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Study the Impact of Sustainable Practices in 3Pl Industry

Ashray Kumar[1], Prof. Dr. Mohammad Akhtar[2]

[1]22GSOB2040030Year 2022-2024, [2]Professor
SOB Galgotias University

ABSTRACT

The Third-Party Logistics (3PL) industry plays a pivotal role in global supply chains, facilitating the movement of goods from manufacturers to end consumers. However, the traditional model of 3PL operations has often been associated with environmental degradation, resource depletion, and social inequities. In recent years, there has been a growing recognition of the urgent need for sustainable practices within the 3PL sector to mitigate these negative impacts. This study show the priority of sustainable initiative and how to implement these things which helps to reduce cost and enhance operational efficiency .through the factor rating method we will try to find out the best option among other sustainable practices

This study aims to examine the impact of sustainable practices in the 3PL industry, focusing on their implications for environmental conservation, social equity, and economic development. By analyzing the adoption of sustainable initiatives and their outcomes, this research seeks to provide insights into the benefits and challenges of integrating sustainability into 3PL operations.The third-party logistics (3PL) industry is undergoing significant transformations due to increasing pressures to adopt sustainable practices. This study delves into the multifaceted impact of sustainability initiatives within the 3PL sector. Drawing on a comprehensive literature review and empirical analysis, it explores how the integration of sustainable practices affects environmental, social, and economic dimensions of 3PL operations.In recent years, sustainability has emerged as a critical concern for businesses worldwide, driven by escalating environmental challenges and heightened awareness of social responsibility. Within the 3PL industry, where logistics activities often contribute to carbon emissions, resource depletion, and social inequalities, there is a growing recognition of the need to adopt sustainable practices to mitigate negative impacts and create long-term value.

The introduction of sustainable practices within the 3PL industry signifies a paradigm shift towards more environmentally friendly, socially responsible, and economically viable logistics operations. By implementing initiatives such as green transportation, energy-efficient warehousing, waste reduction strategies, and ethical sourcing policies, 3PL providers can minimize their carbon footprint, enhance community relations, and improve operational efficiency.

In conclusion, the adoption of sustainable practices within the 3PL industry has not only mitigated environmental impacts but has also yielded economic and social benefits. By embracing sustainability as a core value, 3PL providers can enhance their competitiveness, mitigate risks, and contribute to the creation of a more sustainable future.

1. Introduction:

The third-party logistics (3PL) industry plays a crucial role in global supply chains, facilitating the movement of goods from manufacturers to consumers efficiently. However, traditional logistics operations often come with environmental and social costs. In recent years, there has been a growing recognition of the need for sustainability in the 3PL industry to mitigate these negative impacts and build a more resilient and responsible supply chain ecosystem. Through a comprehensive review of existing literature, case studies, and industry reports, this study will explore how sustainable practices contribute to enhancing operational efficiency, reducing costs, and improving corporate reputation in the 3PL sector. Additionally, it will investigate the role of government regulations, consumer preferences, and stakeholder collaborations in driving the adoption of sustainable initiatives within the industry.

The incorporation of sustainable practices within the Third-Party Logistics (3PL) industry has been pivotal in reshaping its operational landscape. Historically, the 3PL sector has been associated with significant environmental footprints due to its reliance on transportation, warehousing, and packaging, among other activities. However, in recent years, there has been a paradigm shift towards integrating sustainability into various facets of 3PL operations.One of the key areas where sustainable practices have made an impact is in transportation optimization. By adopting route optimization algorithms, alternative fuel vehicles, and implementing strategies like backhauling, 3PL companies have significantly reduced carbon emissions and minimized fuel consumption. This not only aligns with environmental objectives but also contributes to cost savings and operational efficiency.

Furthermore, sustainable warehousing practices have gained traction within the 3PL industry. These practices involve the implementation of energy-efficient lighting, recycling initiatives, and the use of eco-friendly packaging materials. Additionally, advancements in warehouse automation technologies have led to reductions in energy consumption and waste generation, further enhancing sustainability efforts.Another notable aspect is the emergence of green supply chain management principles within the 3PL sector. This involves collaboration with suppliers and customers to promote

sustainability throughout the entire supply chain. By implementing initiatives such as vendor scorecards, carbon footprint assessments, and sustainable procurement practices, 3PL providers can exert influence beyond their own operations, driving positive environmental impacts throughout the supply chain network.

Moreover, the integration of sustainability into corporate social responsibility (CSR) initiatives has become increasingly prevalent among 3PL companies. By investing in community engagement, environmental conservation projects, and employee training programs, 3PL providers can enhance their reputation and brand image while simultaneously contributing to the well-being of society and the environment.

2. Research objective

To investigate the impact of sustainable practices on the third-party logistics (3PL) industry, focusing on areas such as environmental conservation, social responsibility, and economic viability, with the aim of understanding the extent to which these practices influence operational efficiency, competitive advantage, and overall industry growth.

This research aims to achieve several objectives:

- firstly, to assess the effectiveness of sustainable initiatives in reducing carbon emissions and environmental footprint within 3PL operations.
- Secondly, to evaluate the impact of sustainable practices on social responsibility, including labor conditions, community engagement, and ethical sourcing.
- Thirdly, to analyze the economic implications of adopting sustainable measures in terms of cost savings, operational efficiency, and competitive advantage.

By addressing these objectives, this study seeks to provide actionable insights for 3PL companies, policymakers, and stakeholders interested in promoting sustainability within the logistics industry. Ultimately, it aims to contribute to the advancement of sustainable supply chain management practices and facilitate the transition towards a more sustainable future.

3. Literature review

1.1 Environmental sustainability

Delineated a classification of green practices, including vehicle energy efficiency, inter-modality, warehousing, green building, recycling materials, waste reduction (including the realm of reverse logistics), environmental management systems, green certifications, and collaborations for environmental objectives. Evangelista et al. (2017):Contributed by categorizing practices such as transport and vehicle utilization, including fleet modernization, route optimization, and the efficient loading of vehicles. Baz and Laguir (2017): A comprehensive method was employed to examine the distinct responsibilities of shippers and third-party logistics providers (3PLs) in obtaining environmentally friendly logistics services. Jazairy, A.Green procurement concept (European Commission Green Public Procurement) Identifies the reduction of carbon footprint as a key metric for sustainable freight performance at the firm level. Tyan et al., (2003):

Dhar et al., (2015) Emphasizes the need for low-carbon policies to clean the transport sector, particularly focusing on rail and road-based modes in the Indian context. Discusses the implications of global carbon price trajectory on both positive and negative co-benefits. Wehner et al. (2021) Proposed a framework based on three fundamental "building blocks" - sustainable building design, processes like energy mapping for impact reduction, and services oriented towards sustainable deliveries.

1.2 Social sustainability

Lieb and Lieb (2010) -Describes the commitment of many 3PLs to sustainable practices, involving organizational changes, website development, collaborative partnerships, sustainability training, and operational practice modifications. Makov & Newman (2016),- Green logistics practices positively impact the welfare of employees and other stakeholders, fostering social benefits. Social aspects of Circular Economy (CE) include health and safety, employee training, diversity, working conditions, and community support, all of which contribute to social performance and human and social capital development for CE (Padilla-Rivera et al., 2020; Kumar & Anbanandam, 2020; Piecyk & Björklund, 2015).Lai, KH and Wong CWY. 2012- Creating a strategic framework for green logistics involves establishing robust planning, control, and assessment mechanisms to foster environmental, economic, and social sustainability. This includes garnering support and commitment from top management, ensuring widespread participation, and implementing comprehensive education and training initiatives. Adapted from (Furtado, 2017; Perotti, Zorzini, Cagno, & Micheli, 2012)- For the sustainable warehouse Designing a workspace that prioritizes the safety and security of employees in accordance with ergonomic principles. Conduct seminar, program for warehouse management education Material handling should be done by automatic guided vehicle , automatic storage and retrival system

Govindan et al., 2016; Martins et al., 2020; Schönborn et al., 2019; Walker et al., 2021.-Prioritize employability, support social demands, assess the impact on communities, and develop assistance projects. Examples include access to essential services, educational, philanthropic, and cultural activities, and using services from local community providers . Amirmokhtar Radi and Shokouhyar, 2021; Bloemhof et al., 2015; Kumar and Anbanandam, 2019; Singh et al., 2020; Walker et al., 2021.- Cover accident prevention, accessibility, health, well-being, training, inclusion, gender differences, career development, rules on drinking and driving, and salary equality.

1.3 Economic sustainability

Lieb and Lieb (2010)-Identifies transport-related sustainability initiatives such as cargo consolidation, reduction of vehicle speed, use of eco-friendly containerships, fuel-efficient modes, participation in governmental programs, and experimentation Baz & Laguir (2017)- Points out high costs,compliancewith legislation, difficulties involving customers, and management of extensive territory as barriers in emerging countries. Sureeyatanapas et al., (2018)- reduce energy consumption by model shift , use eco driving , opt alternative energy , and fleet management which result comes into cost saving .De Souza et al. (2022), -demonstrate a direct correlation with economic performance. Notably, efforts like energy reduction and sustainable practices Agyabeng-Mensah et al., 2020)**.**- Despite requiring initial financial investment, tend to enhance financial performance in the long term, attracting more customers and potentially increasing market size, sales, and profitability .

Table 1 Category, practices and author name

S	Category	Practices	P Authors
1	Economic sustainability	• Reduce the used of vehicle	• Green practices in Lithuania(Vienazindiene,2021)
		• Optimization of routes	• Green practices in Lithuania(Vienazindiene,2021)
		• Monitoring of emissions from vehicles Use of biofuels in vehicles	• Green Competitiveness in the Logistics Industry (Rukmal De Silva)
	Social sustainability	• Promote employee any initiative for environmental suggestion	• Green practices in Lithuania(Vienazindiene,2021)
		• Green administration department	• Green Competitiveness in the Logistics Industry Sureeyatanapas et al., (2018)
		• Regular training for environment management knowledge training	• Lai, KH and Wong CWY. 2012
		• Green management system	• Govindan et al., 2016; Martins et al., 2020;
		• Prioritize employability	• Schönborn et al., 2019; Walker et al., 2021
		• Accident prevention and Rules for drink and driving	• Amirmokhtar Radi and Shokouhyar, 2021; Bloemhof et al., 2015; Kumar and Anbanandam, 2019; Singh et al., 2020; Walker et al., 2021
3	Enviromental sustainability	• Environment management certification ISO 1400	• Green practices in Lithuania(Vienazindiene,2021)
		• Audit of effectiveness environment management measure	• Green practices in Lithuania(Vienazindiene,2021)
		• Find out alternative energy	• Green Competitiveness in the Logistics Industry
		• Recycle of material and packaging	• Zhang et al.(2014)
		• Eco driving	• Evangelista et al.(2017)
		• Reverse logistics	• Sureeyatanapas et al., (2018)

5.Research methodology

The factor rating method, also known as the point rating method, is a technique used in decision-making processes to evaluate and compare different options or alternatives based on a set of predetermined criteria or factors. Each factor is assigned a weight or importance, and each option is rated according to how well it satisfies each factor. The ratings are then multiplied by the weights and summed to determine the overall score for each option, helping decision-makers make informed choices.

Table 2 : Scale to be used pair wise comparision

Linguistic scale	Scale
Equally important	1
Slightly more important	2
More important	3
Moderately important	4
Moderately more important	5
Highly important	6
Very high important	7
Extremely more important	8
Absolutely high important	9

6.Data collection

Company overview

Mahindra logistics - Mahindra's emphasis on distribution services for customers and stakeholders, the company established a critical 3PL logistics service provider known as Mahindra Logistics, currently headquartered in Mumbai. The company offers its services in a wide range of industries and provides supply chain and transportation facilities. Distribution facilities, notably in rural and far-flung areas, and technology-driven logistics solutions are among its primary services.

FM Logistic India manages over 90 warehouses in more than 30 locations, providing more than 4.50 million square feet of warehouse space. FM Logistic India offers a comprehensive range of warehousing and distribution services to various sectors, including FMCG, retail, automotive, consumer durables, e-commerce, engineering, telecom, and pharma. Partnering with FM Logistic India for your logistics needs has many benefits, including cost efficiency, pan-India reach, and unparalleled expertise in the field. With FM Logistic India, you can focus on growing your business while leaving the logistics to the experts.

Table 3 Rating of sustainability initiatives and their impact by respondent 1

Impact	Sustainability inititatives			
	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	8	6	7	6
2. Reputation or brand image	5	7	7	8
3. Cost benefit	8	7	5	7
4.carbon emission reduction	8	7	7	8
5. stakeholder engagement	5	8	6	7

Table 4 Rating of sustainability initiatives and their impact by respondent 2

Impact	Sustainability initiatives			
	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	7	5	6	5
2. Reputation or brand image	6	5	6	8
3. Cost benefit	7	8	6	7
4.carbon emission reduction	7	8	6	7
5. stakeholder engagement	4	7	8	8

Table 5 Rating of sustainability initiatives and their impact by respondent 3

Impact	Sustainability initiatives			
	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	8	7	5	4
2. Reputation or brand image	7	6	8	6
3. Cost benefit	5	6	6	7
4.carbon emission reduction	5	8	6	7
5. stakeholder engagement	6	7	7	6

Table 6 Rating of sustainability initiatives and their impact by respondent 4

Impact	Sustainability initiatives			
	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	6	7	8	7
2. Reputation or brand image	6	8	6	7
3. Cost benefit	7	6	7	7
4.carbon emission reduction	7	8	8	7
5. stakeholder engagement	6	7	7	8

7.Data analysis and discussion

The factor ratings method is a statistical technique used in data analysis to assess and rank different factors based on their importance or influence on a particular outcome or variable. It involves assigning ratings or scores to various factors and then analyzing their impact through statistical methods such as regression analysis or factor analysis. In the discussion, it's important to interpret the results, examine the significance of each factor, and discuss implications for decision-making or further research. In this table the data is collected is analyzed and created a aggregate matrix which is obtained by taking mean rating of the four respondents and method use factor rating method Through that we find out best selective option among different option

Table 8 Aggregate sustainability initiatives

Impact	Sustainability inititatives				
	Weighted average	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	8	7.25	6.25	6.5	5.5
2. Reputation or brand image	6	6	6.5	6.75	7.25
3. Cost benefit	7	6.75	6.75	6	7
4.carbon emission reduction	8	6.75	7.75	6.75	7.25
5. stakeholder engagement	7	5.25	7.25	7	7.25
	36				

Table 9 :- Factor rating method

Impact	Sustainability initiatives				
	Weighted average	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	0.22	7.25	6.25	6.5	5.5
2. Reputation or brand image	0.16	6	6.5	6.75	7.25
3. Cost benefit	0.20	6.75	6.75	6	7
4.carbon emission reduction	0.22	6.75	7.75	6.75	7.25
5. stakeholder engagement	0.20	5.25	7.25	7	7.25
	1				

Table 10 – Factor rating method

Impact	Sustainability initiatives				
	Weighted average	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	0.22	1.76	1.32	1.54	1.32
2. Reputation or brand image	0.16	0.8	1.12	1.12	1.28
3. Cost benefit	0.20	1.4	1.6	1.2	1.6
4.carbon emission reduction	0.22	1.76	1.54	1.54	1.76
5. stakeholder engagement	0.20	1	1.6	1.2	1.4
Total	1	6.72	7.18	6.6	7.36

Table 11. Factor rating method

Impact	Sustainability initiatives				
	Weighted average	optimizing delivery routes	electric vehicle	Packing optimization	renewable energy
1. Efficiency	0.22	1.76	1.32	1.54	1.32
2. Reputation or brand image	0.16	0.8	1.12	1.12	1.28
3. Cost benefit	0.20	1.4	1.6	1.2	1.6
4.carbon emission reduction	0.22	1.76	1.54	1.54	1.76
5. stakeholder engagement	0.20	1	1.6	1.2	1.4
Total	1	6.72	7.18	6.6	7.36

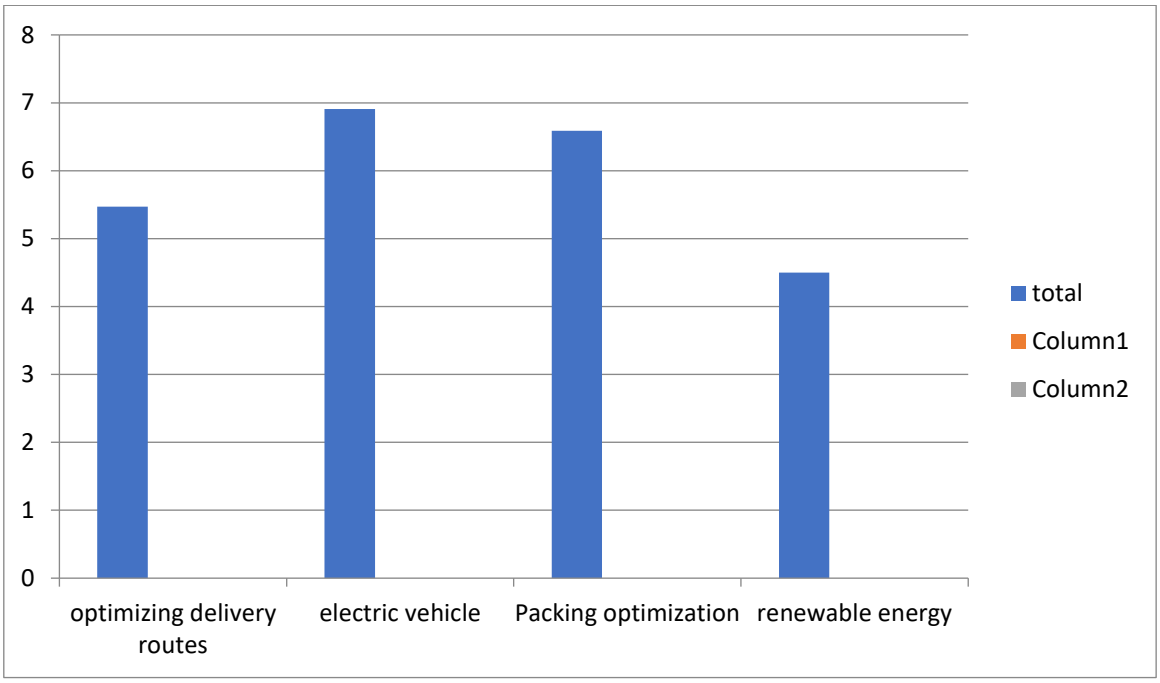

Figure 1. sustainability inititatives and their impact

Table 12.

Sustainability initiatives	Total	Ranking and priority
Electric vehicle	6.91	1
Renewable energy	6.81	2
Packing optimization	6.59	3
Optimizing delivery routes	5.47	4

Discussion

Based on the result we can say that our prioritize based on total highest number like electric vehicle , renewable energy , packing optimization , optimizing delivery routes . based on method we find our that the highest number got the sustainablitiy practices like electric vehicle hence we can focus on invest the money more on electric vehicle for the sustainability practices

Priority of sustainability initiatives based on your results:

1) Electric vehicles:
    - Transitioning to electric vehicles reduces emissions, contributing to a cleaner environment and combating climate change.
    - It also aligns with global efforts to phase out fossil fuel-powered transportation.
2) Renewable energy:
    - Investing in renewable energy sources such as solar or wind power reduces reliance on fossil fuels, decreases greenhouse gas emissions, and promotes sustainable energy production.
3) Packaging optimization:
    - Optimizing packaging materials and designs reduces waste and minimizes environmental impact.
    - It can include using biodegradable materials, reducing packaging size, or implementing reusable packaging solutions.
4) Optimizing delivery routes:
    - Efficient delivery routes minimize fuel consumption and emissions by reducing unnecessary miles traveled.
    - This optimization can be achieved through advanced logistics and route planning technologies, leading to cost savings and environmental benefits.
    - These initiatives collectively address key areas of sustainability, focusing on reducing emissions, minimizing waste, and promoting efficient resource use.

8.Conclusion

In conclusion, the organization should prioritize transitioning to electric vehicles and investing in renewable energy, while also considering packaging optimization and delivery route optimization as important initiatives to pursue in their sustainability efforts. The impact of sustainable practices in the third-party logistics (3PL) industry is significant and multifaceted. It not only reduces environmental footprint but also enhances operational efficiency, improves brand image, and fosters innovation. Sustainable practices, such as optimizing transportation routes, reducing packaging waste, and implementing green technologies, lead to cost savings and competitive advantage. Furthermore, they meet the increasing demand from customers and stakeholders for environmentally responsible supply chain operations. In conclusion, integrating sustainable practices into the 3PL industry is essential for long-term success, resilience, and positive societal impact.

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