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Implementation of Green Practices in Logistics Sector

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Abstract *— Green logistics has become a viable option as environmental concerns grow. Green logistics is the process of incorporating environmental concerns into supply chain management in order to enhance suppliers' and customers' environmental performance and, as a result, change the way the business operates. Green Logistics refers to as a strategy for providing services that improve the environment, economy, and social sustainability. Therefore, Green practices must be implemented from the very beginning in order to practice ecologically responsible logistics. This paper explores the concept of green logistics, green logistics practices or strategies that need to implement, and real world application of green techniques in the logistics industry in India.*

Keywords *— **Green Logistics, Sustainability, Green practices, Eco-friendly logistics strategies, Sustainable solutions***

I. INTRODUCTION

The green logistics industry in India is predicted to expand rapidly, making up 14.4% of the country's GDP and forecast to reach $380 billion by 2025. Green projects like the National Master Plan- Gati Shakti, National logistics policy 2022, tax reduction through GST, E-Way Bill, FASTag are being supported by the government.

The transport sector is at a critical juncture. Green logistics has become a viable option as environmental concerns grow. It may help address issues like waste management, rising carbon emissions, and other problems with traditional logistical operations. Technology advancement in logistics has opened the doors for efficient, effective, reliable and transparent freight and passenger transport systems. But, at the same time negative impacts of transportation on environment have gained attention that causes problems in sustainability. Environmental concern due to human activities created need for environment friendly transportation system. Logistics companies are facing new challenge these days, that is green logistics and sustainable development that aims to strike a balance between environmental approach and economic factors. It plays significant role in supply chain management as well as improvement in transportation. Green logistics operate through all stages of operation; first, middle and last mile logistics. Green logistics includes reduction of carbon emissions, waste management, reusable packaging, renewable materials, recycling, reducing energy consumption, optimum distribution of network, cross docking, sustainable transportation and so on.

Green logistics requires enterprises to reclaim, reuse, and recycle waste, establishing a cyclic logistics system for sustainable development. Staff training and educational initiatives are frequently more successful in fostering environmental consciousness, achievement, and an environmental culture in green logistics.

With regard to green manufacturing, marketing, and consumption, green logistics is essential to sustainable growth. Preventing pollution, damage to the ecosystem, and excessive resource usage is crucial. Sustainable development, a healthy momentum, and the preservation of the environment and resources

should be the top priorities of modern logistics (Ping, 2009).

DEFINE GREEN LOGISTICS

Green logistics, sometimes referred to as ecological logistics, seeks to minimise the negative effects of transportation on the environment by using less energy and materials **(Rogers and Tibben-Lembke, 1998).**

Nowakowska-Grunt, (2008) define green logistics in monetary terms that coordinates all the logistics activities of a firm including transportation, storage, packing, material handling and data collection to meet customer orders at minimum cost.

"Producing and distributing goods in a sustainable way, taking account of environment and social factors" is the definition of "green logistics" as it pertains to sustainable development **(Sibihi & Eglese, 2009).**

Green logistics, according to **Karia & Asaari (2016)**, is a tactic for offering services that enhance the economics, social sustainability, and environment; for instance, by reducing operating expenses, preserving energy, and raising living standards without posing a threat to the environment or society.

In **2021, Dzwigol, Trushkina, Kvilinskyi, & Kvilinskyi**, one of the most important requirements for putting the idea of corporate social responsibility into practice for businesses operating in a circular economy is to maintain the required degree of environmental safety while reducing the expenses associated with using green logistics mechanisms to manage the flow of logistics.

RESEARCH OBJECTIVES

1. To determine the green practices that the logistics industry needs to implement
2. To identify logistics businesses that have adopted green techniques in India

II. REVIEW OF LITERATURE

Companies are compelled to green their logistics services due to marketing demand and environmental concerns, as consumers increasingly prefer green products and are conscious of green activities.

Maurya, Padval, Kumar, & Pant (2023), Using environmentally friendly cars, cutting fuel use, and making use of recyclable materials are some of the tactics used in green transportation. Reusing resources, using recyclables, employing green packaging materials, and cutting down on waste, material consumption, and unpacking time are all examples of green packaging. Energy-efficient lighting, energy-efficient buildings, and minimising transportation are all part of green warehousing and distribution. Strategic planning, value inclusion and control, and the use of cutting-edge machinery and technology for green logistics are all part of green value-added services.

Qin, W.; Qi, X. (2022) Policies ought to direct the growth of green logistics, control consumer behaviour, and strengthen legal frameworks. The infrastructure for green logistics, storage, and transportation should be planned by provincial governments in order to lessen traffic and boost customer satisfaction.

Castillo-Manzano, Castro-Nuño, & Fageda, (2021), In European nations like Norway, Finland, and Sweden, the use of megatrucks has increased traffic accident prevention. The effect on the safety of cross-border travel is still uncertain, though. According to the report, mature nations with a track record of accomplishments in road safety should be the only ones where megatruck circulation is permitted. But launching this kind of car needs careful planning and investigation.

Mutie, Odock & Litondo (2020) recommends that in order to boost business performance and guarantee sustainability for future generations, Kenyan logistics companies should implement green logistics techniques. Since logistics activities have an adverse effect on the environment, these techniques include carbon emission measurement, green packaging, fuel efficiency, route optimisation, and reverse logistics.

Malá, et al. (2017), Sustainable development is supported by the forestry and wood-processing businesses, which rely on renewable resources. Green logistics enhances product value and fosters social and economic development by minimising ecological effect and emphasising ecological orientation.

Karia, & Asaari, (2016), Green Logistics refers to as a strategy for providing services that improve the environment, economy, and social sustainability; for example, by lowering operational costs, conserving energy, and improving living standards without endangering the environment or society. The business

has made some financial benefits such as increased fuel economy, optimised routes and warehouses, and preservation of the environment and society by eliminating any operations that result in needless carbon emissions (CO2).

Kumar (2015) recognised importance of eco-friendly logistics system. While technological developments improve transportation systems' dependability, cost, and efficiency, they also have an influence on the environment. Green logistics tackles urban sustainability challenges by emphasising eco-friendly applications.

Seroka-Stolka (2014), Businesses face ongoing pressure to create ecologically conscious and conscientious operations, and environmental commitment is a crucial factor in competitive settings. Corporate green logistics variables can come from both internal and external sources for an organisation.

Mesjasz-Lech (2011) In order to fulfil or surpass consumer demand, green logistics include the environmentally responsible management of product and information flows between point of origin and point of consumption.

Scott, Lundgren & Thompson (2011), The terms "green logistics" and "reverse logistics" are now frequently used interchangeably; nevertheless, green logistics "summarises logistics activities that are primarily motivated by environmental considerations," whereas reverse logistics does not.

Larbi, Alpan, Baptiste, & Penz, (2011), In a single receiving and shipping door cross dock, the study looks at transhipment scheduling under three different scheduling policies: complete information, partial information, and no information. For comprehensive information, a polynomial time algorithm and an ideal graph-based model are suggested, while heuristics are created for other situations.

Soto, Perales, & Thiell, (2011), Small order volumes and frequent deliveries present distribution issues for businesses. Cross-docking shortens lead times and lowers manipulation costs; reverse logistics aids in product recovery and resale, especially in the fashion industry. In order to enable product redirection without storage, this work presents a linear programming model for cross-docking in reverse logistics.

GREEN PRACTICES REQUIRED FOR LOGISTICS SECTOR

- **Use of energy saving vehicles:** Use of fuel efficient vehicles required lesser fuel and produce lesser amount of greenhouse gases, use of bikes to make delivery in local area for small orders. Electric vehicles such as hybrid, plug-in and all electric vehicles are also helpful in sustainable transportation development. Emerging plans of alternative fuel vehicles include; biodiesel, electricity, ethanol, hydrogen, natural gas and propane. Alan McKinnon's (2010) identify some ways to reduce carbon emission in logistics activities, such as reduction in transport intensity, use of green modes of transportation known as rail, barge, pipeline, and ship, optimum vehicle utilization, electric-transportation, use of energy saving vehicles, proper driving skills can also minimise carbon emission, decarbonising warehousing activities. Green initiatives and renewable energy can lessen the social and environmental challenges of global warming, climate change, carbon emissions problems without sacrificing economic expansion (Khan, 2019).
- **Route optimization:** Green Distribution Logistics include, but are not limited to, employing electronic invoicing, loading the cargo, streamlining the routes of transportation, selecting environmentally friendly modes of transportation, and cutting CO2 emissions (Malá et al. 2017). Cargo distribution optimisation, route optimisation, eco-driving, eco-friendly fuel, use of energy saving equipments defines green distribution logistics practices (Vienažindienė, et al. 2021).
- **Green warehousing:** Energy-efficient lighting, energy-efficient buildings, and minimising transportation are all part of green warehousing and distribution (Maurya et al., 2023).
- **Green packaging:** Seroka-Stolka, & Ociepa-Kubicka (2019), Green logistics work in putting businesses into the circular economy includes the application of green packaging that is good to the environment, as well as

green storage, processing, and transportation. Reusing resources, using recyclables, employing green packaging materials, and cutting down on waste, material consumption, and unpacking time are all examples of green packaging (Maurya et al., 2023).

- **Reverse logistics:** Sibihi & Eglese (2009) emphasize the importance of green logistics activities, which involve assessing environmental impacts, reducing energy usage, managing waste, and promoting sustainable practices. According to Pishvaee, Kianfar, and Karimi (2009), putting in place a good reverse logistics network can boost revenue, improve customer satisfaction, and foster a favourable public perception in addition to offering a competitive edge, cost savings, and increased profit.
- Using **cross-docking** systems, materials are moved as quickly as possible from the receiving dock to the shipping dock during the warehousing process (Apte, & Viswanathan, 2000).
- **Partial truck load service known as PTL service**: Use of PTL service is effective whenever a shipper does not have enough material to fill the vehicle, in such case, two or more shipper share same truck for transporting goods and make payment on volume basis, helps in energy saving. This is also known as **crowdshipping**.
- The potential of **autonomous vehicles and truck platooning** to improve public and private transportation, lower carbon emissions, and use less fuel and pollution is drawing interest from governments, businesses, and academic institutions; however, the real advantages will rely on operating conditions and technological advancements (Paddeu, & Denby 2021).
- **Drones for last mile delivery:** Logistics is starting to pay more attention to drones because of their agility, adaptability, and autonomy. Drones are used by businesses like Amazon to deliver packages while cutting expenses and improving customer happiness. They're environmentally beneficial as well, being electric cars. According to the study, a drone-based parcel delivery system uses more energy than an electric truck-based parcel delivery system, particularly in metropolitan regions with high customer density and short vehicle tours, as well as in rural areas with large distances (Kirschstein, 2020).
- **Crowdshipping**: Use of PTL service is effective whenever a shipper does not have enough material to fill the vehicle, in such case, two or more shippers share same truck for transporting goods and make payment on volume basis, helps in energy saving. This is also known as **crowdshipping**.
- **Longer and Heavier Vehicles:** The trucks with a length of 25 metres and a weight of 60 tonnes are referred to as "megatrucks" and are designated Longer and Heavier Vehicles (Castillo-Manzano, Castro-Nuño, & Fageda, 2021). First, a reduction in the cost of operation per tonne-kilometer moved is implied by increasing the trucks' weight and length. Reducing the quantity of automobiles also lessens externalities (Ortega et al. 2014).
- **Artificial Intelligence and Machine Learning:** AI and ML are revolutionising the logistics industry by assisting in decision-making, lowering human error, forecasting demand, and optimising routes.
- **Cloud Logistics:** Cloud logistics is the practice of performing all logistics tasks online.

INSTANCES OF LOGISTICS FIRMS USING GREEN PRACTICES IN INDIA

- **Ark India** offers temperature-controlled logistics services in India, ensuring the safe transportation of sensitive goods like perishable foods and pharmaceuticals, thereby preserving their integrity throughout their journey.
- As a test project, **Blue Dart** intends to install e-waste recycling bins at a few locations to encourage sustainable practices and responsible trash management.
- **Blue Dart**, a South Asian company, has teamed up with Skye Air, a leader in drone

technology, to deliver about 100 parcels in Gurugram in just 10 minutes instead of hours.

- In order to facilitate cooperative operations in Gurugram, Skye Air and **ECom Express** have teamed. Drones will be integrated into the last-mile delivery ecosystem.
- Training, renewable energy systems, natural daylighting, water conservation, recycling, and effective docking bay design are just a few of the ecologically friendly activities that **Varuna Group**, a logistics company, advocates.
- **Safexpress** is making a concerted effort to minimise waste, optimise product value, and move towards a circular economy. Safexpress is a logistics solutions company that prioritises sustainability and the environment. It uses green, emission-free vehicles for transportation.
- A Mumbai-based business called **Greenline Logistics** provides green logistics services with LNG-fueled vehicles. Utilizing automobile fuels like LNG, CNG, and EV to lower carbon emissions and boost gas stations for heavy-duty cars, Greenline, India's top green logistics company, is making its operations sustainable and green.
- The massive global transportation company **DHL** is dedicated to reducing greenhouse gas emissions and plans to use electric cars for 60% of last-mile and long-distance shipments by 2030. The company plans to deploy a variety of electric and alternative fuel vehicle types for intra-city delivery by 2025, with a goal of using 100% green fuel and electric vehicles.
- **Mahindra Logistics** has pledged to achieve carbon neutrality by 2040, employing more than 1,300 electric cars for environmentally friendly transport services. Mahindra Logistics possesses solar-powered warehouses and other LEED-certified buildings are examples of additional green logistics projects.

III. CONCLUSION

Innovation in logistics technology improves transparent, trustworthy and efficient methods for moving people and goods, but it also brings up difficulties with sustainability and the environment. According to Green logistics is the process of incorporating environmental concerns into supply chain management in order to enhance suppliers' and customers' environmental performance and, as a result, change the way the business operates. This paper has identified some examples of green practices in the logistics industry are energy-efficient trucks, route optimization, green warehousing, eco-friendly packaging, reverse logistics, PTL service, autonomous vehicles, drones, crowdshipping, longer and heavier vehicles, artificial intelligence, and cloud logistics. Ark India, Blue dart, Ecom express, Mahindra Logistics, DHL. Greenline Logistics, Varuna group, Safexpress are few examples of logistics companies that are taking initiative to make logistics sector more eco-friendly and sustainable.

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