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ASSESSMENT OF BARRIERS AND CHALLENGES OF SUSTAINABLE LOGISTICS

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ABSTRACT

This study investigates the various challenges faced by firms in their pursuit of sustainable logistics strategies. First, we need to catalog all the obstacles that keep the logistics sector from becoming more socially and environmentally conscious so that we can assess the challenges of sustainable logistics. Establishing sustainable logistics practices is not without its challenges, including but not limited to: cost, lack of knowledge, infrastructure, legislation, technology, complexity of the supply chain, reluctance to change, problems with measurement and reporting, competitive pressures, and unpredictable customer behavior. "Green logistics" refers to a comprehensive strategy for managing supply chains with an eye toward minimizing negative impacts on the environment. Reduce emissions, waste, and resource consumption at every stage of the supply chain using green logistics. This method covers everything from acquiring raw materials to final disposal. Implementing measures like as route optimization, fleet modernization, and packaging can help businesses save money, run more efficiently, and reduce their environmental impact. Some sustainable transportation options include using alternative fuels and vehicle technology, optimizing last-mile delivery solutions, and encouraging multimodal transportation systems.

KEYWORDS : Barriers of Sustainable logistics, Sustainable transportation, Green logistics, Sustainable supply chain, Best and worst method.

INTRODUCTION

More eco-friendly transportation and logistics practices have recently emerged, propelled in large part by sustainable logistics. Transportation and logistics have a far-reaching impact on the environment, and this has created major challenges for social and environmental sustainability as a result of the ever-increasing complexity and interconnectedness of supply chains and the exponential growth of global trade. One big problem with using sustainable logistics solutions is the increase in costs, both real and expected. Environmentally friendly technologies, alternative fuels, and efficient transportation modes may demand a large initial investment, which may discourage smaller enterprises from embracing sustainable practices. It could be challenging to apply sustainable logistical approaches due to a lack of enough infrastructure, such as sufficient recycling facilities or electric vehicle charging stations. Modern global supply chains are more complex, including multiple parties and interconnected webs of information. Coordinating sustainability efforts across the whole supply chain can be especially challenging when dealing with suppliers or subcontractors situated in different areas. Staff, stockholders, and upper management may all push back against sustainable logistics solutions. This resistance may be from a desire to maintain status quo practices, an unwillingness to change, or concerns about the short-term financial consequences. For fear of being at a competitive disadvantage, companies may prioritize short-term gains above long-term sustainability efforts in industries where margins are extremely tight. Concerns about money, regulations, technology, and consumer habits are just a few of the many obstacles that sustainable logistics must overcome. Only through concerted effort from governments, businesses, and other interested parties can we hope to overcome these challenges via cooperation, new ideas, education, and policy support. Logistics companies may strengthen their long-term profitability, ability to withstand change, and competitiveness by embracing sustainability as a core value and integrating it into their operations. As a result, their impact on the environment will be reduced. There are a number of internal factors that work against successful reporting of the triple bottom line. These include inefficient company processes and structures, unfaltering support from high management, and the use of outdated accounting procedures. A focus on cost-cutting isn't necessarily in line with sustainable supply chain management (SSCM). Impediments to supply chain management (SSCM) in the purchasing and supply function can arise from issues with training and understanding, as well as from competing agendas within SCM. Also, many buying

groups are wary of green product investments because they think a more robust dedication to environmental programs will drive up their overall buying costs and hurt their competitiveness. Due to the increased costs associated with a firm's strong environmental commitment, the bottom line will suffer in comparison to rivals that care less about the environment. There may be fewer viable suppliers to select from, which adds another layer of difficulty to creating an environmentally conscious purchasing strategy, due to stricter environmental quality laws. The need for lower prices from consumers, PR ploys like "green washing," and price competition are all instances of external limitations. Despite the growing interest in environmental supply efforts, there are many who see them as little more than a legislative fix and refuse to support them. Government regulations, supplier indifference, and the nature of the sector are just a few of the many potential roadblocks to SSCM. A greater awareness of the environmental dangers posed by conventional logistics practices is a key factor in the expansion of green logistics. The current transportation and logistics networks are well entrenched, and influential parties are resistant to change, which adds to the snail's pace. Despite this, these challenges present opportunities to innovate, collaborate, and change the system. The worldwide nature of supply networks creates legal and geopolitical challenges that threaten the viability of sustainable logistics initiatives. Different regulatory frameworks, trade barriers, and geopolitical concerns can all contribute to uncertainty and make it harder for sustainable practices to be widely adopted. A comprehensive approach that considers monetary, organizational, geopolitical, technological, and regulatory aspects is necessary to overcome the challenges and problems associated with sustainable logistics. If companies invest the effort to learn about these issues and find proactive solutions, logistics processes can become more resilient and sustainable. Sustainable development is a product of the environmental movement's great pressure during the past 30 years. Looking at SCM via an economic lens requires thinking about how it will influence things like cash flow, profit margins, ROI, business performance, and competitive advantage.

LITERATURE REVIEW

Energy consumption and carbon emissions are two ways in which logistical activities impact the environment, as highlighted by Weber and Matthews (2009). In order to reduce their environmental effect, they highlight the significance of environmentally friendly logistical solutions. Financial hurdles to sustainable logistics solutions include, as stated by McKinnon (2023), large upfront costs, an unclear return on

investment, and a dearth of incentives. To overcome economic obstacles, he says, we need innovative finance methodologies and cost-benefit analyses with a longer time horizon.

Technical challenges in sustainable logistics were enumerated by Seuring and Müller (2008) and include the difficulty of integrating new technologies into existing supply chain systems, issues with compatibility, and the scarcity and insufficiency of environmentally friendly technology. They emphasize that technological innovation and stakeholder interaction are vital to address these challenges. Inconsistent regional legislation, challenges in compliance with rules, and a lack of enforcement measures are some of the policy and regulatory impediments that sustainable logistics faces (Ershadi et al., 2021). They advocate for greater government involvement, international cooperation, and policy harmonization to facilitate the adoption of sustainable practices.

Many writers have pointed to weak and inconsistent regulatory frameworks as the main problem with eco-friendly logistics. Companies may be hesitant to engage in sustainable initiatives due to the uncertainty of future regulations and the difficulty of complying with complex legislation (Sarkis, 2017; Seuring & Gold, 2012). Sustainable practices are logistically challenging to apply in current supply chains due to features such as global sourcing, multi-modal transportation, and fragmented networks. Integrating sustainability into logistical operations is not without its challenges, such as collaborating with many stakeholders and addressing concerns about interoperability (Lund & Mathaisel, 2006; Touboulic & Walker, 2015). The company's culture and the employees' attitudes towards sustainability are major factors influencing the adoption of sustainable logistics practices. Resistance to change, a lack of backing from higher-ups, and inadequate staff engagement are some of the potential roadblocks that may derail attempts to integrate sustainability principles into organizational operations (Pagell & Shevchenko, 2014; Pagell & Wu, 2009). Because of the international nature of supply chains, geopolitical and trade-related challenges make it harder to attain sustainability goals. The implementation of sustainable logistics strategies on a global scale is fraught with uncertainty and difficulty owing to factors such as varied regulatory frameworks, trade barriers, and geopolitical conflicts (Carter and Rogers, 2008; Hoffmann, 2019). The table shows all the identified challenges with sustainable logistics.

RESEARCH METHODOLOGY

The Best-Worst Method (BWM) was supposedly developed, as stated by Jafar Rezaei (2015). If you want to rank criteria or objects

by their importance or functionality, you should use the Best-Worst Method. Healthcare, economics, and the social sciences are just a few of the numerous fields that have made extensive use of the method since its inception. The "best-worst scaling" method is widely used in decision-making, psychology, and market research for evaluating preferences and priorities. One approach is to have individuals rank a set of alternatives and select the "best" and "worst" choices. Researchers can learn more about people's preferences by utilizing this technique, which involves learning both their likes and dislikes. Businesses use best-worst scaling to determine which elements of a product or service are most and least wanted by consumers. The healthcare business can employ best-worst scaling to prioritize client preferences for different treatment alternatives, side effects, or healthcare services. Find the most major challenges that sustainable logistics faces, and rank them. Once your needs have been defined, you may begin to brainstorm possible solutions to each problem. Prioritize the criteria by comparing them in pairs. Based on each criterion, stakeholders, experts, or respondents will score the possibilities and select the "best" or "worst" one. For each requirement, repeat the process exactly as written. Find out how you did by using the answers. Standard practice dictates that the "worst" choice receives no points and the "best" alternative receives one for each criterion. To get the end results, you need to add up all the "worst" scores for each choice and then subtract all the "best" numbers. After tallying up all of the options' scores, you can see how they rank.

RESEARCH OBJECTIVE

Taking stock of the challenges and limitations linked to sustainable logistics will help us understand the complexity of creating environmentally friendly supply chains. Sustainable transportation choices, such as electric vehicles and alternative fuels, confront a significant infrastructure gap. A substantial investment in charging stations, renewable power, and efficient distribution networks is essential for the transition. Additional monetary challenges include unclear long-term benefits of sustainable technologies and higher initial costs.

The regulatory environment is another problem; sustainable practices may be difficult to adopt because of the wide variation in rules and standards across regions. It can be difficult for businesses to grasp the complex environmental requirements and to get permissions for green initiatives. Sustainable practices are further complicated by supply chain intransparency and an absence of collaboration.

The fact that people do not know about or want sustainable products and services is another problem. Without sufficient financial

incentives, companies may be reluctant to implement eco-friendly logistics solutions. Additional logistical challenges arise when attempting to incorporate sustainable practices into the present state of the supply chain. Included in this are transportation route optimization for reduced emissions, waste management, recycling, and reverse logistics. Governments, businesses, and consumers must collaborate if we are to triumph over these challenges. Policymakers must create conducive regulatory structures and financial incentives to encourage sustainable investments. Companies need to prioritize sustainable operations and supply chain management. Additionally, they should educate customers more about the value of eco-friendly products. We must overcome these difficulties if we want the logistics company to have a future.

The Aims

A more efficient and environmentally friendly supply chain is the ultimate aim of sustainable logistics, which encompasses a wide range of practices. Included in this initiative are green packaging solutions, transportation route optimization to reduce fuel consumption and emissions, the use of alternative fuels and energy sources, and the incorporation of circular economy principles into product lifecycle management. One aspect of sustainable logistics is fostering an environment where all parties are encouraged to communicate and work together to achieve maximum efficiency while minimizing waste. This project also includes the construction of supplementary infrastructure, such as areas to charge electric vehicles and to recycle and dispose of waste. Sustainable logistics also encompasses efforts to address social and ethical challenges, such as

DATA ANALYSIS

The data was analysed using BWM as shown.

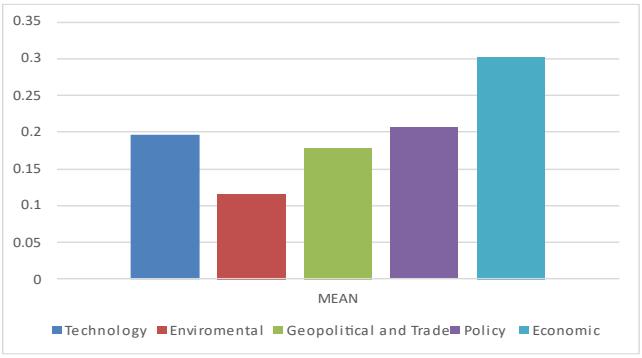

Figure : Weight of the Barriers of Sustainable Logistics by Best and Worst Method

Shows that the Economic Barrier has the largest mean weightage, indicating its relevance. For that reason, it is superior. The policy barrier is second only to the economic one. Then, on a more intermediate level, we have obstacles related to trade, geopolitics, and technology. Environmental Barrier With the lowest mean weight.

FINDINGS

Since it is the sector most responsible for contributing to global warming, the transportation industry is an ideal target for eco-friendly logistics programs. Issues with the Current System: The absence of infrastructure to supply alternative fuels and charge electric vehicles is a barrier to the widespread adoption of sustainable transportation options. The Elements Influencing Price: Despite the numerous long-term benefits of sustainable technology, some businesses are wary of investing in them due to the higher initial investment required. Businesses encounter challenges in integrating sustainable practices into their supply chains due to varied regional standards and legislation on environmental regulations. Due to a lack of customer knowledge and interest in environmentally friendly goods and services, businesses might not implement sustainable logistics practices. Communication and cooperation breakdowns in the supply chain might impede attempts to implement sustainable practices in an efficient manner.

An efficient reverse logistics system that deals with waste management and recycling is essential for a sustainable supply chain. Technological Advancements That Allow for More Openness and Efficiency in the Supply Chain: Innovations in technology, such as blockchain and Internet of Things (IoT) sensors, are facilitating the attainment of sustainability goals. Packaging Solutions: Logistics operations can lessen their impact on the environment by implementing green packaging initiatives, which use biodegradable materials and lightweight designs. Efficient Use of Energy: By implementing energy-saving measures such as automated systems and LED lighting, distribution and warehousing facilities can decrease operational expenses and carbon emissions.

Circular economy approaches, such as product remanufacturing and closed-loop solutions, can help logistics operations decrease waste and resource depletion. Supply chain resilience in the face of climate-related shocks, such as extreme weather events, is a critical component of sustainable logistics planning.

Social Responsibility: In order to be really sustainable, logistics initiatives need to support local communities and ensure fair labor standards. Improved sustainability performance may result from using data analytics and predictive modeling to optimize transportation routes, inventory management, and resource allocation.

CONCLUSION

Within this paper, we have detailed the obstacles that sustainable logistics faces. Two issues that affect the environment are energy consumption and carbon emissions. Costly start-up, unclear return on investment, and no financial incentives are all economic factors. On the technical side, there are issues with complexity, compatibility, and the availability of environmentally friendly technology.

Trade barriers and international tensions Problems with regulation compliance, conflicting policies, and a lack of enforcement For analysis, we use BWM. Time and money limited the poll to only one organization and a tiny sample size. For future research, it would be beneficial to involve ore businesses and respondents. The logistics sector has a long way to go before it adopts more sustainable and socially responsible methods; there are numerous obstacles to overcome, including cost, technology, legislation, economics, and environmental concerns. The findings stress the need of addressing these challenges together. Government legislation and regulatory frameworks offer substantial assistance to companies navigating sustainability plans by outlining specific criteria and norms. This, in turn, facilitates conformity with regulations and well-informed decision-making. ignificant economic challenges that act as roadblocks include high starting costs, hazy ROI, and inadequate financial incentives. A comprehensive cost-benefit analysis and innovative financing strategies for sustainable initiatives are necessary to overcome these economic hurdles. Technical innovation is essential for resolving issues such as resource scarcity, convoluted supply chains, and inefficient infrastructure. Efficient transportation, green technologies, and alternative fuels can lessen operating impacts on the environment while increasing operational efficiency. It is obvious that all important stakeholders, including governments, enterprises, suppliers, and consumers, must collaborate for the logistics industry to see lasting, good change. Together, stakeholders can promote innovation and structural change, which will hasten the transition to greener logistics practices. Logistics companies may improve their long-term profitability and reduce their environmental impact by embracing sustainability as a core value in our interconnected society.

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