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IMPLEMENTING GREEN LOGISTICS IN ORGANIZATIONS TO ENHANCE OPERATIONAL PERFORMANCE

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ABSTRACT
Green logistics is an emerging approach within supply chain management that focuses on minimizing the environmental impacts of logistics operations, including transportation, warehousing, and distribution. This study explores the principles, strategies, and benefits of green logistics in the context of sustainable development. It examines how companies can integrate eco-friendly practices such as carbon footprint reduction, energy-efficient transportation, packaging optimization, and reverse logistics into their supply chains. The research also analyzes the economic and regulatory drivers behind the adoption of green logistics, as well as the challenges faced by organizations in its implementation. Through case studies and literature review, the study highlights successful examples of green logistics initiatives and evaluates their impact on environmental performance and operational efficiency. The findings emphasize the growing importance of sustainable logistics as both a strategic necessity and a corporate responsibility in the face of global environmental concerns.

KEYWORDS: *Green Logistics, Environmental Impact, Carbon Footprint, Eco-friendly Practices, Waste Reduction, Energy Efficiency.*

INTRODUCTION

The logistics and supply chain industry serves as the backbone of global commerce, ensuring the efficient movement of goods from producers to consumers. However, this efficiency often comes at a significant environmental cost. Traditional logistics operations contribute substantially to carbon emissions, air pollution, noise, and resource depletion, particularly through extensive use of fossil fuels, non-biodegradable packaging materials, and inefficient transportation networks. As environmental awareness rises among consumers, governments, and businesses, there is an increasing demand for sustainable practices in logistics operations.

Green logistics, also known as eco-logistics or sustainable logistics, is a response to these growing environmental concerns. It aims to minimize the ecological impact of logistics processes while maintaining or improving service quality and cost-effectiveness. This includes implementing strategies such as optimizing transportation routes to reduce fuel consumption, investing in electric or hybrid vehicles, using renewable energy in warehouses, adopting sustainable packaging, and integrating recycling and reverse logistics systems.

The shift toward green logistics is also driven by stricter environmental regulations, pressure from stakeholders, and the recognition that sustainable practices can lead to long-term cost savings and brand enhancement. Companies that embrace green logistics not only contribute to environmental conservation but also position themselves as responsible and forward-thinking organizations.

Despite its benefits, the implementation of green logistics poses several challenges. These include high initial investment costs, lack of awareness or technical expertise, limited availability of green infrastructure, and resistance to change within organizations. Nonetheless, with increasing technological advancements and collaborative efforts across industries, green logistics is gaining momentum as a vital component of sustainable development.

This study aims to provide a comprehensive understanding of green logistics by exploring its key components, advantages, challenges, and real-world applications. Through an analytical lens, it seeks to highlight the role of green logistics in shaping a more sustainable and environmentally responsible global supply chain.

OBJECTIVES

- To identify the challenges faced in implementing green logistics in organisation
- To review the current green logistics practices and their impact on the company's operations.
- Provide recommendations for better and more effective green logistics implementation.
- To examine the awareness of green logistics practices among employees and stakeholders.

REVIEW OF LITERATURE

Dimitrios Chatzoudes, Marta Kadłubek, and Dimitrios Maditinos (2024)
This empirical study consolidates key organizational elements influencing the implementation of green logistics practices. It investigates the antecedents and effects of green logistics on

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supply chain management, providing insights into the organizational impacts of sustainable logistics initiatives.

M. Išoraitė (2023)
This literature review explores the integration of green logistics and marketing, discussing how sustainable practices in logistics can enhance marketing strategies. The author emphasizes the importance of aligning logistical activities with environmental sustainability to improve brand image and customer satisfaction.

Yiwei Wu, Shuaian Wang, Lu Zhen, and Gilbert Laporte (2023)
This comprehensive review examines the integration of operations research (OR) methodologies into green logistics to mitigate the environmental impact of logistical activities. The authors categorize existing studies into five main research directions: green waste logistics, cost impacts on green logistics, green routing problems, green transport network design, and emerging challenges in the field. The paper highlights the role of OR in balancing environmental concerns with cost efficiency and suggests areas for future research, particularly in understanding the long-term effects of the COVID-19 pandemic on green logistics.

Vania Oliveira, José Martino Neto, Cintia P. Silva, Ronald Mesia, and Valério Salomon (2023)
This study systematically reviews the intersection of circular economy principles and green logistics practices. It identifies leading countries, key journals, and prevalent research themes in the field. The authors utilize bibliometric analysis to uncover keyword clusters and top contributing authors, providing a comprehensive overview of the current state of research and highlighting gaps for future exploration.

Bernardo Nicoletti and Andrea Appolloni (2022)
This paper explores the integration of green approaches within Logistics 5.0, utilizing foundation models to drive sustainability-oriented innovations. The authors present a novel framework to design and implement innovative logistics strategies that align with environmental sustainability goals.

RESEARCH DESIGN

DESCRIPTIVE RESEARCH DESIGN: Qualitative data includes respondents' opinions and ideas. It is also applied in order to describe current conditions or to investigate relationships

SOURCES OF DATA

- Primary Data – Questionnaire was given to 132 respondents
- Secondary Data – Websites and online journals, Published reports & Review of literature from published articles

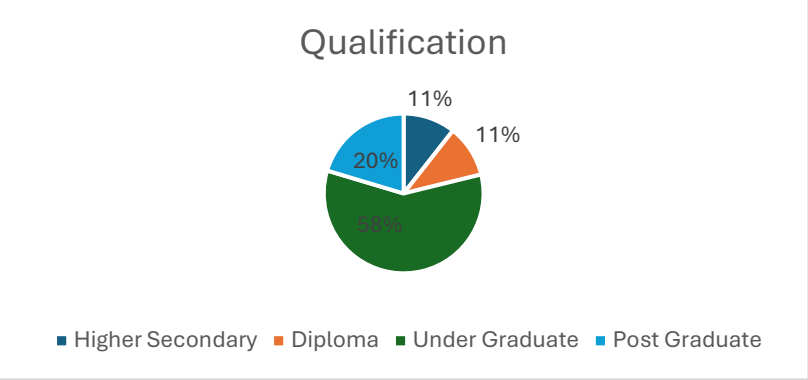
TOOLS FOR ANALYSIS

Research questions are always answered with a percentage analysis and Chi square The percentage is appropriate when it is important to know how many of the participants gave a particular answer. When the responses have discrete categories, percentage is reported

QUALIFICATION

Qualification	No. of. Respondents	Percentage
Higher Secondary	15	10.6
Diploma	15	10.6
Under Graduate	83	58.5
Post Graduate	29	20.4
Total	142	100.0

CHART



INTERPRETATION

The table and pie chart display the educational qualifications of 142 respondents. The majority of respondents (58.5%) are Under Graduates, indicating that most participants have completed a bachelor's degree. Post Graduates make up 20.4%, while both Higher Secondary and Diploma holders account for 10.6% each. This suggests that the study primarily reflects the views of individuals with undergraduate-level education.

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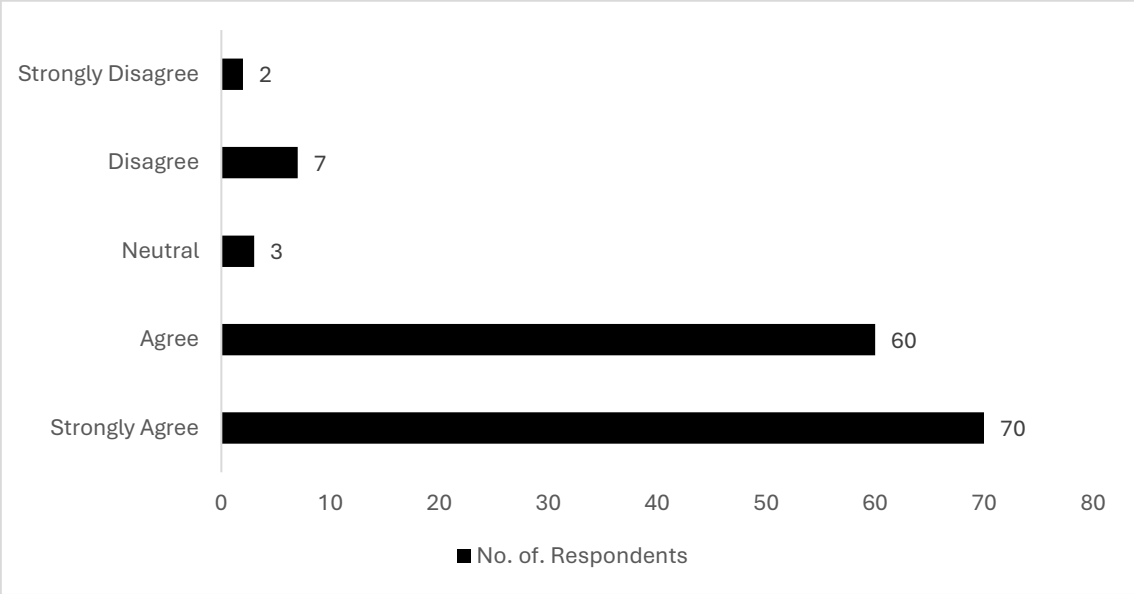
TABLE :High implementation costs are a major barrier to adopting green logistics

High Implementation	No. of. Respondents	Percentage
Strongly Agree	70	49.3
Agree	60	42.3
Neutral	3	2.1
Disagree	7	4.9
Strongly Disagree	2	1.4
Total	142	100.0

CHART: High implementation costs are a major barrier to adopting green logistics



INTERPRETATION

The data clearly indicates that high implementation costs are perceived as a major barrier to adopting green logistics. A significant majority of respondents, comprising 49.3% who strongly agree and 42.3% who agree, believe that these costs hinder the adoption process. Only a small proportion of participants remained neutral (2.1%) or disagreed (6.3% combined), suggesting a strong overall consensus on the financial challenges associated with implementing green logistics practices.

Qualification of the respondents and protocols to manage delivery delay

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	12.493	12	.407
Likelihood Ratio	13.742	12	.317
Linear-by-Linear Association	.223	1	.637
N of Valid Cases	132		

H_0: There exists no association between qualification of the respondents and protocols to manage delivery delay.
Calculated $\chi 2$ Value: 12.493
Degree of freedom: 12
Signification level: .407

INTERPRETATION

As the calculated $\chi 2$ value (12.493) is not significant (.407) at five percent level, there exist no association between qualification of the respondents and protocols to manage delivery delays. Hence the null hypothesis is accepted.

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Experience of the respondents and training in handling specialized cargo

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	24.278	8	.002
Likelihood Ratio	26.378	8	.001
Linear-by-Linear Association	21.457	1	.000
N of Valid Cases	132		

H_0: There exists no association between experience of the respondents and training in handling specialized cargo.
Calculated $\chi 2$ Value: 27.278
Degree of freedom: 8
Signification level: .002

INTERPRETATION

As the calculated $\chi 2$ value (27.278) is significant (.002) at five percent level, there exist an association between experience of the respondents and training in handling specialized cargo. Hence the null hypothesis is rejected.

Training of the respondents and handling delicate and composite materials

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.615	16	.980
Likelihood Ratio	7.176	16	.971
Linear-by-Linear Association	.002	1	.963
N of Valid Cases	132		

H_0: There exists no association between training of the respondents and handling delicate and composite materials.
Calculated $\chi 2$ Value: 6.615
Degree of freedom: 16
Signification level: .980

INTERPRETATION

As the calculated $\chi 2$ value (6.615) is not significant (.980) at five percent level, there exist no association between training of the respondents and handling delicate and composite materials. Hence the null hypothesis is accepted.

FINDINGS

- **High Awareness and Agreement on Green Practices:** A significant majority of respondents (91.6%) either agreed or strongly agreed that green logistics practices are being implemented effectively in their organization.
- **Education Level of Respondents:** Most participants were undergraduates (58.5%), indicating that opinions largely reflect this educational demographic.
- **Association Between Experience and Specialized Training:** There is a statistically significant relationship between employees' experience and their training in handling specialized cargo (Chi-square value = 27.278, p = 0.002), showing that more experienced employees are more likely to be trained in specific green logistics practices.
- **No Association in Other Areas :**No significant association was found between: Qualification of respondents and protocols to manage delivery delays & Training of respondents and handling delicate and composite materials.

SUGGESTIONS

- **Enhanced Training Programs:** Develop and mandate more specialized training for all levels of employees, not just those with high experience, to ensure comprehensive understanding and application of green logistics.
- **Invest in Infrastructure and Technology:** Companies should adopt renewable energy in warehouses, electric or hybrid fleets, and route optimization software to reduce carbon emissions.
- **Encourage Cross-Functional Awareness:**Awareness campaigns and inter-departmental workshops can help foster a culture of sustainability beyond logistics teams.
- **Policy and Incentive Integration:**Align organizational policies with environmental goals and consider incentives for departments that meet green logistics benchmarks.

CONCLUSION

The study underscores the growing importance and acceptance of green logistics practices within organizations. While awareness and support are high, challenges remain in consistent training and infrastructure readiness. There is a clear link between experience and effectiveness in implementing specialized green practices, but broader efforts are required to ensure uniform capability across all employee levels. By embracing green logistics strategically, organizations can not only reduce their environmental footprint but also enhance operational efficiency and long-term sustainability.

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