M.O.P. VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)

CHENNAI-600034

(Affiliated to University of Madras and Re-accredited at "A++" grade by NAAC)

MINI PROJECT REPORT

Project on

Leveraging Sustainable Practices to Reduce Carbon Footprints in Supply Chain Management

Done by

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Master of Business Administration

Under the guidance of

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2023-2024

CERTIFICATE

This is to certify that the project report titled **"Leveraging Sustainable Practices to Reduce Carbon Footprints in Supply Chain Management",** is a Bonafide record of work done by Ms. Anto santhiya josephine, Ms. Swetha A, during the period 2023-2024, and the report has not formed the basis for the award of any Degree.

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Place: Chennai
Date:

DECLARATION

We **Anto santhiya josephine A, Swetha A,** hereby declare that the project report titled "**Leveraging Sustainable Practices to Reduce Carbon Footprints in Supply Chain Management**", is a record of original work done by meduring 2023-2024 under the guidance of Dr. Jamuna Chezhian Assistant Professor, Department of mathematics and it has not formed the basis for the award of any other degree.

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Place: Chennai
Date:

TABLE OF CONTENT

LEVERAGING SUSTAINABLE PRACTICES TO REDUCE CARBON FOOTPRINTS IN SUPPLY CHAIN MANAGEMENT

ABSTRACT

In today's world, where environmental sustainability is of paramount importance, organizations are increasingly recognizing the need to reduce their carbon footprints across all aspects of their operations. This project focuses on exploring strategies to mitigate carbon emissions within the context of supply chain management. The study investigates the adoption of sustainable practices such as eco-friendly transportation, high-efficiency packaging, and sustainable delivery methods to reduce carbon emissions throughout the supply chain. Using quantitative techniques, particularly the Chi-square test for independence of variables, the project aims to analyze the association between different sustainable practices and carbon footprint levels within the supply chain. By examining observed frequencies of sustainable practices across varying carbon footprint levels, the study seeks to identify significant correlations and assess the effectiveness of sustainable interventions in reducing carbon emissions.

[Keywords - Carbon footprint, Supply chain management, Sustainable practices, eco-friendly transportation, high efficiency packaging, sustainable delivery methods]

INTRODUCTION

In recent years, the global community has become increasingly aware of the pressing need to address environmental sustainability challenges, particularly in the context of industrial operations and supply chain management. The concept of carbon footprint, which quantifies the total amount of greenhouse gas emissions generated directly or indirectly by an individual, organization, product, or activity, has emerged as a key metric for assessing environmental impact and guiding efforts towards mitigation and reduction. Supply chain management, encompassing the interconnected network of processes involved in the production, distribution, and delivery of goods and services, plays a pivotal role in influencing carbon emissions and environmental sustainability. The transportation of goods, packaging materials, and delivery methods are among the primary contributors to carbon footprints within the supply chain. As such, optimizing these aspects through the adoption of sustainable practices presents significant opportunities for reducing environmental impact and achieving long-term sustainability goals.

OBJECTIVE

To quantify the impact of sustainable practices on reducing carbon footprints within supply chain management.

IMPACT OF SUSTAINABLE PRACTICES ON REDUCING CARBON FOOTPRINTS WITHIN SUPPLY CHAIN MANAGEMENT

Sustainable practices within supply chain management play a pivotal role in reducing carbon footprints and mitigating environmental impact. By adopting eco-friendly transportation methods, such as utilizing low-emission vehicles and optimizing route planning, organizations can significantly reduce greenhouse gas emissions associated with transportation. High-efficiency packaging solutions, including lightweight and recyclable materials, minimize material usage and transportation-related emissions. Implementing sustainable delivery methods, such as last-mile solutions with electric vehicles or bike couriers, further contributes to lowering carbon footprints. Quantitative analysis, such as the Chi-square test, allows organizations to assess the impact of these sustainable practices on carbon emissions. By comparing observed and expected frequencies of sustainable initiatives, organizations can quantify the association between these practices and carbon footprints. Data visualization tools like Power BI enable the visualization of carbon emission trends and the effectiveness of sustainability initiatives. Visual representations facilitate informed decision-making and stakeholder engagement. Despite the benefits, organizations may face challenges such as cost implications and regulatory complexities when implementing sustainable practices. However, these challenges also present opportunities for innovation and competitive differentiation. Collaboration across stakeholders is essential to address environmental concerns and achieve long-term sustainability goals. Ultimately, integrating sustainable practices into supply chain management not only reduces carbon footprints but also enhances operational efficiency and creates value for stakeholders.

STRATEGIES TO MITIGATE CARBON EMISSIONS WITHIN THE CONTEXT OF SUPPLY CHAIN MANAGEMENT

- Optimize Transportation Logistics: Reduce carbon emissions associated with transportation by optimizing routes, consolidating shipments, and using more fuel-efficient vehicles. Utilize alternative transportation modes such as rail or water transport where feasible.
- Promote Eco-Friendly Transportation: Invest in low-emission vehicles, electric vehicles (EVs), and hybrid vehicles for transportation within the supply chain. Transitioning to cleaner fuels and technologies helps reduce greenhouse gas emissions.
- Implement Sustainable Packaging: Use lightweight and recyclable packaging materials to minimize material usage and transportation-related emissions. opt for packaging designs that maximize space utilization and minimize waste.
- Adopt Sustainable Delivery Methods: Implement last-mile delivery solutions such as electric vehicles, bike couriers, or decentralized distribution centers to reduce emissions associated with final delivery. Explore options for carbon-neutral delivery services.
- Source Materials Sustainably: Collaborate with suppliers to source materials from sustainable and certified sources. Prioritize suppliers who adhere to environmental standards and promote ethical labour practices.

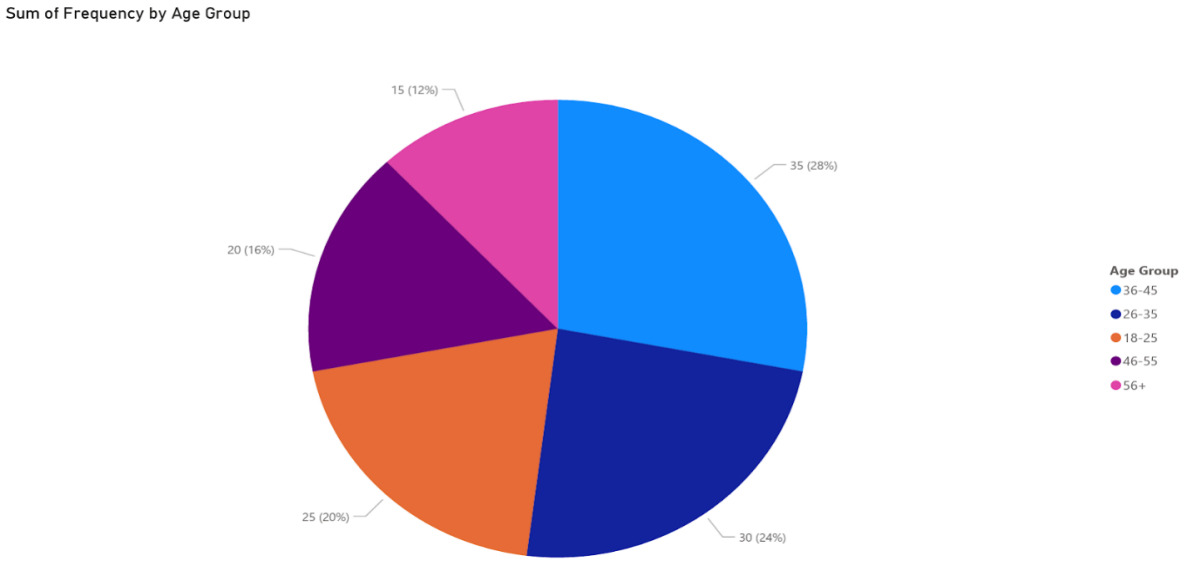
- Reduce Energy Consumption: Improve energy efficiency in manufacturing facilities, warehouses, and distribution centers by investing in energy-efficient technologies, lighting, and heating/cooling systems. Utilize renewable energy sources such as solar or wind power where possible.
- Minimize Waste Generation: Implement waste reduction initiatives and recycling programs to minimize waste sent to landfills. Optimize production processes to reduce material waste and improve resource utilization.
- Promote Lean Principles: Adopt lean manufacturing principles to streamline supply chain processes, minimize unnecessary transportation and storage, and reduce emissions associated with overproduction and excess inventory.
- Measure and Monitor Performance: Implement systems for tracking and monitoring carbon emissions throughout the supply chain. Regularly measure performance against emission reduction targets and identify opportunities for improvement.
- Collaborate Across Stakeholders: Collaborate with suppliers, customers, and other stakeholders to collectively address environmental challenges and drive sustainability initiatives across the entire supply chain. Share best practices, resources, and innovations to collectively reduce carbon emissions and promote sustainability.

METHODOLOGY

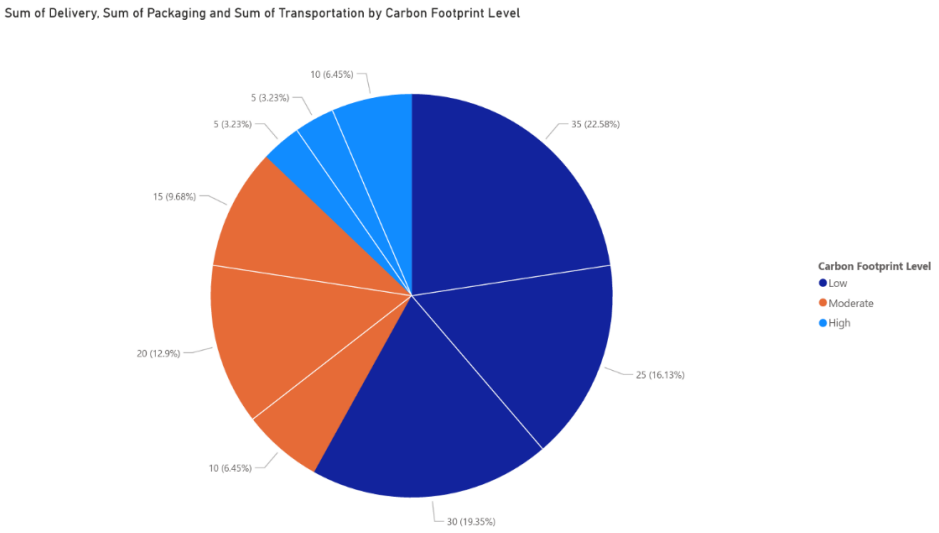
To quantify the impact of sustainable practices on reducing carbon footprints within supply chain management, we have conducted a survey via Google Forms and responses were collected based on questionnaires. The survey includes questions related to sustainable practices such as transportation methods, packaging solutions, and delivery strategies. The survey was voluntary, anonymous, and accessible to participants. The completed survey was returned by Google Forms.

SURVEY

(Age Group)



DIFFERENT COMBINATIONS OF CARBON FOOTPRINT LEVELS AND ADOPTION OF SUSTAINABLE PRACTICES IN SUPPLY CHAIN



OBSERVATION

From the above analysis, there may be a potential association between carbon footprint levels and the adoption of sustainable practices in the supply chain. Specifically, higher frequencies of sustainable practices adoption are observed in conjunction with lower carbon footprint levels, indicating a possible relationship between these variables that warrants further statistical analysis using the Chi-square test.

DATA ANALYSIS FOR THE MATHEMATICAL TOOLS

	High efficiency packaging	**Eco-Friendly Transportation**	**Sustainable Delivery practices**
Low carbon Footprint	25	30	35
Moderate carbon Footprint	20	15	10
High carbon Footprint	5	10	5

CHI-SQUARE TEST

χ^2 test for Independence Attributes

***H_0*:** There is no significant association between carbon footprint levels and the adoption of different sustainable practices in the supply chain.

***H_1*:** There is a significant association between carbon footprint levels and the adoption of different sustainable practices in the supply chain.

25	30	35	90
20	15	10	45
5	10	5	20
50	55	50	**155**

O	**E**	**(O – E)**	**$(O - E)^2/E_i$**
25	29.03	16.09	0.554
30	31.94	3.73	0.365
35	29.03	35.47	7.113
20	14.52	31.99	23.611
15	15.94	0.8836	0.689
10	14.52	20.54	12.774
5	6.45	2.10	0.340
10	7.12	8.21	1.531
5	6.45	2.10	0.340
155	**155**		**$\sum (O - E)^2/E_i$ = 47.317**

D.F = (R-1) (C-1)
= (3-1) (3-1)
= (2) (2)
= 4

Table value 0.05 (4) = 9.49
Calculated χ^2 > Table value 0.05 (4)
Accept H_1
[There is a significant association between carbon footprint levels and the adoption of different sustainable practices in the supply chain]

RESULT

Since the calculated value is greater than the tabulated value, we reject H0 and accept H1. Therefore, the responses are uniformly distributed.

CONCLUSION

The study has revealed a significant association between carbon footprint levels and the adoption of sustainable practices within the supply chain. The Chi-square test results indicate that sustainable practices such as high-efficiency packaging, eco-friendly transportation, and sustainable delivery methods play a vital role in reducing carbon emissions. These findings underscore the importance of integrating sustainability initiatives into supply chain management strategies to mitigate environmental impact. Moving forward, implementing and promoting these practices can contribute to a more sustainable and environmentally responsible supply chain.