

# GREEN LOGISTICS : ECO-FRIENDLY MEASURE IN SUPPLY-CHAIN

Purnendu Kumar Patra\*

Management Insight  
14(1) 65 -71  
DOI: <https://doi.org/10.21844/mija.14.01.10>

Correspondence Email : [purnendu.patra@gmail.com](mailto:purnendu.patra@gmail.com)

## ABSTRACT

*Green Logistics may be defined as the entire set of efforts taken by organisations to measure and minimize the environmental impact of logistics activities. Among other reasons why companies choose to go green, one major cause is that it gives the company a competitive advantage. Other reasons could be: to reduce traffic congestion, control pollution or to save transportation costs. Logistics is the backbone of globalization process but unfortunately, it takes a toll on the planet. Technological advancements have improved the cost, efficiency and reliability of transportation systems but the negative environmental impacts of transportation have generated much attention and are at the core of issues of sustainability.*

*The term "logistics" denotes the degree of coordination and control over shipments and has become one of the most important developments in transportation. Green has become a buzz word for a range of environmental concerns. When put together, the two words point towards an eco-friendly, efficient transport and distribution system. It describes all attempts to measure and minimize the ecological impact of logistics activities. This includes all activities of forward and reverse flows of products, information and services between the point of origin & point of consumption.*

*This paper is an attempt to look at green logistics from an industry point of view. Doing thus, it is hoped to make the industry see business sense in adopting and implementing eco-friendly measures in their colossal supply chains. A new model supported by adequate literature review has been proposed with an aim to convey to the stakeholders that there is perfect rationale in accepting modern green practices without sacrificing any of their econometric performance indicators. The method adopted is that of analysis of existing literature coupled with a proposal to enhance the efficiency of the existing traditional supply chain system.*

**Key Words :** Green Logistics, Supply Chain Management

## INTRODUCTION

Supply chain management is important in every activity of the manufacturing process. It includes movement, storage of raw material, work-in-process and completed goods. The supply chain is present from starting to end of manufacturing a product, i.e. from point of origin to point of consumption. Logistics is the set of all activities required to move finished, semi-finished

products and raw material through the supply chain. For a typical product this runs from raw material source through the production-distribution system to the point of consumption and the ensuing reverse logistics. Such activities comprise freight transport, storage, inventory management, material handling and related information processing. The main objectives of logistics management are to coordinate these

---

\*Assistant Professor, School of Management Sciences, Varanasi (UP)

activities such that the customer requirements are met at minimum costs. However, as concern for the environment rises, companies are taking more care of the external costs of logistics mainly implying climate change, air and noise pollution, and vibration.

The term "Green Logistics" is made up of two independent words: "Green" and "Logistics". The first word, logistics, is at the heart of all modern transport systems. The term indicates the degree of organization and control over freight movements and has become one of the most important evolutions in transportation. Greenness has become a buzz word for a range of environmental concerns. Thus, when put together the two words suggest an environment friendly, efficient transport and distribution system. It is not very new though; it was introduced in the late 1980s and implies a form of logistics supposed to be environmentally and often socially friendly while being economically beneficial. It describes all attempts to capture and control the ecological impact of logistics activities. This includes forward and reverse flows of products, information and services between the point of origin & point of consumption.

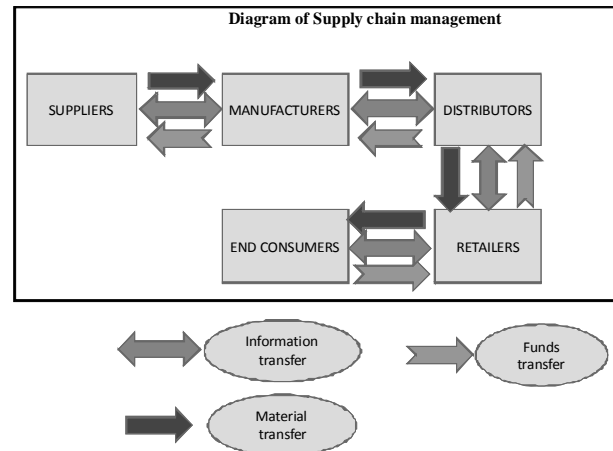
#### DIFFERENCE BETWEEN SUPPLY CHAIN MANAGEMENT AND GREEN LOGISTICS

Generally supply chain management means the process of movement, storage and delivery of goods and services. In case of goods, it also includes converting raw material to work-in-process items and subsequently to finished goods.

There are similarities between supply chain management and green logistics but there are major differences between them too. In green logistics the organization is alert about the environment. It focuses on eco-friendly practices such as packaging, reduction of carbon emission etc. Organizations going green focus on shifting goods from one place to another through the routes which are more eco-friendly, such as sea route and rail. Eco-friendly packaging means reduction in the use of plastic and wood along with rationalizing the cost overheads passed on

to the customers. Green logistics is thus inclusive of yet more than simply supply chain management.

#### Diagrammatic representation of typical Supply Chain and Green Logistics Processes



In supply chain diagram only three things are transferred, viz: information, material and

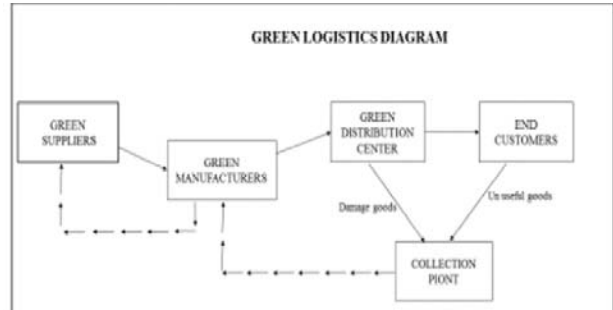


Fig-a

Fig (a)-shows the usual flow starting from green suppliers, green manufacturers, green distribution center, and finally the end customers. Then damaged or returned goods are moved from the center and resold in the market. In this flow chances of damage to goods would be more. This flow can be optimized. So a new way can be proposed (Fig (b)) to make green logistics more



Fig-b

efficient. An intermediary goods distribution center after green supplier stage and green manufacturer stage has the potential to substantially reduce chances of damage to goods apart from being less time consuming and eco-friendly in terms of packaging. This way, green logistics could also be made sustainable.

#### DRIVERS OF GREEN LOGISTICS

Logistics is linked with every stage of manufacturing. Some commonly associated problems of logistics are environmental pollution, noise vibration, damage to products etc. Because of these reasons green logistics has been developed after decades of academic and industrial collaboration. Following are the various drivers which helped green logistics to develop:

#### COST

In the absence of any concern for environment the costs of power, fuel, raw materials and transportation increased. The increasing cost impacted the bottom line in a very big way. Therefore, the green alternative was developed that could lead to a significant reduction of expenditure by developing the new

technologies, reducing energy sources.

#### GREENHOUSE GASES (GHG) EMISSION

It is a serious problem which occurs at the time of transportation of product from one place to another. The awareness of this issue has increased by leaps and bounds in recent times, thanks to improved education and technology. Many organisations are making policies to decrease the effects of GHG in the micro and macro environments they operate in. Problems are being identified progressively and efforts for lowering their impact on environment are being taken up in full earnest.

#### CLIMATE CHANGE

It is an outcome of GHG emissions as well as rapidly increasing mining activity to excavate fossil fuel for multiple purposes. These emissions are squarely responsible for global warming. Climate change has been majorly attributed to rapid deforestation for residential and industrial purposes, irreversible changes made to the terrestrial landscape through mining activities. Vast spreads of forests have either been wiped out or are on the verge of disappearing thanks to

ever increasing consumer demand for material needs. Logistics plays a vital role not only in quenching the demand but also in creating it. If a stated need can be fulfilled by minor increments in physical transport leading to rich dividends, organisations usually turn a blind eye to the planet. Such increments, although small when seen individually, may give rise to colossal and irreversible damage to the environment when seen at a global scale. Thus, the need for optimized transportation was felt.

### IMPORTANCE OF GREEN LOGISTICS

Logistics is an important part of modern transport systems. While traditional logistics seeks to organize forward distribution that is transport, warehousing, packaging & inventory management from the producer to the consumer, environmental consideration opened up markets for recycling & disposal led to an entire new subset; green logistics. Going green is now well integrated with business culture for every industry and logistics is no exception. The following are well acknowledged significances of green in logistics systems:

- Reduction in carbon dioxide emission.
- Unlocking significant cost savings.
- Controlling air and noise pollution, environmental degradation.
- Less damage to products at the time of delivery.

### LITERATURE REVIEW

Much scope for improvement remains in the state of research in India as far as Green Logistics is concerned. Thaller et al (2012) emphasize on a need of research from multi-country perspective. Their research paper suggests that although there is plenty of room for improvement as far as Green Logistics activities by businesses there is very little research interest shown by top institutes. Giving a German stand point, Thaller et al state that there is some common collaboration that exists between the two nations' logistics institutions along with considerable scope and willingness to improve the situation.

Sanchez-Rodrigues (2006) observes that supply chains should be minimized from a transport perspective, but their life cycle assessment must include external variables such as international sourcing and green manufacturing. He suggested that inventive routing methods like Factory Gate Pricing (FPG) could be a solution for the uncomfortable tradeoff organisations must make between frequency of transport and stock quantity. Regarding Green Logistics, another effective tool could be Vendor Managed Inventory (VMI) which is based on consolidation of inventory and transport flows of several vendors. External and internal integration of transport flows could be a solution to the tradeoff between minimizing stock and optimizing transportation (McKinnon, 1996).

Chittyal et al (2013) analysed variables like cost, time/flexibility, network, reliability, warehousing and e-commerce. Their research suggested outcomes and paradoxes regarding these variables which feature prominently in a supply chain. Considering the example of reliability alone for reference sake, it may be defined as reliable and on-time distribution of freight whereas the simultaneous paradox is that to achieve these, the modes used are air transport and trucking, which are least environment friendly.

Sengupta (date unavailable) in his analysis of multimodal transport says that with along with growth and infrastructure development in India, emphasis should be given to sustainability and use of methods that reduce carbon footprint and air emissions. Examples that have already found application abroad include alternative vehicle technologies like electric vehicles and alternative fuel technologies like LNG and bio-fuel. Sengupta also cites examples of LNG terminals successfully developed in Kochi and Dahej in the port sector.

Palanivelu, Dhawan (2010) have laid emphasis on the need for sustainable logistics in the long term to realize more than just cutting carbon emissions. They have mentioned two types of costs associated with the impact of unabated use of traditional logistics systems. Firstly and

more obviously is the monetary cost which has always been the area of focus and concern for industry. Secondly, they state that the external costs of logistics are those associated with climate change, air and noise pollution, vibration, accidents etc. They also underlined four areas where the implementation of Green Logistics could have a positive impact on Supply Chain of organizations, namely: Network Optimization, Packaging, Procurement and Warehouse Layout Optimization.

Bhanu Krishna et al (2012) in their research paper mention the need of Green Supply Chain Management (GSCM). They advised stakeholders to realize that GSCM can be instrumental in reducing ecological impact of industrial logistics while at the same time ensuring quality, cost, reliability and energy utilization. They have highlighted the present pitiful state of India in the Environmental Performance Index ranking 125 which coincidentally is the one of the worst among 132 nations studied.

Rodrigue et al (2016) argue that logistics firms are progressively finding matches between environmental considerations and profitability. According to them, it is now acceptable within the industry to go green. They provide image and reputation enhancement along with ensuring profitability. Rodrigue et al say that systems such as ISO 14000, may offer opportunities to the green logistics industry.

Saroha (2014) analysed the cases of furniture major IKEA and global logistics giant DHL to highlight how these organisations have undertaken drastic, albeit simple, steps to improve CO2 efficiencies in their operations. DHL's Global Forwarding initiative has developed a carbon reporting methodology which has precision and reliability at the core. Global Forwarding solutions introduced a way of accounting for supply chain CO2 emissions, with carbon reporting and carbon offsetting services for clients. Similarly, IKEA dramatically decreased transportation keeping effectiveness intact to reduce Co2 emissions. IKEA took the path-breaking, disruptive decision of removing unnecessary wooden pallets used

worldwide in logistics and instead using cardboard pallets and ledges.

### **Objectives of the study**

- Study effectiveness of green logistics practices.
- Understand the issues that drive green logistics.
- Differentiate supply chain management from green logistics.
- Propose an improvement over the existing Green SCM models.

### **RESEARCH METHODOLOGY**

Our research is based on a review of selected literature in the same context. Emphasis was laid on literature that was based on industrial data. Since most of the scholarly articles utilized a survey based approach it was prudent to refer to their conclusions and in some cases challenging some observations could shed new light on the probable research gaps that exist. This paper is based on qualitative research method. Secondary data is used. A thorough study of literature as well as discussions with academicians led to identifications of the variables of the green logistics. Descriptive research design has been used. In descriptive research design paper describes how green logistics is better than conventional supply chain management.

The articles referred to majorly represent international scenario and thus only those conclusions or suggestions with a universal perspective were included for review. It also referred to industry white papers which yielded more information as far as the Indian logistics industry is concerned. Green Logistics, although an old concept has only recently taken centre-stage in the global scheme of things and hence little contemporary literature is available for analysis and fruitful comparison.

Case study method is also used to analyze how green logistics has been practically instrumental in reducing not just carbon emissions but also enhancing the profitability by eliminating unnecessary waste.



**CASE ANALYSIS : DELL INC.**

There are many companies who have switched to green logistics in letter and spirit. The example of DELL, an American privately owned multinational computers technology company, has been cited.

**DELL'S GREEN INITIATIVE**

Dell delivers services reliably and on time, resulting in unparalleled customer satisfaction. But behind the scenes, Dell also works hard to minimize the impact on environment. When its Global Fulfillment and Logistics (GFL) team identified processes to reflect the evolution of PC suppliers in to solutions provider, Dell evaluated the order fulfillment scenario worldwide in the allotted time without hassles and also kept a tab on the environmental impact. This could easily qualify as an example of innovation in logistics. A brief outline of how it was achieved is listed below:

**1. Making efficient transportation**

Dell Company is always utilizing different tools and modes for the better and efficient use of the air, land and sea routes for transportation.

**2. Modes of transportation**

Dell switched from truck to rail and air to sea wherever possible. Air to sea is one of the best things to happen to its transportation system because it significantly reduced carbon emissions.

**3. Expansion of retail center**

Dell developed the concept of a retail distribution center in mainland United States so that the fuel consumption, damage to products and carbon emissions could reduce.

**4. Reverse logistic**

In the reverse logistics Dell takes back the rejected products from its customers and resale those through Dell outlet. These products carry the same certifications, transparent declaration of refurbishment and new warranty. 94% returned products are resold and rest, recycled.

Change in factors	In supply chain management (%)	In green logistics (%)
Eco-friendly Packaging	58%	66%
Reduce of Plastics	32%	55%
Carbon Emission Reduce	-	80%

**Limitations of the study**

Due to time constraints, it was not possible to pursue primary data. There are number of research gaps which can be addressed through statistical inference. Significant deviations are observed between expected outcomes and practical realizations of green practices. For example, the excessive use of solar panels to generate electricity for household has a significant flip side too; it generates huge amounts of e-waste in form of outdated solar panels every 3 to 4 years, the safe disposal of which is still a grey area. Hence to conclude similar findings in the area of green logistics, research must be backed by first hand data which demands a lot of time and dedicated efforts in form of resource requirement.

Plenty of literature review still needs to be done. Research was carried out through only secondary data which leaves a lot of scope for augmenting our research observations if carried out through primary information.

The area of green logistics itself, although implemented successfully in bits and pieces, has not been able to bring about path-breaking changes in the logistics industry. Today, transportation continues to be dominated by traditional and highly inefficient means of carrying and storing goods.

Hence, although contemporary literature speaks highly of the probable outcomes, green logistics' aims will be truly realized only if there is a paradigm shift in the operations and logistics functions of organisations worldwide. Hence suggestions by eminent authors, as already mentioned in the review that follows, continues to be majorly academic in nature.

## CONCLUSION

India's economic growth hinges on robust logistics infrastructure. Be it transportation or warehousing, be it handling of material or inventory management, logistics activities impact customer satisfaction and industry performance as a whole. The speed of the movement of goods depends heavily on the choices available to move material such as like rail networks, road-ways, air freight corridors, and maritime routes. An integrated approach to logistics might help in reducing costs and enhancing the customer service level. Along with the traditional model of green logistics, the author found that an intermediary goods distribution center after green supplier stage and green manufacturer stage has the potential to substantially reduce chances of damage to goods apart from being less time consuming and eco-friendly in terms of packaging. India's logistics industry itself is dominated by a huge number of fleet operators and warehouses, thus leaving each with small capacities and poor investment avenues in technology. All these issues create obstacles in creation of an efficient, let alone green, logistics network around the country. Despite these issues, logistics has hope in India. Along with inheriting the geographical advantage of being perfectly capable to position itself as a manufacturer for a plethora of products, India has recently shown renewed commitment to reduce harmful carbon emissions and decrease its national carbon footprint by adopting green practices in a variety of economic activities including logistics.

## REFERENCES

- Bhanu Krishna, P., Vamsi Krishna, K., V., et al (2012), "The Importance of Transport and Logistics Services in Green Supply Chain Management", IJITEE, 1(6), p-125.
- Chittyal, R. V., et al (2013), "Green Logistics", IJRMBSS, March,1(1).
- Cooper, M.C., Lambert, M.D., Pagh, J.D., (1997), "Supply Chain Management: More Than a New Name For Logistics", The International Journal Of Logistics Management, vol.8, Iss:1, pp.1-14.
- Georgiana, B., (2014), "Green Logistics: A Sustainable Business Growth Model", Journal of Studies in Business and Economics, Vol.9, Iss:1, pp.5-23.
- McKinnon A (1996), "Logistical Restructuring, Freight Traffic Growth and the Environment, Transportation", 23(2).
- Mentzer, J.T., Dewitt, W., Kebler, J.S., Min, S., Nix, N.W., Smith, C.D., Zacharia, Z.G., (2011), "Defining Supply Chain Management", Journal Of Business Logistics, Vol.22, Iss:2, pp1-23.
- Palanivelu, P., Dhawan, M., (2010), "Research Paper on Green Logistics".
- Rodrigue, J., Slack, B., Comotois, C., (2016), "Green Logistics (The Paradoxes of)", The Handbook of Logistics and Supply-Chain Management, Handbooks in Transport #2, London: Pergamon/Elsevier.
- Sanchez-Rodrigues, V., (2006), "Supply Chain Management, Transport and the Environment- A Review", Green Logistics Consortium Working Paper.
- Saroha, R., (2014), "Green Logistics & its Significance in Modern Day Systems", International Review of Applied Engineering Research. 4(1), pp. 89-92.
- Sengupta, D., "Knowledge Paper": Multimodal Logistics in India: An Assessment by PHD Chamber and EBTC, (Date: Unavailable).
- Srivastava, S. K., (2007), "Green Supply Chain Management: A State of the Literature Review". International Journal Of Management Review, Vol.9, Iss: 1, pp.53-80.
- Thaller, C., Moraitakis, N. et al, (2012), "Analysis of Logistics Research in India-White Paper", BMBF, Germany. Under Contract IND 11/A15.