

# GREEN SUPPLY CHAIN PRACTICES

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## Introduction

Patrick Penfield of the Whiteman School of Management appropriately defined Green Supply Chain Management 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 life cycle thus, creating a sustainable supply chain”.

## Key words

Green supply chain, environment friendly, processes

## Objective

To understand green supply chain management, its practices and challenges

## Methodology

To collect and collate relevant information from secondary data taken from the internet, newspaper articles

## Concept of Green Supply Chain Management

Green Supply Chain is about delivery of products and services from suppliers and manufacturers, to end customers through material flow, information flow and cash flow in the context of environment. It is about integrating the environment into supply-chain management. This includes product designing, material sourcing and selection, manufacturing processes and delivery of the final product as well as end-of-life management of the product after its useful life.

Traditional Supply Chain Management focused on total quality, optimum cost and best service but today's Green Supply chain management requires that the environmental idea be incorporated in each and every stage of the product and service in a Supply Chain. Hence Supply chain today has a great role in developing innovative environmental technologies to tackle the problems faced by the economy on environmental problems. This in turn needs to be communicated to every participant in the chain. Organizations everywhere continue to use toxic chemicals, wasteful packaging, and transportation practices that produce clouds of gases that contribute to global warming. That means, from materials acquisition and manufacturing to packaging, logistics and distribution, every stage of the supply chain provides opportunities to reduce waste and pollution.

In general, any sustainable supply chain is built on three dimensions: economical, social and environmental, in that order; while the green supply chain focuses on environmental issues with consideration of an economic result. In a supply chain profit is a first priority with respect to other two dimensions, social and environmental; while the green supply chain finds that environmental issue is an opportunity to create economic value.

Supply chain management has been historically viewed as a process wherein raw materials are transformed into finished goods and then delivered to consumer. In the past few years however, the emissions and the waste generated by the traditional supply chains have reached such high levels that they have become one of the major causes of environmental problems, such as acid rains and global warming. As a result, the need for environmental sustenance gained intensity which led to "Green Supply Chain Management" (GSCM) which covered all stages of a product's life cycle from the planning, production, and distribution phases to the use of goods by the end users and its disposal at the end of product's life cycle. GSCM thus, involves the integration of environmental thinking into supply chain management (SCM).

As the public became more aware of environmental issues, consumers asked more questions about the products they were purchasing. Companies faced questions about how green their manufacturing processes and supply chain was, how big their carbon footprint was, and how they recycled and so on. Protecting the environment and purchasing green products became popular. In fact, the 2012 earth summit held at Rio de Janeiro, Brazil, focused on “sustainable economic development”. To protect the environment from getting despoiled, international companies and governments from different countries recognized the need for taking corrective action. Carbon emissions were considered to be the single biggest factor when it came to making economic development sustainable. In this context,

the waste and emissions caused by the supply chain were considered as one of the main sources of serious environmental problems. Green supply chain (GSCM) therefore came into existence as one of the recent innovations to preserve the environment. It helps in improving not only the efficiency of the organization but its profitability as well. GSCM practice is required to be a part of every company's DNA – right from the blueprint and creativity of a product to its distribution and consumption and lastly to its recycling.

### Ways to build Green Supply Chain

In order to set the green supply chain in motion, the blue print needs to come from following

- **Product Selection:** Designing the product in such a way that it is safe for use, creates least pollution and consumes less energy. It should not be hazardous during storage and transportation nor while disposal once it reaches the end of its product life cycle. Design for Environment is about developing products that have no negative side effects for humans and environment, are cost effective and environment friendly. This practice however, has to be implemented in product design stage.
- **Process and production:** Process has to be designed in such a way that it conforms to the Green Supply Chain Management initiatives to reduce environmental negative impact. Efficient and effective production strategy is one which reduces energy consumption and reduces waste material, air and water emissions. This contributes to lean manufacturing. All possibilities have to be checked also for recycling the scrap materials.
- **Business Partners selection:** Selecting suppliers who have proven track records on practicing lean manufacturing and using environment friendly material is important. Vendors need to be involved during product conception and design so that they can share their best practices to best align Company strategy with the customer strategy on going green. Correct partner selection ultimately results in customer delight and satisfaction.
- **Logistics Design:** This includes efforts to reduce fuel consumption and can be achieved by setting up suppliers near to the Original Equipment Manufacturers and their hubs. Reduced use of air freight, increased use of rail and sea transport is the key here. Back hauling needs to be practiced where the empty vehicle is used to collect the goods from other sources after delivering finished goods. Logistics partners have to be included during product designs itself so that improved cubic space utilization and effective fleet management can be implemented.
- **Packaging Material:** Includes replacing package materials with those which are eco-friendly. Fumigation certificate also needs to be obtained for international shipments for wooden pallets and crates. Packaging material has to be designed in such a way it can be re-used and re-cycled. Packaging needs to be robust so that any hazardous material inside it doesn't spill over and cause environmental hazard.
- **Reverse logistics Design:** Materials after consuming should be effectively used for re-use, repair, recycle, remanufacture and redistribution. It calls for reusing containers and pallets, redesigning and recycling package materials etc. Reducing pollution during transportation are important activities of reverse logistics. Proper design of reverse logistics contributes greater towards Green Supply Chain Management.
- **Information Technology:** A Green approach to IT has to be achieved through various automatic processes thereby reducing carbon foot prints. Paper usage has to be minimized through automatic invoice/payment processing.

### Challenges

Implementing GSCM is never easy. Organisations face challenges on a number of accounts.

- Cost is the biggest predicament in implementing Green SCM. Companies generally implement new technology or processes when they can see the results in quantifiable terms. But as GSCM is a fresh concept it is relatively difficult to exploit any measurable data to check the value chain effectiveness. There has to be a proper technology in place to compliment business with the Green practices. Green architects, consultants, green developers and contractors in the region are few in number due to which many organisations remain apprehensive about going ahead with the investment.
- Another issue of GSCM is integration of recycling of the products. It is a major challenge for companies to integrate or recycle the waste as raw materials to be used again in manufacturing units. Lack of awareness regarding the implementation process, regulations and best practices is also an impediment. Support and commitment from the top level management is often uncertain due to lack of confidence in the concept and high initial investment.
- A supply chain has lot of participating stakeholders and any one party's reluctance to accept and get involved in the design process and technology affects the overall performance of the whole chain. Lastly, the biggest challenge is the fear of failure. The organizations are not confident whether the Green initiative will lead to success or a major failure.

### **Green supply chain management (GSCM) practices**

In spite of above challenges, successful implementation of green supply chain can be done through various practices and initiatives. Scholars have discussed green supply chain practices from different aspects. For example, Tseng et al. (2015) mentioned inter-relationships among suppliers to reduce hazardous materials. Govindan et al. (2015), Rao and Holt (2005), identified GSCM practices that consist of reverse logistics, product recovery and reuse of used products, green design, green purchasing, and collaboration with suppliers and customers. Some other scholars discussed internal management support (Zhu and Sarkis, 2004), customer environmental collaboration (Lawson et al., 2006), green manufacturing (De Giovanni, 2012), green packaging (González-Torre et al., 2004) and even green marketing (Van Hoek, 1999).

Accordingly, the practices and initiatives of green supply chain can be categorized into following groups:

- **Reverse logistics**

Logistics is forward activity where goods are delivered to customers from manufacturers or distributors. In case of reverse logistics goods are moved back from customers to manufactures or distributors. This practice has been an important solution to collect defective and unused items from the customers. Reverse logistics therefore refers to collecting unused items, sorting them, inspecting them, then recycling, reusing, remanufacturing, and finally disposing them. The objectives of this practice are to protect environment from pollution by companies' unused items or end of life items, maximize the value of the unused items and minimize cost. Future Group, which runs a number of retail chains across product categories including Big Bazar runs a successful reverse logistics process.

- **Industrial symbiosis**

This refers to the association between two or more companies within industries in which the wastes of one partner become the raw materials for another. Firms achieve competitive advantages in business management through eco-innovation, in fact industrial symbiosis is all about saving money and reducing consumption by working together to maximize the outputs that can be generated from resources.

- **Green information technology and systems (GITS)**

Green Information Technology and Systems (GITS) are an important tool to drive environmental footprints and sustainable practices and are mostly noticed in the mining industry where it helps lower overall energy consumption. The use of eco-friendly hardware, reduction of unused hardware, collaborative group software for minimizing cost, and buying eco-labeled IT products are all considered as green practices. GITS also involves environmentally sensitive redesign of software packaging.

- **Green design**

According to Fiksel and Fiksel (1996) and Tseng et al. (2013), green design reflects the design of products or services with certain environmental consciousness. It involves a systematic consideration of design issues, such as waste management, resource conservation and pollution prevention. Green design is closely related to product safety, environmental risk management, resource conservation, waste management and pollution prevention. A well-designed product does not use hazardous materials during manufacturing and minimizes waste during production. In other words, green design should be able to trace and manage the retrieval of raw materials out of the environment and the disposal of the product back into the environment.

- **Carbon management**

In 2009, the World Resource Institute announced that 80% of carbon emissions were found to be produced through the supply chains (Hsu et al., 2013). Hence, carbon issues were quickly recognized as an important element in GSCM; many companies built a competency framework for carbon management and discovered benefits such as decreased manufacturing costs, reduced total energy consumption, as well as impelling the consequences of carbon footprints externally.

- **Supplier environmental collaboration**

To reduce environmental impact and to seek environmental solutions, organizations develop cooperative activities to handle environmental activities within the supply chain. Activities such as joint environmental planning, shared environmental knowledge,

green product development and innovations have a positive effect on delivery and supplier performance. Such environmental collaboration helps companies manage suppliers' environmental performance, ensuring that the purchased materials are environment-friendly and produced using green processes finally raising customer satisfaction, and reduce business waste and supply chain cost.

- **ISO 14001 certification**

Many companies employ Environmental Management Systems (EMS) which includes principles describing policies, procedures, and audit protocols to evaluate the environmental impact of an organization's operations. Among the most recognized EMS, as suggested by Nawrocka et al. (2009) and Robèrt (2000), is International Organization for Standardization (ISO) 14000 series.

- **Green manufacturing**

Green manufacturing considers environmental impacts throughout the product lifecycle including the sale of used, unsold, or returned products in secondary markets. It considers environmental impacts in every stage of the product lifecycle to minimize the environmental impacts of manufacturing processes, generate minimum waste, and reduce environmental pollution. Pursuing green manufacturing also helps firms lower their raw material costs, gain production efficiency, reduce environmental and occupational safety expenses, and improve their corporate image. Thus, green manufacturing helps firms achieve profit growth and increase their market share.

- **Green packaging**

Green packaging addresses all packaging issues including size, shape, and materials, because reverse logistics entails a process of continuously taking back products or packaging materials to avoid environmental damages, it entails not just the use of recycled or recyclable materials but also the impacts of packaging on distribution arrangements such as loading and handling efficiency and space utilization. The packaging used must be less costly, easy to handle, and environmentally friendly. Packaging contributes directly to product success in supply chains because it can enable the efficient distribution of products as well as lower environmental impacts due to spoilage or waste.

- **Green logistics**

Transportation systems actually have the most significant impacts on the environment. Salimifard et al. (2012) confirmed that 15% of greenhouse gases and 23% of CO<sub>2</sub> emissions are the direct results of the transportation sector alone. Therefore, companies can achieve various economic benefits, through fuel efficiency, route and warehouse optimization by avoiding any activities that cause unnecessary carbon emissions.

A number of companies have realised that there is a link between improved environmental performance and financial gains. Companies have looked to their supply chain and seen areas where improvements in the way they operate can produce profits. In an attempt to reduce costs in their supply chain, companies found that the cost reductions they identified complemented the company's commitment to the environment.

## Conclusions

Designing and implementing a greener supply chain is a win-win-win scenario for any company, its shareholders and the planet. When a supply chain becomes greener, waste is driven from it. When waste is driven from the supply chain, the cost is reduced. When costs are reduced – both economical and environmental aims are achieved.

Optimizing a supply chain means getting customers what they want when they want it – and by spending as little money as possible while accomplishing that. Most green initiatives often are cost savers. Reduction in shipping typically means less fossil fuel is burned, consolidating and optimizing material and packaging usage means fewer packing products are consumed. When hazardous materials are taken out of the supply chain, lower costs are associated with handling and disposing of the materials and when waste is minimized, so too are the costs associated with purchasing and disposal. GSCM helps gain a competitive advantage by attracting new customers, increasing better use of resources, improving efficiency and reducing production cost. Improved quality of products and services gives higher customer delight and reputation. It contributes more towards improved financial performance.

A study by Lokesh Vijayvargv,( Jaipuria Institute of Management, Jaipur), Jitesh Thakur, (Indian Institute of Technology Kharagpur) and Gopal Agarwal, (Malaviya National Institute of Technology, Jaipur), reveals that Indian organizations have shown a satisfactory implementation of majority of the environmental practices, except supplier ISO:14001 certification and out of 21 practices, medium-

sized organizations have adopted GSCM practices at a similar level compared with large organizations. It was found that GSCM adoption leads to equal improvements in performance for both large-size and medium-size organizations.

This clearly indicates that with the help of GSCM operational efficiencies can be improved and CI benefits of Continuous Innovations, Continuous Improvements and Continuous Interactions, can be realized out of this initiative.

Companies can reap the benefits of cost savings by reducing the environmental impact of their business processes. By re-evaluating the company's supply chain - from purchasing, planning, and managing the use of materials to shipping and distributing final products, savings can also be identified as a benefit of implementing green policies.

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