

# INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE & MANAGEMENT

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**GREENING OF SUPPLY CHAIN: BENEFITS AND CHALLENGES****ABRAR AHMED****STUDENT****DEPARTMENT OF ELECTRICAL ENGINEERING****BITS PILANI, DUBAI CAMPUS****UNITED ARAB EMIRATES****ANURAG REDDY RAMIREDDY****STUDENT****DEPARTMENT OF ELECTRICAL ENGINEERING****BITS PILANI, DUBAI CAMPUS****UNITED ARAB EMIRATES****SOURYA SRI HARSHA****STUDENT****DEPARTMENT OF ELECTRICAL ENGINEERING****BITS PILANI, DUBAI CAMPUS****UNITED ARAB EMIRATES****PUSHKALA MURALIDHARAN****SR. LECTURER****DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES****BITS PILANI, DUBAI CAMPUS****UNITED ARAB EMIRATES****ABSTRACT**

Supply chains have been developing over time since the inception of commercial trade and barter. Green supply chain management (GSCM) is a powerful way to differentiate a company from its competitors and it can greatly influence the plan success. With increased awareness to corporate responsibility and the requirement to meet the terms with environmental policy, green supply chain management (GSCM) is becoming increasingly important for companies. This paper explains the concept of green supply chain management, the difference between conventional supply chain management and green supply chain management and how GSCM benefits organizations while at the same time supporting a sustainable environment system. An effort has also been made to analyze research already done in this field while exploring the challenges and barriers that organizations face in implementing GSCM practices in their existing systems.


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**KEYWORDS**

Corporate Social Responsibility, Green Supply Chain Management, Environmental Sustainability, Business Strategy.

**1. INTRODUCTION**

upply chain management (SCM) is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. Supply chain management involves coordinating and integrating these flows both within and among companies. [1]

According to Srivatsara, 2007 GSCM is integrating environment thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers, and end-of-life management of the product after its useful life. [2]

Green Supply Chain Management involves a proactive rigorous effort to incorporate environmental considerations into the decision making processes of an organization using the basic principles of green procurement, green manufacturing and green distribution thereby resulting in an integration of both environmental and supply chain management along with the elimination of waste [3][4][5]. A summary of differences between the conventional Supply Chain Management system and Green Supply Chain Management system is given below:

The conventional SCM concentrated on cost, efficiency and product variety with low regard to environmental consequences as opposed to the higher emphasis of GSCM on life cycle costing, asset efficiency, waste reduction and recycling. [5]

SCM involves more conventional decision making which commonly overlooks costs and benefits that may occur in departments to which the decision maker has no relation whereas GSCM requires an organizational commitment and a more proactive approach. [5][6]

In SCM, costs incurred due to environment related inefficiencies are usually hidden in overhead accounts, leading to potential environmental impacts proving to be financially detrimental. In comparison, the main aim of GSCM is to reduce the liability of an organization to the environment. [6]

A supply chain, even though easier to maintain, need not necessarily be profitable. A green supply chain on the other hand facilitates resource conservation and product innovation which could prove to be profitable in the long run.

A supply chain requires compliance with only the usual mandates as compared to a green supply chain which has to comply with all relevant environmental regulations along with the usual mandates.

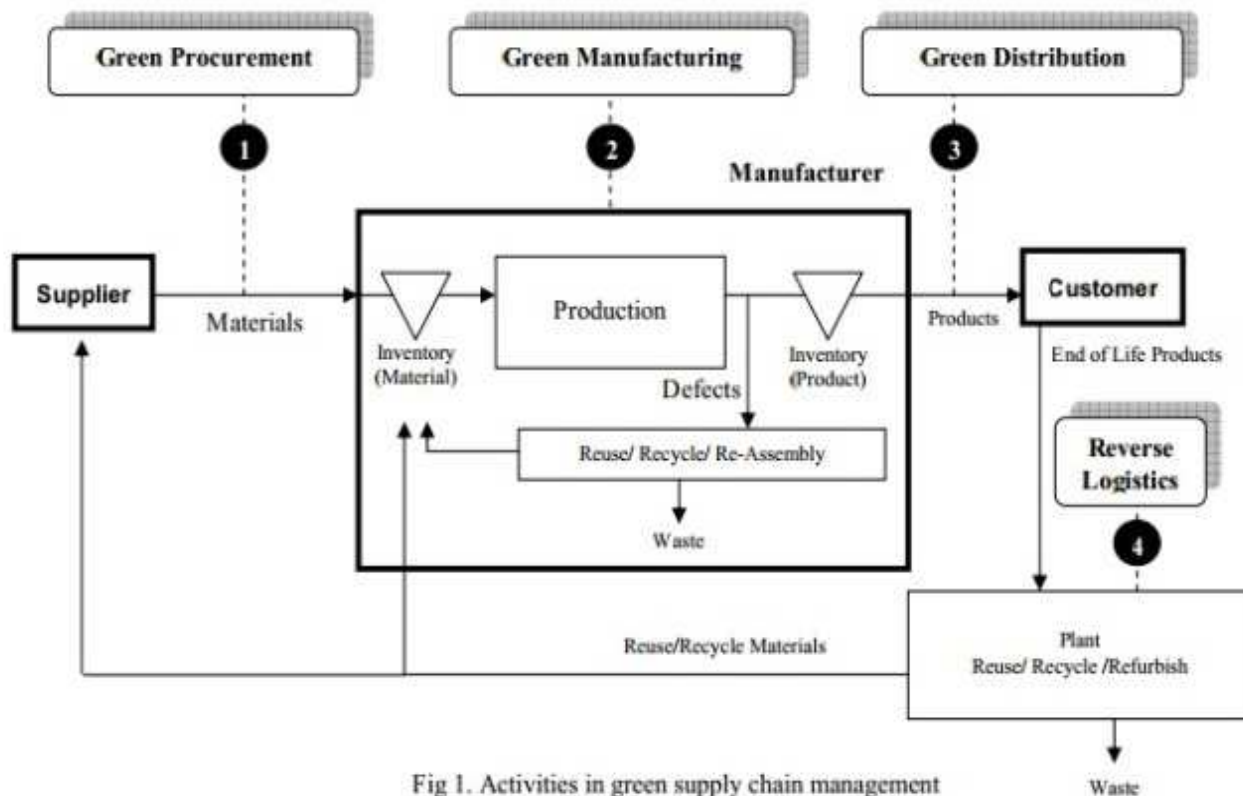


Fig 1. Activities in green supply chain management

## 2. LITERATURE REVIEW

Science for Environmental Policy, European Commission (2010) had analysed two specific GSCM practices: assessment of suppliers' environmental performance and imposing requirements on suppliers to meet certain environmental criteria. GSCM was effective at improving environmental performance in the areas of natural resource use (energy and water), waste generation and wastewater emission. Benefits of GSCM such as improved reputation and innovation are intangible and with these there may be an increase in profits in the long run.

In an era of globalisation, manufacturers need to work with their suppliers of raw material and component, in order to produce environment friendly products. By using their purchasing power, the industries can set up environment criteria for their suppliers upstream in supply chain. Ultimately it can result in the greening of the supply chain. GSCM = Green purchasing + Green manufacturing / materials management + Green Distribution / marketing + Reverse Logistics. The idea of GSCM is to eliminate or minimize waste (energy, emissions, chemical/hazardous and solid wastes) along supply chain [10].

The decision to go green requires an organizational commitment to improving environmental sustainability, backed by meaningful measures of green performance. Far from maintaining the *status quo* with a few green performance metrics added for good measure, however, the decision to adopt a green supply chain will require many organizations to fundamentally change how they operate [5].

Pagell & Wu (2009) contend that managers not only need to be continuously cognizant of sustainability goals, but also to impress upon everyone in the firm that sustainability is a daily operation at every level of the firm.

Research conducted to survey the current green activities in computer parts' manufacturers in Thailand suggests that, collaborative partnership among important stakeholders is a strong criterion to obtain efficient and effective in GSCM [3].

In the UAE, the Centre for Responsible Business of the Dubai Chamber of Commerce has done research since 2008 to assess the level of maturity of business in Dubai with regard to 'Green Supply Chain' and to identify the main trends in the field. A study in 2008 'Green Supply Chain in Dubai' by Dr. Belaid Rettab and Dr. Anis Ben Brik, suggests that lack of awareness is the major barrier towards greening of supply chain by corporates. Among companies that adopted measures, consumer expectations and legal regulations were the main motivators while company policies and competitor behaviour were also considered for change in practices. Another study 'Green Purchasing in Dubai: Practices, Drivers and Performance', conducted in 2009 reveals that even among businesses that were aware, a willingness to green does not translate into strategic alignment of green purchasing. Quality standard ISO 9000 is a well-established practice while Environmental Standards ISO 14000 and EMAS were a bit uncommon. Innovative techniques, such as low-density packaging and material purification and substitution were seldom used by businesses while eco-design and the eco-labelling of products were still embryonic in Dubai. A recent study in 2013 by Anis Ben Brik, Kamel Mellahi and Belaid Rettab 'Drivers of Green Supply Chain in Emerging Economies' reveal that in emerging economies like Dubai, it is not so much the presence of regulatory factors that bring in GSCM as is the ability of the government to monitor the implementation of such practices. While internal drivers are the leadership at the top and economic incentives that can be derived through competitive advantage, the main external drivers are regulations of the countries to which goods are exported and policies of headquarters for MNCs. The authors suggest that in emerging economies like Dubai it pays to be proactive in implementing GSCM in the corporate sector rather than being reactive. [7][8][9].

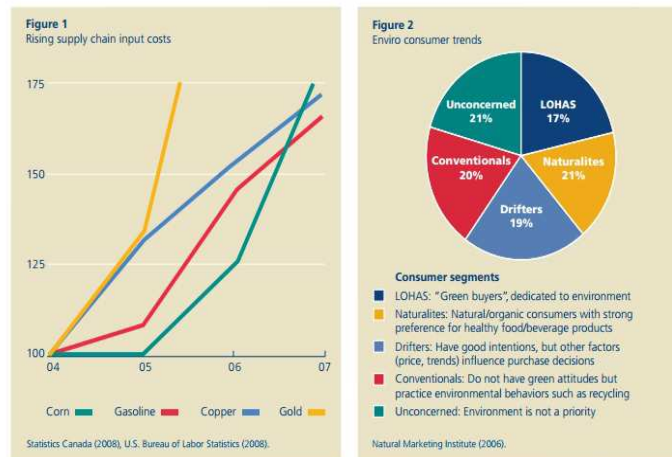
## 3. THE EVOLUTION OF GSCM

The evolution of green supply chain management started with the spike of public and consumer awareness in environmental sustainability, coupled with the rise in prices of fuel, energy and commodities has changed corporate thinking and has given rise to new opportunities [5].

As is obvious from these trends, supply chain input costs have been on the rise due to the rise in prices of basic commodities which has led to a domino effect. Add the fact that more people are aware of the world's environmental problems, and you have an increased demand for GSCM. The environmental movement from the 1960s onwards led to increased pressure on organizations to address environmental management. This was mainly driven by increasing environmental degradation, diminishing natural resources as well as rising pollution levels. It led to the formation of the EPA which led the directive of enforcing regulations covering industrial processes along the supply chain. There arose the need for manufacturers to consider the financial and social benefits of recycling and reusing product components, for manufacturers to develop 'win-win' strategies that achieve profit and market share objectives by lowering environmental risks and increasing ecological efficiency. Slowly, organizations began seeing the bright side of GSCM, of how profitable it would be in the long run. The downside of conventional decision making was obvious looking at the losses incurred due to ecological inefficiency. More and more organizations began looking at how a shared focus on reducing waste and cost deepens customer relations and gave rise to opportunities for product and service innovation. Not so prominent a few



decades ago, GSCM has begun picking up pace. Under the backdrop of globalization, green supply chain management is recognized as a direct and effective mechanism to address environmental problems along the global value chain. Using the purchasing power and consumption behaviors of governments, large enterprises and the public, green supply chain management is a market mechanism for reducing pollution and improving energy and resource efficiency[1][5][11][12].



#### 4. WHY HAS GSCM TAKEN PROMINENCE

Green Supply Chain Management has risen to new levels, especially in south East Asia and China. Western European manufacturers, concentrating on reducing costs and on outsourcing operations, are moving production to the region of Central, Eastern and South-East Europe seeking cost-efficient production facilities [11].

Green Supply Chain Management improves operations by employing an environmental solution.

- improves agility – GSCM helps to mitigate risk and speeds up innovations;
- Increases adaptability – green supply chain analysis often leads to innovative processes and continuous improvements.
- promotes alignment – GSCM involves negotiating policies with suppliers and customers, which results in better alignment of business processes and principles [13].

Companies that successfully adopt a 'green' policy can generate profits, provide positive social impact, and reduce environmental impact. Establishing a green supply chain enables an organization to gain access to key markets, differentiate them from the competition and improve products, processes and quality.

Ideas from environmentally friendly packaging to carbon-footprint reducing logistics are saving money and providing competitive advantage. Such ideas have knock-on additional benefits, from waste reduction, to less resource being spent on adhering to regulatory issues.

*Economic benefits from increased efficiency*- By reducing wastes, companies decrease handling expenses, fines, and even costly inputs. Supplier's savings may be passed along to buyer companies [14].

*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 [14].

*Improved product quality*- Supply chain partnerships help maintain relationships between buyers and suppliers leading to increased control over product quality [14].

*Consistent corporate environmental goals*- In an era of multi-faceted, non-vertical manufacturing, companies include supplier outreach to address corporate environmental goals [14].

*Improved public image*-Consumers, investors, and employees respond positively to companies with a reputation for good environmental performance [14].

Some examples to show the benefits of companies that have adopted green supply chains-

- *Wal-Mart*, which in 2005 launched a sweeping business sustainability strategy, recently set the goal of a 5% reduction in packaging by 2013. The retail giant expects the cut in packaging will save 667,000 metric tons of carbon dioxide from entering the atmosphere. Moreover, the company anticipates \$3.4 billion in direct savings and roughly \$11 billion in savings across the supply chain [13].
- *Nestlé* employs an ongoing, company-wide sustainability program that has generated significant environmental and financial benefits. The company has applied the strategy to its use of product packaging by initiating an integrated approach that favors source reduction, re-use, recycling, and energy recovery. In particular, the company's packaging material savings between 1991 and 2006 led to \$510 million in savings, worldwide, according to Nestlé's corporate website [13].
- *Heineken* committed to reduce fuel and electricity use through its "Aware of Energy" program. The company said in its 2006 sustainability report that it aimed to reduce fuel and electricity costs by 15% between 2002 and 2010. At the time of the Diamond report, Heineken had achieved savings of 6%—even after the acquisition of new breweries [13].

#### 5. CHALLENGES FACED IN GSCM

**Awareness** - Each year a different consulting group authors The Carbon Disclosure report (CDP) which is based on private and public sectors responses. One interesting point from several reports is the lack of awareness at the C-suite. Green awareness is improving but has always been a challenge [15].

**Business Case Development** - Corporate social responsibility, competitive pressures, as well as where to use limited capital will be a choke point for multi-national supply chains in the future. Strategic planners will likely struggle with business cases as best practices are shared. One interim solution as new business models mature involves integrating tying carbon to future supplier contract. This concept will take years to evolve but is critical to managing greenhouse gases and level playing field in Europe and North America [15].

**Sustainability Program Implementation** - The Implementation of the program is a big challenge. It was found that implementation is a challenge because organizations don't know which rules or standards to follow [15].

**Communications Planning** - The environmental, sustainability, green space is very broad. It encompasses everything from renewable energy to various employee commute emissions and industry specific operational definitions. Organizations have to develop a communication strategy early in Green Supply Chain planning process. The communications strategy is key to driving long term compliance and reducing emissions [15].

**Lack of appropriate technology and business processes needed** - Technology provides energy efficient solutions that have a more favorable impact on the environment. Information technology can make the supply chain greener by optimizing the resources required to support the business and also enable more effective supply chain planning, execution and collaboration, thereby reducing resource requirements. Green supply chain technologies cannot work independent of the business processes in the supply chain. Both the green supply chain and the supply chain are complementary to one another. A supply chain technology cannot work without an infrastructure which is provided by the business process, There is need therefore to have a process that captures such data [16][17].

**Trade-off between green requirements and lean practices** - Lean and green strategies are often seen as compatible because of their shared focus on waste reduction. Leanness stresses on reduced amount of inventory to go through the supply chain which minimizes the negative environmental impact of the supply chain. However, lean strategies that employ just-in-time (JIT) delivery of small batch sizes which improves sufficiency can require increased transportation, packaging, and handling which increase emissions contradicting the green approach. Outsourcing also may involve parts of the manufacturing process being transferred to plants on the other side of the world, only for the products to be transported back for the next part of the supply chain process which requires additional transportation and thus increasing emissions [16].

**Failure to integrate supply chain optimization efforts with green supply chain efforts** - Cash and Wilkerson (2003) argue that most firms implementing green supply chain practices do not actually integrate environmental considerations into their supply chain management processes. Their approach is usually driven by a need to green an existing process or a piece of the chain. Although this may have a positive impact on the environment, the environmental aspects are frequently not considered when those responsible for reviewing a business's overall supply chain performance make changes in the supply chain. They further argue that it is only after changes in the supply chain have been implemented and their effects on the environment revealed that the idea of greening the supply chain has the opportunity to emerge. There is no dearth of tools for supporting green supply chain initiatives. The challenge lies in selecting the right tool [16].

**Lack of information about the green supply chain best practices** - The aforementioned green supply chain survey found that it was not investment costs, but a lack of information on regulations and green supply chain best practices that left organizations with a limited view of what to do and implement. Green Supply Chain Operations Reference (SCOR) incorporated within the SCOR framework can provide immense help by offering information on best practices, waste disposal process and metrics to increase the success of GreenSCOR initiatives [17].

**Global sourcing making tracing of carbon footprint difficult** - Given global sourcing, tracking the carbon footprint of finished products can be difficult. Increasingly, however, new initiatives have emerged for adopting the practice of requesting a carbon footprint from suppliers. One of the examples is the carbon disclosure project that is being piloted by 11 multinationals including Dell, L'Oreal and Unilever. The project asks participating organizations to request carbon footprint information from suppliers and promote emission reduction measures across the supply chain [17].

## 6. CONCLUSION

Most of the time, greening the operations is related to corporate social responsibility or emotional aspect of business towards the environment. However for sustainability of the green initiatives, it is important that we look at this opportunity from business point of view. It is high time to focus on the tangible or intangible benefits associated with these green initiatives. Sustainability reports of many companies indicate that greening the supply chain has helped them to reduce their operating cost with increased sustainability of business. The result of a survey done by McKinsey shows that green supply chain has got maximum attention of companies. Only 3% respondents felt that it was important in past while 16% respondents felt that it is going to be very important over next 5 years and have placed it in top 2 goals of companies in supply chain management. Now it's not an option but a necessity for the companies to proactively invest in economically attractive opportunities in supply chain management that address environmental impact in the near or medium term and increases the overall sustainability of business.

Greening the supply chain takes a long-term commitment. Even for companies that have an environmentally focused culture, green supply chain implementation is a multi-year program, requiring significant resource investment. Successful green supply chain management companies include many profitable firms such as Herman Miller, Hewlett Packard, Timberland and Xerox. For these companies going green is not just a slogan, it an integral part of their business strategy.

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