

GREEN LOGISTICS FOR SUSTAINABLE DEVELOPMENT

**Tanu John, St. Pauls College, Kalamassery
Siya Sebastian, Pauls College, Kalamassery**

Abstract

Green logistics is an important part of supply chain management and it plays a prominent role in the improvement of transport system which is the back bone to all trade. Logistics is the peripheral operation which helps in getting products and services whenever they are needed and desired to the customer. Economic transactions certainly up skill and sprout out only with this support system of logistics. The American Council of Logistics Management defines logistics as “the process of planning, implementing and controlling the efficient, cost-effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of meeting the customer’s requirements. Contemporary technological developments have improved the cost, efficiency and reliability of freight and passenger transport systems. At the same time, the negative environmental impacts of transportation have gained wide recognition for Green logistics. The issues of sustainability and pollution free sustenance especially in urban areas have turned out as the voice of the hour. Since the applications of logistics are generally positive for the efficiency of transport systems, it has been suggested that logistics should be environmentally friendly, thus formation and relevance of the concept of “green logistics”. Issues of green logistics and the environmental impacts is discussed here. This paper analyses how logistics managers could lead the initiative in this area by incorporating environmental management principles in to their daily decision-making and successful running of business. Can sustainable development be achieved through a strong base formation with Green logistics.

Keywords: Green Logistics, Reverse Distribution, Sustainability, Supply chain management, 3BL

Introduction

India is one of the largest economies in the world. The structural base of Indian youth population has come out with new ideologies in the fields of transportation and communication. The investment rates seen rising, the larger rates of domestic demand and global competition all around, has paved a much-developed framework for the development of Logistics. Even though, the unexpected global crisis has taken its toll on the economy, it is predicted that India will become the third largest economy by the year

2025. The transport and logistics sector are fundamental to the development of any country, especially so in India where it is estimated to provide employment for more than 45 million people in the coming years. The economic growth in India has increased the demand for practically all transport services and further underlines the importance of providing an efficient logistics infrastructure in India. Various governing bodies specify that focus needs to be given to integrated transport solutions in preference to individual transportation and distribution services, which is the prime area of operation of the logistics. In recent years there has been an increasing concern about the environmental effects on the planet where all humans persist. That is why it has had an increasing amount of attention in the print and electronic media, in governmental agendas, in the academic literature and from the general public that a Green priority must be generated. Stakeholders are increasingly pressuring firms to assume responsibility for any negative effects their business activities might cause as well. The rising attention to the greener solutions doesn't leave logistics aside because it plays a very important role, as it is one of the main pollution sources and resource user. Green logistics is largely studied in literature in the international context; yet very little research exists in order to better understand what the role of green logistics has to do in sustainable development. This article analyzes the state of art of green logistics, which still constitutes an unexplored field.

Objectives of the study

- What are the main pillars of green Logistics
- What are the drivers of Green Logistics
- What are the different paradoxes of Green logistics and creation of social and economic value by the green logistics
- What are the dimensions of the green logistics

Why Green Logistics

By prioritising green logistics, manufacturers in India can unlock the potential to not only reduce their carbon footprint but also achieve operational efficiency, cost savings, and resilience in the phase of environmental challenges. Green logistics helps to reduce the distance and number of goods transport operations, especially those that use combustion vehicles, which emit greenhouse gases that are harmful to the environment. As a result, companies can make essential savings while reducing pollution. Green

logistics describes all attempts to measure and minimize the ecological impact of logistics activities. This includes all activities of the forward and reverse flows of products, information and services between the point of origin and the point of consumption. Logistics is the process of planning and executing the efficient transportation and storage of goods from the point of origin to the point of consumption. The goal of logistics is to meet customer requirements in a timely, cost-effective manner. Green logistics includes any business practice that minimises the environmental impact of the logistics network and delivery. Sustainable logistics or green logistics secure a strong bottom line without sacrificing customer satisfaction, or the well-being of the planet. Intelligent businesses are rushing to understand and embrace sustainable logistics management, supported by powerful technologies such as artificial intelligence, machine learning, and advanced analytics. In business, success in logistics translates to increased efficiencies, lower costs, higher production rates, better inventory control, smarter use of warehouse space, increased customer and supplier satisfaction, and an improved customer experience.

Statement of the Problem:

This paper is going to look on the factors that affect the emergence of green logistics and identifying the major contribution factors related to green logistics' emergence. Green products and green entrepreneurship are stepping to higher strata. But the different reasons for emergence of green logistics are limited. This study is very relevant in present era where the health and safety are the serious concern for customers. As the study reveals the major contributing factor in emergence of green logistics, this is very helpful for the potentiality not only to green entrepreneurs, to redesign the product with new production, innovation and marketing.

Research Methodology

This study used concise analysis methods, as it is mainly a descriptive study. The data facts collected helped to gain a deeper insight into the relationship between different aspects of the study. The research design is purely **descriptive** in nature. In this descriptive research Green Entrepreneurship is enlightened by using the facts and information already collected through **Articles, Journals, Books and Multiple Websites**. Only **secondary data sources** were used for the study in order to bring out the points supportive to green ventures. The emphasis of nature's importance is portrayed especially in the business sector by analysing multiple journals and publications of authors in the field of Entrepreneurship. The data collection to support this methodology occurred by reviewing a large amount of literature. From all the major databases articles were extracted from International Journals. After that doing an extensive review of the relevant academic literature was developed. Literature reviews usually fulfil two objectives: first, they summarize existing research by identifying patterns, themes and issues. Second, they help to identify the conceptual content. One problem

derives from the challenge that it is impractical to read everything. So, a focused literature review seems to be a valid approach, as it is a necessary step in structuring a Green logistics is an unexplored area and thus developed a paper on green logistics. The data collection to support this methodology occurred by reviewing a large amount of literature. From all the major databases articles were International Journal of Business. After that doing an extensive review of the relevant academic literature was developed through initial searches on specific terminology. Literature reviews usually fulfil two objectives: first, they summarize existing research by identifying patterns, themes and issues. Secondly, they help to identify the conceptual content of the field. One problem derives from the challenge that it is impractical to read everything. So, a focused literature review seems to be a valid approach.

How Green Logistics in business is implemented

Electric vehicles, solar power, IoT sensors, packaging optimisation, and green warehouses are some of the green logistics technologies that companies can use. Green logistics includes the carbon footprint of the supply chain, dealing with carbon emissions from waste management and waste disposal, packaging, recycling, reducing energy consumption.

Scope of Study

Green logistics describes all attempts to measure and minimize the ecological impact of logistics activities. This includes all activities of the forward and reverse flows of products, information and services between the point of origin and the point of consumption. Logistics & Supply Chain Management- In 2021, the Indian logistics market was worth \$250 billion and contributed to almost 14.4% of India's GDP. Statistics suggest that the Indian logistics and supply chain market gives employment to more than 22 million people. There are different concepts about GSCM which can be defined as adopting a lifecycle approach to maximize environmental, social, and economic profit through activities that involve material selection, manufacturing of different products, sales, and recovery of materials.

Limitations of Study

The common barriers to implementation of GSCM in various industry sectors are: Lack of integration of IT system, Lack of acceptance of advancement in new technology, Poor organizational culture in GSCM,

Lack of skilled human resource professionals in sustainability and GSCM, Uncertainty and competition in market.

Literature review and theoretical framework

Logistics is seen as the actions of which the objective is to minimize costs and maximize profits. The term was used mostly in purely business areas exhibiting companies and in financial reports. But, for many years, the term logistics was used in conjunction with the "green" by creating "Green Logistics" - the term containing costs, yet did not appear on financial reports and on the environment and society. According to Rodrigue et al. (2012), the term "green logistics" is defined as supply chain management practices and strategies that reduce the environmental and energy footprint of freight distribution, which focuses on material handling, waste management, packaging and transport. According to Mesjasz-Lech (2011), Green logistics consists of all activities related to the eco-efficient management of the forward and reverse flows of products and information between the point of origin and the point of consumption whose purpose is to meet or exceed customer demand.

Lee & Klassen (2008) describe green logistics as Green Supply Chain Management that can be defined as an organization's activity taking into account environmental issues and integrating it into supply chain management in order to change the environmental performance of suppliers and customers. According to Sibih & Eglese (2009), green logistics activities include measuring the environmental impact of different distribution strategies, reducing the energy usage in logistics activities, reducing waste and managing its treatment. From the sustainable development point of view, green logistics can be defined as, "producing and distributing goods in a sustainable way, taking account of environmental and social factor Nowakowska-Grunt, 2008). Now, the environment has become a concern. It is treated as a factor of the cost. Some companies have already taken external costs of logistics associated especially with the environmental issues such as climate change, pollution and noise into account. Green logistics is therefore defined as efforts to examine ways of reducing these external factors and achieving a more sustainable balance between environmental, economic and social objective.

All efforts in the "green" logistics area are therefore focused on contributing in ensuring sustainability Hans (2011) There are basically two reasons which compel companies to green their logistics services. One is marketing demand and second is environment concern. These days most of the consumers prefer green products to purchase and even they are much conscious for every kind of activity in the chain and wish it should be green so that this planet will become safer to live a longer life. Alan McKinnon (2010), regarding the key drivers for green logistics and found that managing the good relations is the major

factor while developing alternatives Logistics network is the least factor for adoption of green logistics by the companies. Therefore, the main purpose for companies to promote their green image through the management of logistics is just to enhance their public relations, not to help the environment. Generally, companies take easy route of reputation and brand protection on green messaging.

According to Rodrigue et al. (2001), green logistics is made up by two words green and logistics and showed that the green and logistics are often in opposite to each other. Logistics are used to manage its different activities strategically through cost minimization but this cost minimization comes at the expense of the environment. Thus, there is a kind of paradox between the "green" and "logistics". Paradoxes are occurring in several key areas - cost, time/availability, Network, Reliability, storage, e-commerce. Paradoxes of green logistics Dimensions Outcome Paradoxes Cost Reduce costs by improving packaging and minimizing waste. Environmental costs are often much higher than cost of packaging. Time/Availability Creation of integrated supply chains and JIT provides efficient distribution system. Increased production, higher sales and distribution system needs more space, more energy and increases CO2 emissions Network Increasing the efficiency of the system due to changes in network.

According to Linton et al. (2007), the term "sustainability" has been defined in various disciplines, such as engineering science, operations management and social science while according to Carter and Rogers (2008), there exists a divergence of definitions of sustainability in the literature. The World Page on Environment and Development entitled it as "our common future (1987)" which is better known as the Brundtland Report, defined sustainability as "using resources to meet the needs of the present without compromising the ability of future generations to meet their own needs." From a corporate perspective, this definition suggests that focus should be on economic aspects of one's business, as well as the sustainability of natural resources and the people the companies serve. This fundamental requirement was the starting point to develop concepts for the implementation of sustainability initiatives. According to Willard (2002), the concept of the 3BL was introduced in the mid-1990 s, when a management think tank focused on accountability and began using the term in its work. Elkington (2004), defined the 3 BL in its simple form as corporations not just focuses on the economic value that they add, but also on the environment. Klassen (2001), the environmental dimension includes the set of objectives, plans and mechanisms that promote greater environmental responsibility and encourage the development and diffusion of environmentally friendly technologies and most of the sustainability research has focused on this dimension.

According to Lehtonen (2004), concrete material circumstances lie at the basis of the social dimension while the social phenomena themselves are immaterial and therefore difficult to analyze. Hall and Matos (2010), emphasize that the social dimension of sustainable development is emerging as the key challenge in sustainable development, due to the fact that companies have to involve a wide range of stakeholders with different goals, demands, and opinions that may interpret the same situation differently. Economic The long-term success and competitive advantage of a company depend on the economic dimension.

According to Rumelt (1974), the economic dimension is principally quantitative in nature which is in contrast to environment and social dimension and is focused toward the efficient use of resources and achieving a return on investment. Thus, it is very difficult to measure these three dimensions through the same analytical framework. Conflicts may arise within one dimension (e.g., individual vs collective interests within the social dimension) and between the dimensions (e.g., between the environmental and economic dimension relating to cost aspects).

Pagell and Wu (2009), conducted the research based on case studies and explore what more sustainable companies do that is unique. The findings indicate that the organizational practices that lead to a more sustainable supply chains are a mixture of best practices in traditional SCM and also new proactive behaviours towards sustainable practices. But being proactive and committed can only be effective if the business model and the environmental and social elements of sustainability are adequately aligned. According to Lehtonen (2004), in these three dimensions, research on the environmental dimension has been more pronounced these days than the social but less attention has been paid for its implement.

Marcus Thiell (2011) the framework for green logistics will comprises green transport; green warehousing; green packaging; green logistics data collection and management; waste management. Rogers (1998) the general character of the green logistics system is employing advanced technology and equipment to minimize environmental damage and increase the utilization of the resources. Reverse logistics is covering transportation, warehousing, and value-added services in the context of redistribution of end-of life products and residuals along with their collection, product inspection, dismantling and separation, reprocessing of secondary materials and products, and distribution into productive processes.

Voigt (2004) Sustainability Practices for removing the negative impact Green Transport The construction of transport network The operations of transport vehicles The disposal of transportation vehicles Modal Choice Freight Consolidation Clean Vehicles Fuel Efficiency Reuse of Pallets and Containers

Standardization of Trucks Sizes Green warehousing Layout, design and capacity of the warehouse may impact the sustainability. Clean material handling equipment Process optimization Automatic warehousing systems Inventory minimization programs and Just-in-time system, Product disposition On-site recycling green packaging. The elements of the packaging which have an impact on warehouse and transport costs are size, shape and materials. To sort out the packaging issues, innovative packaging technologies and environmental certifications can be introduced.

Green Procurement Lack in quality raw material Quality check monitoring tools waste management Different kind of waste generate during the logistics like waste from expired product or due to packaging etc Waste contractor. Marcus Thiell (2011): Applications of ICT practices in logistics can be an effective way to reduce carbon footprint, help reduce dependency on fossil fuels and reduce air and noise pollution. Some of the ways include: Information Management Systems, Cold Chain logistics, Freight Operation Information System (FOIS), Electronic Data Interchange (EDI), for information flow between ports, Customs, shipping lines, and users. The use of ICTs in logistics is usually motivated by an attempt to reduce costs. The objective is to obtain a more efficient freight transport, which consumes fewer resources in terms of fuel, labour, space, etc., while maintaining the level of service provided to the customer. This search for cost savings has a positive indirect effect on the environment.

But the question is how ICT can use so that logistics will meet. There are various means to do so like facilitating communication and coordination among different entities which will reduce the marginal cost. Apart from this there are number of software which enable to increase the efficiency by using operation research and thus could be achieved optimum utilization of resources. Last but not the least is by using latest ICT practices can enable a person to locate and identify the article in real time situation. Thus, it could be said that ICT practices are helpful in the sustainable development. Thus, the conceptual model will be as follow.

Related terms in Green Logistics and its importance

1. Logistics elements and activities: life cycle support
2. Product support management: product flourishing
3. Supply support system: supply chain management
4. Packaging, handling, storage, & transportation.
5. Maintenance planning & management.
6. Design interface.

7. Sustenance engineering
8. Cold chain logistics

ANALYSIS AND FINDINGS

Findings:

As per study of secondary data sources, we can understand that most of the logistics companies are yet to start with the concept of green logistics.

- Green logistics is having a wider applicability and ensure high efficiency in logistics
- As online markets are a major platform, logistics branch still have higher opportunities.
- People are most impacted by eco based/ organic products as they are health wise valuable and user friendly
- Environment friendly operations serves better to business environment and green Logistics in business can improve the overall performance of young entrepreneurs in terms of technological advancements and giving maximum services to customers at a better rate.
- Green logistics have lack of sustainability and a high-cost creation.
- Green logistics has bought revolutionary technology, which changed people's habits, preferences, choices and switch on to variant tendencies
- Maintaining a well-established green logistics system is very expensive.
- Green logistics paves way for increased visibility to customers regarding pollution less environment, lower health concerns from employees, market sustainability etc
- Companies that have adopted green supply chain management include IBM, HP, and Dell. These companies have all implemented green practices into their supply chains in order to reduce their environmental impact and improve their sustainability.

List of companies using GSCM(Green logistics/ green supply chain management):

- DHL. "Clean operations for climate protection" is the motto underpinning the sustainability policy of the global parcel giant.
- UPS
- EccoFreight

- XPO Logistics
- Brambles
- Knight-Swift Transportation
- IKEA
- Our carbon neutral routes

Conclusion

Sustainable development by simultaneously delivering economic, social and environmental benefits which has been labelled as the triple bottom line or 3BL. Green logistics is closely linked to sustainability. In fact it contributes to a reduction in pollution, traffic congestion and as a consequence it improves the quality of life and also reduces health diseases due to a reduction of air pollution. A conceptual framework is developed which defines green logistics as the sum of five pillars: green transport; green warehousing; green packaging; green logistics data collection and management; waste management. Waste management from the environmental perspective supports environmentally sound practices such as recycling, remanufacturing, reuse and recall. The basic principle is that if the product has longer life it will benefit the environment. The application of ICTs in logistics has allowed reducing inefficiencies and optimizing processes in all stages of freight transport. Automatic identification tools, optimization programs, satellite navigation and positioning systems (GPS) or mobile communications systems (GSM and GPRS) facilitate the development of new logistics processes, which attempt to reduce costs through better use of available resources. This study is an analytical review of green logistics with reference to sustainable development. The paper has its limitations as well. The Paper is based on the past study and thus need an empirical study so that the real testing of every kind of theory could be done. There are more opportunities to conduct an in-depth study in relation to the application to the green peripheral operations.

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