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A Research on Green Logistics

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Abstract - The main of this research is to understand business strategy that reduces the logistics network's and delivery's environmental effect is considered green logistics. Green or sustainable logistics protect a healthy profit margin without compromising the welfare of the environment or client delight. Robust enterprises are rapidly adopting and comprehending sustainable logistics management, bolstered by potent technology like advanced analytics, machine learning, and artificial intelligence.

Keywords - Green Logistics

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INTRODUCTION

Supply chains have typically been linear and unidirectional, with raw materials being transformed into finished goods and sent to consumers, who subsequently discard them. Reverse logistics and circular supply chains, two modern approaches that boost supply networks' bottom lines while lessening their environmental impact, are upending this flow.

OBJECTIVE OF THE STUDY

Main objectives were identified in which researchers are more involved in the theme of green logistics, as follows:

- Review the current state of the art related to green logistics and propose recommendations for future research;
- Show the interrelationship between green logistics and sustainability;
- Identify the green practices required in the logistics market;
- Identify associations of practices of green logistics with lean logistics;
- Identify how information and communication technology tools are used in green logistics main objectives were identified in which researchers are more involved in the theme of green logistics, as follows:
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- Identify the green practices required in the logistics market;
- Identify associations of practices of green logistics with lean logistics;
- Identify how information and communication technology tools are used in green logistics

The main objectives of the study

- Examine the state of the art in green logistics at the moment and offer suggestions for more research.
- Illustrate how sustainability and green logistics are related to one another.
- Determine the green practices that the logistics industry requires.
- Determine the connections between lean and green logistics practices.
- Determine the applications of information and communication technologies in green logistics.

SCOPE OF THE STUDY

The main goal is to examine ways of reducing these external factors and achieving a more sustainable balance between environmental, economic and social objectives, focused on contributing in ensuring sustainability.

LIMITATIONS OF THE STUDY

- Dependence on fossil fuels, especially in transport

- Last Mile Deliveries' impact on urban traffic
- Lack of infrastructure
- The invisibility of logistics to consumers

RESEARCH METHODOLOGY

This research is classified as a tertiary literature review. It is employed to examine the approach, findings, and main ideas that were covered in follow-up research on a particular topic. Since the field of green logistics is uncharted, the author wrote a conceptual paper on the subject. In order to gather information for this methodology, a substantial body of literature was reviewed. Articles from every major database were looked up and downloaded. Following that, a thorough analysis of the pertinent scholarly literature was created by conducting preliminary searches using particular terms. Reviews of the literature often serve two purposes: first, they provide an overview of the field's body of work by highlighting trends, themes, and problems. Second, they aid in determining the field's conceptual content. The challenge that it is unrealistic to read everything leads to one issue. Given that a targeted literature review is an essential component of any research project and is a required step in organizing a study field, it appears to be a viable strategy.

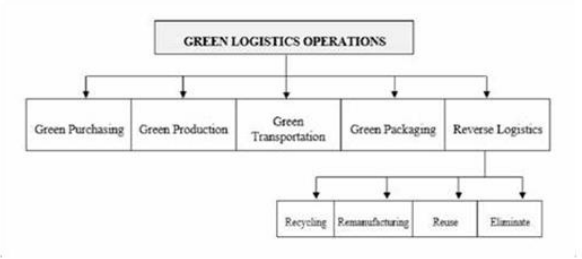
Reverse logistics and circular supply chains

Traditionally, supply chains have been linear and unidirectional: raw materials are processed into products and shipped to customers, who then dispose of them. Today, this flow is being disrupted with two practices – reverse logistics and circular supply chains – that add bottom-line value to supply chains while reducing environmental impact.

- **Reverse logistics: As** the name implies, reverse logistics refers to processes related to the return of items and goods traveling backward through the supply chain. This can include repairs and maintenance, returns of defective items, reuse of packaging, or recycling and reclamation of end-of-life products. For businesses, today's reverse logistics challenges most often come in the form of customer returns. Online purchases contribute to a much higher rate of customer returns than in-store purchases.

- This issue is further exacerbated by the business model of "subscription box" brands (typically fashion), which are based entirely on the concept of customers selecting from a wide assortment of delivered goods and returning whatever they decide not to keep. In fact, as this trend progresses, estimates are for the global amount of e-commerce returns to exceed one trillion dollars over the coming decade. Furthermore, transporting returned inventory creates more than 15 million metric tons of CO2 in the U.S. alone each year.

- **Circular supply chains: A** circular supply chain is a loop in which organizations reclaim as much as possible, from raw materials to finished products. In its simplest form, this means realizing value from end-of-life products, often by recycling their primary components. For example, plastics can be shredded and repurposed – even into the very shipping pallets that are used to move goods. And as the world's metal supplies diminish, there is meaningful value to be had in extracting gold, copper, and other recyclable commodities from otherwise discarded items.



Green transport and the growing use of commercial EVs

At the height of the COVID pandemic, online shopping rose to an all-time high with parcel volume in the US alone, growing 37% from 2019 to 2020, reaching 55 million deliveries each day. The Amazon Effect put further strain on logistics operations with consumers expecting deliveries within a day – and sometimes even within a few hours. This means goods can no longer be warehoused in a single location and distributed nationally. To achieve such aggressive delivery speeds, items must be stored in local distribution centers and then rushed to consumers in smaller batches. This calls for larger fleets of smaller vehicles.

And as the pandemic shifts and restrictions lift, these trends show no sign of slowing. According to the World Economic Forum, we should expect demand for urban last-mile delivery to grow as much as 78% by 2030, and add up to 36% more delivery vehicles in the world's largest 100 cities.

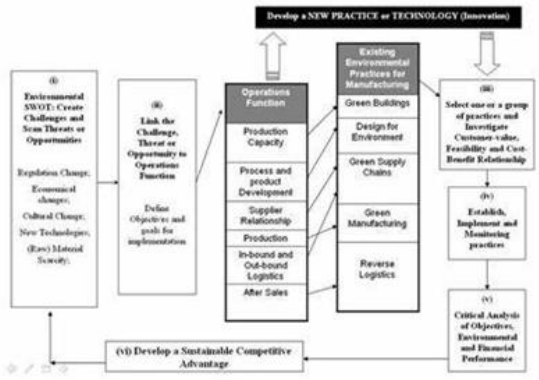
To meet these changing delivery demands, businesses are rapidly shifting to EV fleets. At less than half the cost per mile for electricity as for gas or diesel, and without any need for tune-ups or oil changes, EV fleets have lower operating costs and less downtime. For businesses, another advantage of EVs is the ease with which they can be integrated into a greater cloud-connected supply chain network. This means that businesses can use AI-powered technologies to analyze both past and real-time operational data – delivering powerful (and actionable) insights into ways to save money, lower

fuel consumption, and streamline their operations overall.

The capacity and size of modern EVs is also becoming increasingly diverse. Today, we are seeing a rise in not only light commercial vehicles (LCVs) like cargo vans but also a growing range of electric semi-trucks and long-haul transport vehicles.

And when it comes to greener transport, let's not forget that some 80-90% of the world's goods are transported by sea. Each year, container ships spew about 1 billion metric tons of carbon dioxide into the air — about three percent of all greenhouse gas emissions — and tons of toxic waste left in the oceans. Recognizing this, in September 2021, the International Maritime Organization (IMO), representing 150 industry leaders, set a decarbonization goal to reduce emissions by 50% by 2050, compared to 2008 levels.

Danish company Maersk (whose ships emitted 33 million tons of CO2 in 2020) ordered eight new vessels that run on carbon-neutral methanol to help meet that ambitious goal. Shipping companies in Japan and Norway are also bringing significant innovation to the marine cargo sector, unveiling fully electric tanker ships and even the world's first autonomous electric cargo carrier which (using radar, infrared, and automotive integrated solutions cameras) can be operated and moored entirely via remote control.



Alternative distribution networks and green logistics solutions

Of course, making the switch to EVs and alternative fuels is probably the most significant change when it comes to greener logistics. However, as McKinsey's Bernd Heid points out "in an 'ecosystem scenario' in which both public and private players work together effectively, delivery emissions and congestion could be reduced by 30%...when compared to a 'do nothing' scenario". To achieve maximum cost efficiency, faster delivery speeds, and meaningful reductions in emissions and waste, businesses will need to consider more collaborative logistics methods, and a more sophisticated array of optimizations.

A few additional optimization strategies include:

- **Load pooling:** A growing trend in optimized supply chain management sees similar (even competitive) companies working together to pool their warehouse and logistics resources. At first glance, this can seem like a challenging concept but fortunately, cloud-connected logistics management technologies are helping businesses to collaborate and cooperate with maximum visibility and control.

- **Unbranded parcel lockers:** Amazon pioneered the idea of neighborhood parcel lockers to shorten routes and speed up delivery. This is highly effective but has tended to shut out the competition. Unbranded community parcel lockers function similarly to the existing Amazon locker networks, but are accessible to a much broader range of delivery providers. By making this resource more widely available, the major logistics providers can work together to save time and money – and improve consumer choice.

- **Automated load optimization:** This refers to coordinating items (held in warehouses and distribution centers) with similar delivery ETAs and destinations. With today's volumes, it's essentially impossible to achieve this via manual efforts but smart supply chain solutions can identify and automate vehicle loading, to help eliminate the costly practice of sending delivery vans out with only half a load.

- **Night-time delivery:** The more time vehicles spend on the road, the greater the amount of fuel and energy used. Especially in urban areas, making deliveries at night can reduce road-time and congestion by up to 15%. Furthermore, with EVs being quieter, there is less risk of adding to night-time noise pollution.

- **On-demand micro-mobility networks:** Micro-mobility refers to small – often two-wheeled – vehicles like electric scooters and e-bikes. Modern logistics technologies now give drivers easy access to cloud-connected apps. This means connectivity with the home base (dispatch) and the customer (delivery ETAs) in real time. By leveraging an on-demand network of independent drivers (not exclusively employed by any one business), companies are reaping significant savings in both fuel usage, and the cost of maintaining standing fleets.

- **Dynamic route allocation:** In urban settings, cloud-connected route allocation tools can assess traffic, parking, even construction or other delays. In rural areas, other factors may be more

relevant such as road and weather conditions, or distance from EV charging stations. By incorporating this kind of intel into real-time route planning, companies can increase delivery speed and minimize fuel consumption.

- **Drones and automated vehicles:** It's visually compelling to think of drones crossing the skies and dropping packages like mechanized storks, or unmanned robots rolling down city sidewalks, laden with parcels. Though, we are still a few years away from fully automated logistics networks. But innovation is fast in this sector and digital automation is at the fore of many green solutions.

Advantages of green logistics

The advantages of green logistics accrue to the company, its suppliers and partners, its customers, and every member of society. Here are just a few:

- **Improved long-term profitability:** From first to last-mile delivery, green logistics cut waste, cost, and carbon emissions. Although realizing the advantages of green logistics requires an upfront investment, the downstream benefit outweighs the cost. A recent study found "evidence that High Sustainability companies significantly outperform their counterparts over the long-term, both in terms of stock market as well as accounting performance." The bottom line? Green business equals good business.

- **New or enhanced partnerships:** When businesses use sustainable supply chains and green logistics, they're not only more attractive to customers but to corporate partners as well. A recent study from HBR found that the largest global multinationals are using the United Nations Global Compact or the Carbon Disclosure Project's (CDP's) Supply Chain Program to assess their suppliers' levels of sustainability and environmental impact. Suppliers, in turn, are eager to partner with the largest brands and are making investments to try to reduce their carbon footprints.

- **Happier, loyal customers:** Customers – both retail and business – demand fast delivery and the flexibility to make easy returns. They want to know where their products came from, whether they're sustainably sourced and transported, and where they are in their journey – in real time. Companies that offer these insights and transparency gain new customers and earn long-term loyalty among existing ones.

- **Better corporate responsibility reputation:** Large companies are increasingly called to the mat to answer for their contribution to global warming, which is considered a social justice issue. Publicly leveraging the advantages of green logistics will help companies win in the court of public opinion. Smart companies are scrutinizing their environmental footprint locally, as well as globally. Those that aren't willing to change, especially in moving away from fossil fuels, risk their reputation and are at a competitive disadvantage.

- **Easier recruitment:** In the tightest job market in decades, every company advantage matters. An organization focused on green logistics is more attractive to young professionals who desire to work for a company that embodies their values.

Green logistics strategies

Organizations that combine a cloud-based smart supply chain with mobile technologies get a birds-eye view of their entire logistics process, from manufacturing to delivery to returns. But green logistics isn't achieved in isolation. Successful implementation requires planning and the inclusion of all the various stakeholders. Below are a few suggested steps:

- Collaborate with suppliers, vendors, third- and fourth-party logistics (3PL and 4PL) partners, and experienced advisors to develop environmentally-friendly procurement protocols and eco-friendly shipping options.

- Use AI-powered technologies like supply chain control towers to integrate carbon footprint analysis into all stages of the business.

- Engage with corporate networks to share logistics resources and data-driven insights. Even brands that are typically competitive can become partners for a shared purpose.

- Strategize and right-size your fleet. Build in the ability to handle fluctuating demand with elastic logistic networks so that trucks aren't sitting idle. For last-mile delivery, consider adding micro-mobility vehicles, such as e-bikes or drones.

- Educate customers on the impact of fast delivery speeds versus more sustainable choices. Amazon, for example, encourages customers to pick an "Amazon Day" that groups packages into fewer shipments, which saves money on packaging and transportation.

Green logistics and the future of distribution networks

Robust, AI-powered, cloud-based logistics solutions are at the core of the supply chains of the future – helping businesses to consolidate loads, automate dispatch and tracking, optimize routes, determine when and where to charge batteries, calculate ETAs, monitor vehicle maintenance, and more. Data modeling and simulations can test routes and fleet capacities, and integrated technologies can help incorporate and analyze supply chain and delivery data across the entire value chain. Every step toward the smoother and faster movement and delivery of goods, is a win/win, making customers happier and more engaged, and helping businesses to improve both their sustainability profiles and their bottom lines.

CONCLUSION

Green logistics practices, which try to implement business goals in an eco-friendly way, are becoming more and more significant and will provide companies a competitive edge. The logistics industry is intimately related to the operations that will ensure social, economic, and environmental sustainability. The only way to reduce the sector's negative environmental effects is to implement sustainable business practices. Need to ship their goods in bigger quantities. It must make use of efficient and ecologically friendly distribution and transportation networks. It has to cut back on the materials and packing processes. Recyclable materials must be preferred for packaging. The staff needs to be trained. They have to enlighten their customers and clients. Needs to support initiatives using reverse logistics. Engines and vehicles must be equipped with ecologically friendly technologies. Needs to reorganize shipment routes and planning. Need to perform their vehicles' emissions on a regular basis. The use of old cars must end.

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