supply chain operations and reduce their carbon footprint. To achieve this, trade-offs throughout the supply chain are normally required. Monitoring and reducing carbon footprints makes good business sense because it eliminates waste and reduces costs. The exercise to reduce carbon footprints can also help organisations when choosing efficient business partners. I help business ready to prepared by mitigating risks associated with sudden changes in energy and fuel prices. Additionally, a lower carbon footprint can lead to an improved corporate brand and provide an advantage over competitors.

It is important for organisations to determine the environmental impacts of their supply chains. Through this process ideal baselines can be set and performance optimised. Successful organisations often work on incremental solutions to gradually improve environmental performance, at the same time minimising the burden of change in other areas. To understand fully the trade-offs inherent in their choices, executives must be able to analyse the entire value chain of a product or service in terms of cost and environmental impact associated with the supply chain process. In doing so, they can make certain that the various components in the chain interact in ways that benefit the whole system. Finally, no green initiative will succeed unless it has better economical outcome, marketing advantages for its products and services and improved benefits for consumers.

Chapter 6: Conclusions and Scope for future Work:

GSCM principles can be applied throughout the entire supply chain. In addition to being good for the environment (such as reduced waste, increased energy efficiencies, reduced air and water emissions, and reduced fuel consumption), these principles have important economic (such as increased revenue, reduced costs, improved asset utilisation, and enhanced customer service) and social benefits (such as reduced community impacts, minimised traffic congestion through improved transportation management, and better health and safety). It can also improve company's brand and reputation.

The selected three best Indian IT product companies have adopted GSCM initiatives and are reaping the rewards. HCL identified hazardous substances and removed those from the manufacturing processes. This helped the company to be a leader in Green ICT manufacturing. TCS applied GP policy to reduce resource consumption and minimize waste. Dell computers reduced costs by using environment-friendly packaging material. As the major player in India, these companies are expected to set the benchmark, and GSCM is the only way forward for clean environment and sustainable development.

The following are scope of future work aligned with the solutions stated below table:

Scope of Future Work	
Cleaner materials sourcing and manufacturing are associated with:	Improved environmental design
	Improved packaging
	Designs that use recyclable materials
	Minimal use of hazardous and environmentally damaging materials
	Better waste management and end-of-life planning
	Reduced product sizes and mass
Lower transport emissions through:	More efficient transportation systems
	Alternative fuels and improved fuel efficiency
	Optimisation of shipping, aircraft, road, and rail transportation
	Use of environmentally friendly logistics providers.
Cleaner warehouse operations through:	Strategically placed warehouses and distribution centres
	Improved warehouse layouts
	Minimising total costs/carbon footprint

	Improved efficiency and productivity.
Consolidated movement of goods through:	Use of green sourcing for both indirect and direct materials
	Collaboration with suppliers
	Use of local suppliers where possible
	Consolidation of both inbound and outbound traffic
Reduction of transit distances by:	Rerouting fleet vehicles
	Optimising truckloads and reducing empty trailer space
	Reducing mileage and improving fleet use.
Reduction of volumes and total mass shipped through:	Better design of packaging and products
	Good management of containers.
Reduction of nodes and legs for transportation by:	Using rail or mixed modes
	Using computerised route planning.
Reuse and recycling by:	Using product & packaging designs that maximise reuse/recycling
	Providing benefits to consumers to return products
	Designing and employing reverse logistics systems.

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