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ASSESSING THE FINANCIAL IMPACTS OF SUSTAINABLE PRACTICES IN PROJECT MANAGEMENT IN LOGISTICS INDUSTRIES

A case Study of Logistics Companies on Kath-
mandu Nepal

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ABSTRACT

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The concept of sustainability is inevitable in every sector nowadays. This thesis tends to explore how sustainability impacts the performance of logistics firms financially. The specific focus of current research goes to those logistics companies which are based in Kathmandu, Nepal meaning to ask if green logistics strategies offer real financial value. The aim is to assess these outcomes and offer practical guidance for traders, including policymakers.

The study draws renowned theories to show the relationship between sustainability, profitability, and corporate responsibility in this sector which are triple-bottom line, research-based perspective, and stakeholder theory. The research used here is a mixed-methods approach, with structured surveys in quantitative technique, and interviews and case studies in qualitative depth. The research is intentionally localized to Kathmandu-based firms ensuring the findings are appropriate and can be applied in this business setting.

Findings reflect that there is a notable increase in profit after adopting sustainable logistics practices. There is expected to diminish operational costs while their investments in sustainability are being paid off within a short period. In addition to the cost benefits, these firms are expected to experience stronger customer loyalty, better brand perception, and noticeable reductions in emissions. It grants sustainability as a strategic tool for long-term financial benefits and competitiveness.

Keywords sustainability, financial impact, logistics, ESG

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ABBREVIATIONS

| | |
|-----------|---|
| 3PL | Third-Party Logistics |
| AI | Artificial Intelligence |
| B2B | Business-to-Business |
| CBA | Cost-Benefit Analysis |
| EPA | Environmental Protection Agency (United States) |
| ESG | Environmental, Social, and Governance |
| EVs | Electric Vehicles |
| GHG | Greenhouse Gas |
| GLMP | Green Logistics Management Practices |
| GLPs | Global Logistics Providers |
| IEA | International Energy Agency |
| IRR | Internal Rate of Return |
| ISO 14001 | International Organization for Standardization |
| ML | Machine Learning |
| NPR | Nepalese Rupees |
| PPP | Public-Private-Partnership |
| RBV | Resource-Based View |
| ROI | Return on Investment |
| SMEs | Small and Medium Enterprises |
| SSCM | Sustainable Supply Chain Management |
| TBL | Triple Bottom Line |
| TMS | Transportation Management System |
| WCED | World Commission on Environment and Development |

1 INTRODUCTION

Time is changing and humankind must change accordingly for adaptation. Survival of the fittest warns us to be updated or exist from the world. Technology advancement has brought the high importance of logistics and supply chain since the human needs and desires have been unlimited and the time is limited to manage them appropriately. Hence, this thesis is a detail on the transforming picture of conventional logistics into sustainable logistics at the same time, taking more financial advantage from the paradigm shift.

1.1 Background: Sustainable Practices in Logistics

Supply chain management is the entire network of an organization that ensures whether the project has all the required materials at the right time and place while logistics ensures the efficient and cost-effective delivery and storage of resources. Here, the key term logistics is taken as a set of actions whose goal is to minimize costs and maximize profits. The term is mainly used in the purely commercial sector by exhibition companies and in financial reporting (Kharel & Maharjan, 2024). Green logistics refers to the part of supply chain management practices aiming to reduce the environmental and energy impact of goods distribution, focusing on handling materials, proper waste management, and transportation. In that sense, "Green Logistics" is an organization's ability to deliver goods and services in an environmentally friendly yet economically efficient manner.

Brundtland Commission in 1987, in its "Our Common Future," sustainable development is described as "the meeting of the present needs without compromising future generations' ability to do the same (WCED, 1987)". Due to the increasing awareness of environmental issues and the need for responsible business practices, in recent years, sustainability has emerged as a crucial focus across various industries. As a global

issue, this fact has driven the attention of many researchers, for not only depicting reality but also setting an example of financial impacts due to sustainability in logistics industries. It shows the high need of integrating eco-friendly measures and practices in supply chain management, reducing the adverse ecological impact enhancing financial performance.

Historically, environmental policies were often treated as unimportant issues, primarily focusing only on economic benefits, addressing only the most immediate concerns. There is a paradigm shift in manufacturing practices focusing more on sustainable and more proactive, comprehensive environmental management strategies these days, due to the increasing scarcity of resources and the harmful impacts of unsustainable practices. Similarly, the condition applies to the entire logistics and supply companies.

In the context of Nepal, Kathmandu has been listed in the top polluted cities of the world. Logistics industries, covering transportation, warehousing, inventory management and distribution, contribute to the growth of the national economy. Significant attention has been given in logistics industry to mitigate the environmental degradation caused due to the high consumption of fossil fuels, including outdated infrastructure of cities like Kathmandu.

Carbon emissions and waste generation are challenges for logistics sectors and even the situation is worsened due to traffic congestion and dependency on fossil fuels, particularly in developing countries like Nepal. However, opportunities lie in challenges. It is an emergence to accept sustainability in logistics management and supply chain for greener future, at the same time, lead business into a more eco-conscious platform.

Hence, this thesis aims to assess the financial Impacts of implementing sustainable practices within project management in logistics industries, examining how proactive green initiatives impact financial management

in logistics industries. It tends to contribute to understanding the viability and importance of integrating sustainable practices into core logistics operations.

1.2 Importance of Financial Assessment in Sustainability

Financial assessment identifies the greatest economic and environmental benefits and cooperates to prioritize sustainability initiatives in logistics industries. It also mitigates financial risks associated with environmental regulations, resource scarcity, and climatic change. Integrating sustainability and financial performance can be useful in a competitive marketplace due to their long-term economic viability, contributing to the overall sustainability of the business. Investors and corporations are considering environmental, social, and governance (ESG) criteria to assess sustainable financial performance and risk management in the present context. In research, it is found that the integration of ESG factors into investment decisions does not compromise financial returns but enhances them. The research highlights about the business case for ESG investing is "empirically very well founded, with roughly 90% of studies finding a nonnegative ESG-CFP relation, and the majority reporting positive findings (Friede, Busch, & Bassen, 2015)".

Financial viability is a key concern for logistics companies while sustainability initiatives are discussed. Renewable energy-powered warehouses, low-carbon emission transportation, and digital chain optimization are some sustainable logistics investments for which significant upfront capital is required. While research shows that "investment in the adaptation of renewable energy within supply chain management have demonstrated strong return on investment, financial resilience, and long-term cost savings (Khanfar, Iranmanesh, Ghobakhloo, Senali, & Fathi, 2021)".

Analyzing green logistics to measure both environmental and economic performance to assist in decision-making, it is important to consider

both the physical performance factor (CO₂ emissions) and monetary performance factor (cost) in sustainable corporate decision making in logistics (Lee & Wu, 2014). Hence, the study tends to highlight the financial Impacts of sustainable practices in project management in logistics industries, generally to the global context and particularly to Kathmandu, Nepal.

1.3 Research Problem

The burning issue of sustainability in project management in logistics has focused the directors and investors of the supply chains. The study tends to address the below gaps by analyzing the financial implications of green logistics strategies:

- i. Lack of studies accessing the financial benefits of sustainable logistics in Nepal, particularly, in Kathmandu.
- ii. Need to evaluate the financial impact of implementing green practices in logistics.

1.4 Research Objectives and Research Questions

The research objectives of the study include but are not limited to the following facts:

- i. To assess the financial impact of implementing sustainable practices in the logistics industries in Kathmandu.
- ii. To identify the key drivers and barriers influencing the adoption of sustainable logistics practices in Kathmandu.
- iii. To explore financial strategies and investment models that logistics companies can adopt to enhance sustainability while maintaining profitability.

Following the above research objectives, the study covers the research questions below:

- i. How do sustainable practices affect the financial performance of logistics companies in Kathmandu?
- ii. What are the key drivers and barriers to implementing green logistics initiatives in Kathmandu's logistics industries?
- iii. What financial strategies and investment models can logistics companies adopt to enhance sustainability while maintaining profitability?

1.5 The Scope and Limitations of the Study

Aiming to assess the financial impacts of sustainable practices in project management within the logistics industries in Kathmandu, the research seeks to identify the economic benefits and challenges attached with green logistics initiatives, for example, low-carbon transportation, renewable energy, and digital supply chain optimization examining how sustainability-driven initiatives impact profitability, cost efficiency, and long-term business resilience.

The current research limits in geographical focus which only studies logistics companies operating in Kathmandu, Nepal and may not represent completely to all the logistics supply chains of other parts of the world. The other limitation can be in the accessibility to accurate financial data due to confidentiality matters of logistics companies.

There is limitation in timeframe and the research may be unable to cover big sample size and even if it is not possible to investigate the financial impact over a long period, the study will access short term financial impacts which may limit the generalizability of findings to larger-scale logistics companies for long-term financial impacts. Finally, due to the use of qualitative components of the study, subjective bias may be introduced, as responses will be based on the perspectives of the owners and managers of the companies.

1.6 Significance of the Research

The term sustainability has become a global priority for every industry, including logistics companies which are facing the challenge of balancing financial viability with environmental responsibility. The research insights into the economic benefits, risks, and challenges adopting sustainable logistics strategies. The study will provide data-driven recommendations on integrating green logistics while generating business surplus. It also assists the policymakers in shaping regulations on carbon emissions, fuel efficiency, and waste management. Hence, the several key stakeholders like logistics companies, policymakers and regulators, investors and even academics and researchers will benefit from the study.

1.7 Structure of the Thesis

This thesis paper is well structured into six major chapters with a logical sequence from understanding the impact of sustainability on financial performance, as a comprehensive analysis of sustainable logistics in Kathmandu, Nepal. Chapter 1 covers the introduction phase with the background of the study. It also presents research problems, objectives, limitations and the research significance. Chapter 2 covers the literature review part of the study. It critically examines the existing research on sustainable logistics, green supply chain management, and the financial assessment frameworks in project management exploring major theoretical models, prior empirical studies, and industry best practices. Identifying the research gap in literature, the review part justifies the focuses on Kathmandu's logistics industries.

Similarly, Research Methodology, chapter 3, covers the complete research design, with data collection and analysis techniques which are used in the study. It demonstrates how interviews with company executives to gather qualitative data and financial records, industry reports and empirical studies related to the topic are gathered and analyzed. It

also discusses sampling strategy, ethical considerations, and reliability of data. Chapter 4 covers the data analysis and finding's part. The results are analyzed in relation to the research questions, in response to the financial impact of sustainable logistics initiatives, key drivers and barriers and investment models adopted by the companies which will be supported by statistical analysis and quantitative insights from interviews with the industry executives.

Next, chapter 5 interprets the findings in the context of existing theories and literature focusing on how sustainable logistics investments affect financial performance, particularly that of the logistics companies of Kathmandu. It also explores practical implications for the stakeholders highlighting the challenges Kathmandu's logistics sector. Last but not the least, chapter 6 summarizes the key findings and their implications providing actionable recommendations for logistics companies and other stakeholders on integrating financial sustainability with green logistics. It provides a coherent progression from problem identification to practical solution in sustainable logistics management.

2 LITERATURE REVIEW

2.1 Concept and Overview of Sustainability in Logistics

This literature review explores key theoretical frameworks and financial implications including some of the challenges and research gaps in sustainable logistics. The logistics industries are under the service industries and research on the environmental sustainability of these industries has been limited despite its negative environmental effects (Kim, Na, & Ha, 2024). This research primarily focuses on the impacts of sustainability in profit making logistics business, identifying other areas for further research.

Environmental sustainability has been a growing issue in global context throughout the beginning of the new millennium. There is significant attention for sustainability in logistics due to environmental concerns and cost control. With the increasing shift towards green logistics, companies are striving to balance sustainability with financial viability. Together with adopting eco-friendly logistics practices that help mitigate environmental damage, business must also navigate the financial implications within their project management frameworks to ensure both operational efficiency and sustainable profitability.

For Merzi (2025) the imperative of a transition towards sustainability-oriented practices has become imperative for governments, companies and international organizations, especially in industrial sectors whose environmental and social impact is particularly burdensome. In his Doctoral dissertation he explores the financial implications of adopting sustainable supply chain strategies in various industries, discussing how business can differentiate themselves by implementing green logistics for perpetual financial stability.

In terms of revolutionizing supply chain management by enhancing logistics efficiency, case studies of major corporations here, for instance,

Amazon, DHL, Walmart and Starbucks reveal the application of effective strategies to incorporate artificial intelligence (AI) and machine learning (ML) in logistics and supply chain management. However, to overcome challenges like data integrity, system complexity and data privacy issues including cost control successful AI and ML integration require strong data governance, measurable technological solutions, and a habit of continuous innovation which enables maximizing the long-term efficiency and sustainability in logistics operations (Azari, Arif, Moustabchir, & Jawab, 2025).

The silver lining of the COVID-19 pandemic is that it has taught humankind a good lesson on environmental and ecological aspects. Despite the shutdown of numerous factories, stay-at-home orders affected countless supply chains across industries. Study shows that last-mile challenges” became magnified during the COVID-19 pandemic because stay-at home orders forced these firms alike to rely more on online distribution (Ketchen Jr & Craighead, 2020).” This article explores the urgency of stay-at-home orders in pandemic situations and sustainability in logistics companies in general.

In conclusion, term sustainability, particularly in logistics, like for Carter & Roger (2008), refers to practices that minimize environmental impacts while ensuring long-term economic viability and social responsibility. “...Carter and Jennings (2002) have conceptualized the integration of social and environmental issues under the rubric of LSR, which ties together the previously standalone concepts of the environment, diversity, human rights, safety, and philanthropy and the community as they relate to logistics management (Carter & Roger, 2008)”. Hence, sustainability in logistics is the integration of environmental, social and economic principles to optimize supply chains while diminishing adverse impacts. Generally, it encompasses green logistics, eco-friendly packaging, energy-efficient warehouse and reverse logistics like recycling, remanufacturing, and waste reduction initiatives (Puri, 2024).

2.2 Importance of Sustainable Logistics in Project Management

Based on data sources from the International Energy Agency (IEA), global emissions of CO₂ from bulk energy production and industrial activities reached 36.8 gigatons in 2022 (Abanan & Susilowati, 2024). Some studies show that the provision of sustainable supply chains and green logistics is a rapidly developing area of research (Lee & Wu, 2014). With the revolution in market trends, especially in the post-COVID era, there are many challenges along with the opportunities in project management.

As per Alsehaimi et al. (2024), there is a paradigm shift in logistics clearly noticed as sustainability has become not a choice but a necessity for companies

striving to sustain in the competitive market. Further, the global building industry has seen a paradigm shift towards sustainability and efficiency in current years as the globe grapples with the issues supplied by means of useful resource depletion and climate exchange (Alsehaimi, et al., 2024).

As shown in figure 1, sustainable logistics holds three pillars: society, environment and economy (Vudugula, 2025). Logistics firms are essential to achieving environmental sustainability within the industry, yet scholarly attention to their specific sustainability efforts is limited (Kim, Na, & Ha, 2024). United States Environmental Protection Agency (EPA) addresses the National Environmental Policy Act of 1969 emphasizing the importance of integrating environmental, economic, and social considerations into decision-making, declaring it a national policy "to create

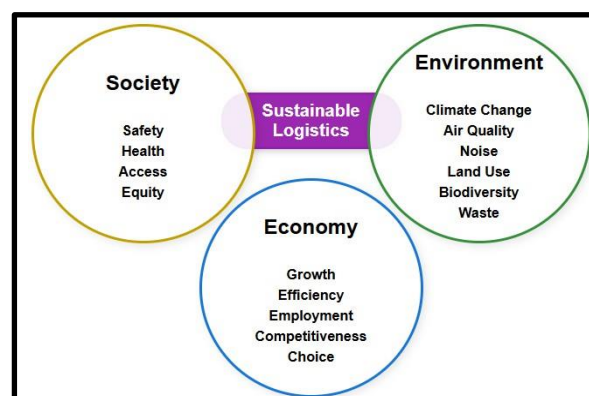


Figure 1: The Three Pillars of Sustainable Logistics: Balancing Society, Environment, and Economy

and maintain conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations (EPA, 2025).”

Post-COVID era has seen significant disruptions in logistics and supply chain management, driven by many global factors. Russia-Ukraine war, leading to the European energy crisis since 2022, and the increasing awareness among governments, business, and the consumers have re-shaped market dynamics accelerating trends such as deglobalization, the adaptation of new sourcing strategies, the expansion of e-commerce and home delivery services including the growing need for digital transformation across logistics and manufacturing (Solari, Bottani, & Romagnoli, 2025). It justifies the emergence of sustainable logistics for business to enhance resilience, reduce environmental impact, and adapt to evolving market demands.

Hence, from the above references, the importance of sustainable logistics for businesses can be listed as below:

- Since the governments of the countries worldwide are imposing stricter environmental regulations, business must comply with the laws to avoid penalties,
- Sustainable logistics might seem expensive initially, but ultimately, it gets very nominal operation cost, saving fuels with improved operational efficiency, and
- Environment conscious customers prefer brands that align with the sustainability values, compelling logistics companies towards sustainability.

2.3 Financial Impacts of Sustainable Logistics

For some scholars,“ the logistics industry has recognized the importance of environmental sustainability as a necessary precondition (Kim, Na, &

Ha, 2024)”. Wise investment in sustainable logistics reduces environmental impact providing significant financial surplus for business and entrepreneurship. Cost savings through green transportation investments is one major advantage for logistics industries which indicates that those companies adopting green transportation technologies can experience up to a reduction of 20% in fuel costs (Khanfar, Iranmanesh, Ghobakhloo, Senali, & Fathi, 2021). For some scholars, there is the crucial role of logistics companies in the promotion of the environmental sustainability of the logistics industry since they are involved in the physical networks of the industry (Kim, Na, & Ha, 2024). Considering decarbonizing logistics for economic and environmental benefits, it is both a business opportunity and an environmental necessity (Miklautsch & Woschank, 2022).

Green Logistics Management Practices (GLMP) enhance both environmental sustainability and financial performance by optimizing resource utilization, minimizing waste, and implementing energy-efficient strategies to improve operational efficiency. Various advancements in technology have been made so far to enhance operational efficiency and at the same time minimize environmental impact. Not only this much, during post-COVID era, according to Vudugula (2025), integration of green technologies into logistics and supply chain management has emerged as a significant research focus due to increasing environmental concerns and the demand for sustainable business practices.

The end goals of the efficient supply chain are increased profits by better customer satisfaction and low expenses of conducting business. Profits are better while expenses are controlled and lessened to the maximum range. In a study, the report indicates that “implementing green logistics management practices has a substantial positive effect on financial performance (Abanan & Susilowati, 2024),” revealing the fact that “trucking companies adopting environmentally sustainable practices, such as utilizing more efficient fuels, managing waste properly, and optimizing

routes, experience significant financial improvements (Abanan & Susilowati, 2024). Numerous green practices have been adopted across various logistics functions, such as procurement, warehousing, distribution, product design, transportation, and packaging, aimed at improving social and environmental sustainability (Abanan & Susilowati, 2024).

2.4 Theoretical Framework on Sustainability and Finance

The integration of sustainability into logistics and finance is underpinned by theoretical frameworks which guide business strategies and decision-making process. To offer distinct perspectives on sustainability driving financial performance and long-term value creation, theories like Resource-based View (RBV), Stakeholder Theory and Triple Bottom Line (TBL) are used in this research. These theoretical frameworks provide a structured approach to understanding sustainability initiatives, economic success and their relationship.

2.4.1 Triple Bottom Line

Introduced by John Elkington (1997), the Triple Bottom Line of People, Planet and Profit, has become an influential approach all over the world and "business leaders should understand the importance of sustainability from its Triple Bottom Line of People, Planet and Profit, to make an effective application of the concept (Correia, 2019)."

The Triple Bottom Line framework establishes essential enduring strategies for businesses inclining toward sustainability, emphasizing three vital aspects of sustainable development: maintaining environmental quality, promoting social equity, and ensuring economic profitability (Correia, 2019).

The Three Ps mentioned in this framework encourage a business corporate house to assess "their impact not only through financial performance (making enough profit) but also through social and environmental considerations, like social corporate responsibilities. By considering the broader consequences of their actions, businesses can strive for

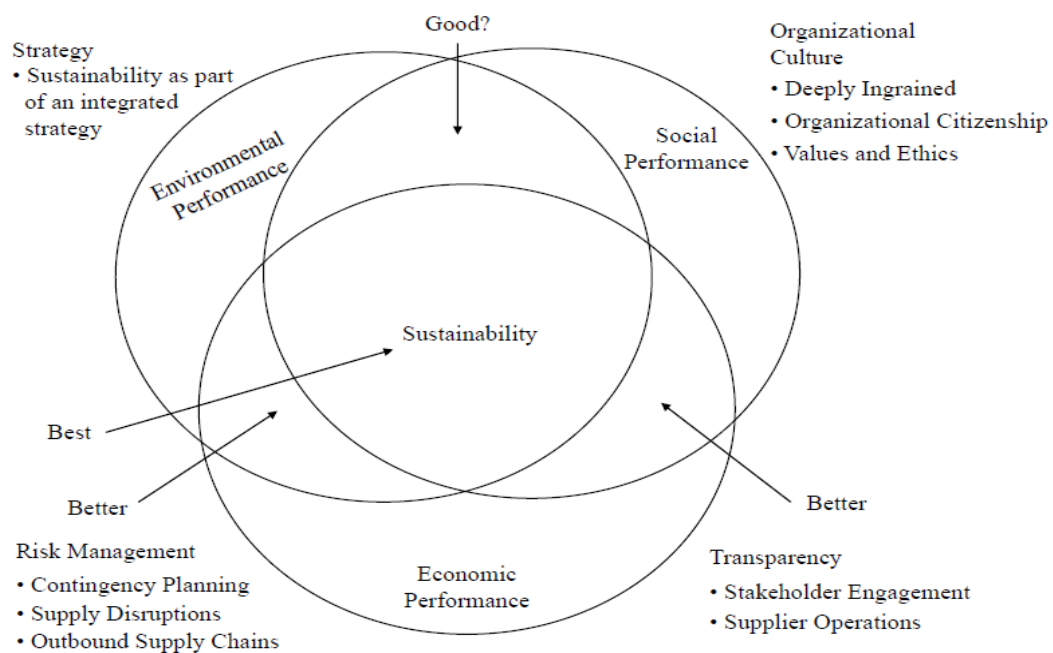


Figure 2.1 Sustainable supply chain management long-term sustainability and contribute positively to society and the environment (Doeing, n.d.).

Companies seeking sustained sustainability can utilize Triple Bottom Line model, which outlines strategic directions based on the interconnectedness of ecological integrity, social justice, and economic advantage (Elkington, 1998).

The Triple Bottom Line framework has been applied to sustainable supply chain management (SSCM), which is shown in the above figure 2,

as it underscores the interdependence of environmental, social and economic dimensions in achieving long-term business sustainability (Carter & Rogers, 2008). Similarly, Carter and Jennings (2002) emphasize pursuing environmental and social initiatives considering their economic implications. Porter and Kramer (2002) also agree that social and environmental objectives must align with an organization's overall financial and strategic goals to avoid being financially burdensome (Porter & Kramer, 2002) It shows that when strategically aligned, corporate philanthropy can enhance a firm's competitive advantage by creating shared value, improving industry conditions, and fostering innovation.

With reference to the literature mentioned here, it is justified that TBL framework has driven companies to adopt Green Supply Chain Management practices, such as transitioning to renewable energy-powered transportation, minimizing waste generation, and leveraging route optimization technologies to improve company efficiency. Embracing logistics sustainably mitigates regulatory compliance risks strengthening brand equity which also increases customer loyalty and market competitiveness (Carter & Rogers, ., 2008).

2.4.2 Resource-Based View (RBV)

According to a theory initially proposed by Birger Wernerfelt, Resource-Based View (RBV)" an institution's sustainable competitive advantage is derived from its VRIN, that is, valuable, rare, inimitable, and non-substitute resources (Barney, 1991)". This view suggests that an organization can achieve a competitive edge by leveraging their unique internal resources like green technologies, sustainable supply chain capabilities, human capital and knowledge and strategic partnerships. Sustainable logistics practices become a VRIN resource when companies invest in green supply chain innovations that are not easily replicable, contributing to cost efficiency and environmental responsibility

This model advocates investment in energy-efficient, warehouse automation, and renewable energy resources. Similarly, eco-friendly packaging, reverse logistics, and carbon footprint reduction enhance sustainable supply chain capabilities. Firms are required to develop expertise in sustainable operations, training green logistics, and innovation in circular economic strategies with a resource-based view. Taking an example of Starbucks, it has leveraged strategic partnerships to secure a consistent supply of premium coffee while ensuring fair compensation for farmers who cultivate crops using environmentally sustainable practices (Argenti, 2004). This model enhances farmers' financial abilities and at the same time optimizes supply chain costs by reducing intermediaries in procurement, leading to more cost-effective sourcing. Starbucks collaborates with NGOs and other stakeholders to improve supply chain sustainability, ensure ethical sourcing, and maintain quality while supporting farmers through fair wages and environmental initiatives. With the example of Starbucks, RBV strengthens a firm's competitive benefits by securing valuable, rare, and sustainable supply chain resources, reinforcing long-term business resilience and environmental responsibility (Argenti, 2004).

For some scholars, a resource-based model of sustained competitive advantage" anticipates a more intimate integration of the organizational and the economic to study sustained competitive advantage (Barney, 1991)." Advocating RBV, Barney (1991) emphasizes VRIN with the role of managers being important since "it is managers that can understand and describe the economic performance potential of a firm's endowments.

2.4.3 Stakeholder Theory

The groundwork of modern stakeholder theory is laid in the book by R. Edward Freeman (1984) where the writer emphasized that organizations must consider the interests of all stakeholders of the company, not only of the shareholders. In this sense, stakeholder theory is "a theory about

how business works at its best, and how it could work (Freeman, 1984).” This theory is still influential in shaping how businesses understand their responsibilities to various groups, as stakeholders like customers, suppliers, communities, and even the environment. Sustainable logistics inherently involves considering the impact of logistics operations on a wide range of stakeholders which can include customers and communities who demand environmentally friendly delivery options, in a pollution-free environment, employees concerned about working conditions, and governmental groups for setting environmental regulations, along with environmental groups.

For McCance (2024) Stakeholder theory argues that businesses exist” to do more than just make profits and money for shareholders. Instead, they function best and serve the greater good when their actions reflect what’s best for all stakeholders – employees, suppliers, the community, partners and, of course, shareholders.” A stakeholder-centric approach to transparency extends beyond mere reporting; it involves proactive engagement, incorporating stakeholder feedback to gain support and refine supply chain operations. Also, green marketing initiatives are integrated in this approach within a broader framework of stakeholder collaboration (Carter & Rogers, 2008). Therefore, while discussing sustainability in logistics it is relevant to view from stakeholder theory for better understanding of the concept and its application.

Hence, integration of the discussed theories, companies can create sustainable logistics strategies that are both profitable and responsible. This integration provides a holistic framework for sustainable logistics. Highlighting the importance of engaging all the stakeholders in ethical and sustainable practices, long-term value can be created in business building resilient and responsible supply chains.

2.5 Case Studies on Sustainable Logistics and Profitability

The integration of sustainability into logistics operations is one of the major priorities for companies seeking to balance economic performance with social and environmental responsibilities. The case studies discussed in this section, with real-world examples of leading companies, provide vital insights into how sustainable logistics practices contribute to cost-control, and operational efficiency including long-term profitability.

The examples of leading logistics companies like Amazon, DHL, and Walmart have invested heavily in green logistics which has proved that sustainability can lead to significant cost savings, improved brand reputation, and regulatory compliance. Here, green logistics refers to the sustainable policies and practices applied through the supply chain to reduce environmental impact. Companies like Amazon have recognized that sustainability is not just a regulatory necessity, but also a strategic lever for cost efficiency, competitiveness, and loyalty towards consumers. In a report published by Amazon it quotes that they aim to make Amazon a more resilient and more sustainable business, by scaling carbon-free energy, to "drive a global transition to cleaner energy, and achieve our commitment to The Climate Pledge to reach net-zero carbon emissions by 2040 (Amazon, 2024)."

The 2023 Amazon Sustainability Report (2024) details various sustainability initiatives, including reducing carbon emissions, using renewable energy, minimizing packaging waste, and promoting responsible supply chain practices. The report declares that Amazon has positioned itself at the forefront of sustainable logistics with electrification and reduction in emission of harmful gases with a transition into cleaner energy. Amazon has significantly invested 100,000 electric delivery vehicles in collaboration with Rivian (Amazon, 2024). It marks the company's transformative shift in last-mile logistics. Amazon has become an example for other logistics companies adopting sustainable packaging solutions and low

emission transportation fleets which align with environmental goals at the same time generate substantial long-term cost savings.

Another vehicles manufacturing company, Tesla, has been focusing on resource efficiency, waste reduction, and the use of technology to improve both environmental performance and economic outcomes, which are key themes in sustainable logistics and profitability.

“Tesla's unique supply chain management processes and commitment to sustainability offer new insights and inspirations for global organizations, as a leader in electric automobiles and renewable energy technology (Zheng, 2024)” pp 46.

Tesla is promoting a circular economy by recycling and reusing used batteries and vehicle parts, which helps reduce the demand for new resources. The company has significantly improved its operational efficiency, reduced energy consumption, and minimized waste through the adoption of advanced manufacturing technologies and automation. These innovations have enabled more streamlined production processes and enhanced sustainability across its operations (Zheng, 2024). As per different studies, companies can unlock up to 35% of logistics emissions reduction potential using commercially available solutions (Miklautsch & Woschank, 2022).

DHL, another logistics company defines logistics sustainability as “actionable steps a business can take to reduce the environmental impact of these processes. Examples include carbon offsetting, optimizing transport routes (to decrease emissions), and switching to electric vehicles (Thompson, 2024).”

DHL has established itself as a leader in sustainable logistics by offering a wide range of environmentally friendly transportation and distribution solutions aimed at significantly reducing greenhouse gas (GHG) emissions. These initiatives include the deployment of alternative transport modes, adoption of low-carbon fuels, and the use of advanced emission-

reducing technologies. Aligned with science-based climate targets, DHL Group has committed to achieving near-zero emissions by 2050, with any residual emissions offset through certified carbon removal and storage strategies. This approach enables businesses to minimize their environmental impact without compromising operational efficiency or service quality (DHL Group, 2023).

DHL's strategy for sustainability involves achieving several interim targets by 2025 as mentioned in its Corporate Responsibility Report 2016. It targets to help reducing local air pollution by using clean delivery options for 70% of first and last mile services, ensuring that over 50% of sales are Green Solutions to support customer sustainability, and training almost 80% of workers as GoGreen specialists while engaging them in environmental and climate performances like planting one million trees annually for forest conservation (DHL, 2017).

2.6 Key Challenges in Implementing Sustainable Practices

Maintaining business sustainably implementing sustainable practices is itself a challenge to logistics companies. This approach offers a transformation of logistics firms to mitigate environmental impact pursuing long-term business profitability. There are several challenges for logistics companies to address to achieve success in implementing sustainable practices for long-term viability in logistics business. The obstacles include high initial costs, regulatory complexities, technological limitations, supply chain disruptions, including organizational resistance to change. Some of the challenges are discussed in this section.

2.6.1 High Initial Costs and Financial Barriers

The substantial upfront capital investment is the first and foremost hindrance to the transition towards sustainable logistics. Logistics firms acknowledge that there are costs associated with environmental and social initiatives and that these costs can be a complicated proposition for

managers and they go on to suggest that "win-win situations are very rare and will likely be overshadowed by the total cost of a company's environmental program (Carter & Rogers, 2008).

The logistics and supply chain management companies are required to invest in electric vehicle fleets, with the insertion of renewable energy sources to power warehouse, and the development of carbon-neutral warehousing facilities. Carter and Rogers (2008) highlight that "Responding to environmental challenges has always been a costly and complicated proposition for managers", indicating that the financial burden is a significant factor in the adoption of sustainable practices.

However, there is positive feedback in Amazon's 2023 sustainability report which mentions how regionalizing operations reduces shipping costs and emissions. It also details how increasing packaging efficiency reduces the number of trucks needed, which lowers emissions and costs (Amazon, 2024). These are all ways that sustainability initiatives contribute to a positive return of investment (ROI) for the company. Wang (2024) believes that this encompasses various dimensions, including financial metrics, that is, profitability, Return on Investment (ROI), operational efficiency, like cycle time, inventory turnover, customer satisfaction, market share, etc.

2.6.2 Regulatory and Policy Challenges

In Nepalese case and worldwide, governments and regulatory bodies are responding to growing environmental pollution by implementing stringent policies focused on environmental protection, emission reduction, and carbon taxation. While crucial for environmental sustainability, these regulatory actions present a significant financial and operational challenge for logistics companies, increasing the cost and competitiveness of providing sustainable logistics services (Carter & Rogers, 2008). Further, the need to comply with a patchwork of varying regional policies can create more complexities, especially in global supply chains, often necessitating frequent adjustments to logistics strategies.

According to Kim et al. (2024), the financial performance of green logistics firms can be improved when Global Logistics Providers (GLPs), large multinational entities offering integrated supply chain services, engage in public disclosure and operate within supportive governmental policy frameworks. Government intervention, such as the implementation of green logistics certification, is essential to complement environmental, social, and governance (ESG) reports and enhance their effectiveness in improving the financial efficiency of logistics companies. However, it is equally important to recognize that government policy alone, such as the certification of green logistics practices, is insufficient on its own to guarantee improvements in the financial efficiency of these companies (Kim, Na, & Ha, 2024). Including these challenges, organizations operating across multiple jurisdictions must navigate diverse environmental laws, leading to increased administrative costs and regulatory burden.

A critical insight emerging from recent studies on sustainable logistics is the importance of building resilient supply chain strategies to navigate the growing complexities of global disruptions. Key approaches like supply chain diversification, financial risk management, and strategic sourcing have been shown to effectively reduce vulnerabilities and ensure continuity. Particularly in developing economies, where logistical structures are less formalized, organizations face distinct challenges that require adaptive policy frameworks. These frameworks should integrate circular economy principles, promote resource efficiency, and should emphasize stakeholder inclusivity, ensuring collaboration among governments, businesses, and civil society (Zuo, Shen, & Chang, 2024). The incorporation of these elements into national and corporate sustainability policies is essential for fostering long-term resilience and competitiveness in global logistics networks (Solari, Bottani, & Romagnoli, 2025).

Similarly, the other challenges include technological limitations and infrastructure gaps for successful integration of green logistics technolo-

gies, such as sufficient charging stations for electric trucks and alternative fuel supply chains, and intelligent transportation networks (DHL, 2024). The high costs of sustainable materials and alternative fuels, reluctance to adapt within traditional supply chains, and the competitive pressures in logistics create significant obstacles to green initiatives (Inbound Logistics, 2023). Finally, organizational resistance and cultural barriers can be another challenging aspect for green logistics companies. Multinational corporations struggle to enforce sustainability standards across their entire supply network, leading to inconsistencies (Villena & Gioia, 2020). Similar in the case of logistics companies, lack of shared environmental commitments among supply chain partners can create inconsistencies in sustainability efforts across the logistics network.

2.7 Research Gaps and Need for Further Study

Sustainable logistics has garnered increasing attention these days for its ability to integrate economic efficiency with environmental responsibility. Global research has extensively examined sustainable supply chain practices. However, significant gaps persist, particularly in developing nations like Nepal. Key aspects such as the financial viability of green logistics, implementation challenges, and the influence of regulatory frameworks within Kathmandu's logistics sector remain underexplored.

This section highlights the gaps in existing literature, emphasizing the need for further research. By addressing these gaps, the study aims to provide valuable insights into how logistics businesses in Kathmandu can adopt sustainable practices while maintaining financial stability. The following subsections delve into specific areas requiring further investigation:

Insufficient Financial Evaluation of Sustainable Logistics in Nepal

Although global literature often explores the cost-effectiveness of sustainable logistics, there is a notable lack of empirical analysis focusing on Nepal. The economic impact of adopting green logistics practices within the Kathmandu region remains under-researched, limiting the ability of stakeholders to make informed investment decisions.

Absence of Tailored Financial Frameworks for Nepalese Context

Existing financial models for sustainable logistics are often generalized or designed for industrialized economies. There is a gap in developing localized frameworks that reflect the unique market dynamics, infrastructure limitations, and regulatory environments of Kathmandu, making it difficult to forecast financial outcomes accurately.

Implementation Barriers in Kathmandu's Logistics Sector

Despite increasing awareness of environmental issues, logistics companies in Kathmandu face considerable challenges in adopting sustainable practices. These range from high initial investment costs and lack of technical expertise to fragmented supply chains and insufficient government incentives, all of which hinder green transition efforts.

Unclear Financial Trade-Offs Over Time

Another critical gap involves understanding the temporal dimension of financial returns. While long-term benefits of sustainable logistics are often highlighted, there is limited evidence on the short-term financial strain businesses may encounter creating uncertainty for green investments.

Limited Integration of ESG Investment Strategies in Local Logistics

Environmental, Social, and Governance (ESG) investment frameworks have gained traction globally, yet their application in Nepal's logistics

sector remains minimal. Research is lacking in how ESG metrics influence investor behavior in the local context, particularly in funding green logistics initiatives.

Hence, these gaps highlight the need for further exploration, informed methodologies, and collaborative efforts to uncover new insights, improve existing frameworks, or solve unresolved challenges. Systematically addressing these gaps, researchers can contribute to the enrichment of knowledge, ensure practical applicability of findings, and pave the way for impactful advancements in the domain.

3 RESEARCH METHODOLOGY

Current study on the financial Impacts of sustainable practices in project management in logistics industries has applied a combination of both qualitative and quantitative approaches, often said as mixed methods. It has focused on evaluating the financial impacts particularly in the context of Kathmandu.

The reason behind selecting Kathmandu for the research area is that it covers an elegant contrast of natural beauty with environmental problems. The valley is a tourist area, attracting several tourists, nationally and internationally, promoting the national economy. However, the heavily populated city Kathmandu ranks among the most polluted cities in the world according to research, which takes sustainability is not just a buzzword but a responsibility to be completed (IQAir, 2024).

As the city is densely populated, most of the roads are busy with heavy traffic and emit harmful gases, especially due to the old vehicles still plying on the road. This research is designed to present a real-world testing ground to implement eco-viable practices against environmental degradation. Hence, sustainable practice in logistics companies is relevant and necessary in Kathmandu.

3.1 Research Design

This research aims to explore and understand how sustainable project management practices influence the economic performance of logistics companies. Here, a mixed-methods approach has been used to collect data and information which combines both quantitative and qualitative techniques.

Meta-analysis methods are used in this research which are among the powerful tools to synthesize empirical findings across multiple studies to

aggregate data systematically. It combines the findings from various studies which helps to identify patterns, measure effect sizes, and draw inferences from the findings. This method also helps to integrate diverse empirical results to show how sustainable initiatives affect the financial performance of the company, particularly in the logistics sector.

Pearson product-moment correlation coefficient (r) is used in this research to study logistics and operations management which will be active to quantify the soundness of the relationship.

Quantitative data will be gathered using online surveys, sent to logistics and supply chain companies located in Kathmandu, the capital city of Nepal. Those companies are selected purposively based on their implementation of sustainable practices, focusing on economic performance and sustainable initiatives.

At the same time, qualitative insights will be obtained through in-depth interviews and case studies with the key decision makers and stakeholders of identified logistics companies which have successfully integrated sustainable practices at their operations level. This ensures holistic and multi-perspective understanding of the research problem.

3.2 Data Collections Methods

Since mixed method approach was used during the research, along with qualitative and quantitative techniques, data collection is a prime phase to attain the research objective as per the proposed hypotheses.

Employing both research techniques provides a sight of measurable relationships between the variable's sustainable practices and financial performance. The resulting dataset in question was mostly a structured survey of key professionals. This section clearly describes specific data collection methods applied during the research to obtain the result of

how the financial impact was after the logistics companies changed their conventional style of supply chain with updated sustainable resources.

3.2.1 Quantitative Method

The major data collection method in this research was the formation of a structured questionnaire for survey method to assess the relationship between sustainable practices and financial performance.

The questionnaire was carefully developed to ensure it was more organized, reliable and applicable to the research objectives. The closed ended questions were composed mainly so that standardized answers can be recorded. It was primarily focused on those of the respondents concerned which were in any way related to logistics and supply chain companies. The structured questionnaire was dispatched to the various managerial and operational level staff of several logistics companies to get the data authentic and genuine.

The survey questionnaire was mailed and sent through WhatsApp contact list of selected representative professionals directly responsible for sustainability and financial decision-making process in the company. All the respondents were based on the objectives of the survey establishing the opinions from operational and strategic view of sustainability initiatives.

Structured Questionnaire

The study covered structured questionnaire mainly divided into four sections, with different thematic areas, systematically capturing insights from those selected logistics companies integrating sustainable systems in one or many ways in their operations.

- i. Sustainable Practices Adoption
- ii. Financial Performance Metrics
- iii. Implementation Challenges

iv. Perception of Impacts

The first section tried to focus on the adoption of sustainable practices in their firms. It tended to identify the sustainability measures implementation. The respondents provided data on initiatives such as improving energy efficiency, reducing waste, utilization of renewable resources, sustainable procurement strategies including the mitigation of carbon emission.

Following the next section of the questionnaire, it tried to present the financial implications of sustainability where the participants shared information on the major financial indicators impacted by their initiatives. Cost savings, return on investment and profit margins were included in this section.

Then the third section explored the implementation challenges of the organizations faced when integrating sustainable practices. High upfront investment costs, regularity complexities, gaps in technical skills, and limited stakeholder buy-in were some of the challenges explored during the section.

The final section explored the respondents' opinions on how sustainability efforts are influencing business performance from a financial point-of-view. It tried to capture a comprehensive portray of sustainability's role in the continuous progress of the organization by assessing subjective views on the benefits and drawbacks.

In this way, structuring the survey questionnaire the study ensured a consistent and comparable dataset to identify trends, test hypotheses and explore the correlation between the two variables: sustainability and financial performance of a logistics company.

3.2.2 Qualitative Method

During the research, as a complement of survey, qualitative methods were also employed for more reliability for hypotheses testing and examining the result of the study's objectives. The survey could only measure trends and patterns, qualitative insights explored the context, motivations, and challenges which are not measurable or explained in statistics. It focuses on collecting detailed and experienced narratives to understand how sustainability is acquired and implemented in practice.

i. Semi-structured interviews

Besides surveys for quantitative statistics, interviews in a semi-structured way were also conducted with a selected group of owners and operational and managerial employees. Those professionals included project managers, operational and financial officers, chosen for their hands-on experience and strategic involvement in sustainable projects in the company.

All the interviews were designed in full ethical consideration, to explore the logistics company's day-to-day application of sustainable project management, the challenges they faced during implementation of sustainability in chain management and the financial impacts it had on the company, both positive and negative.

During the semi-structured interview, the key informants offered valuable insights on the way organizations shape strategic decisions, their company's priorities and what lessons they learned after sustainability was employed in their company. A flexible interview guide was used to make sure about consistency while letting the informants share their perspectives most relevant to their roles. It maintained a structure for them to elaborate the key themes, providing a deeper understanding of the motivations behind the initiatives for sustainability balancing one of the sustainable goals, environment and financial performance.

The data collected through such qualitative techniques played a vital role in complementing the survey results. It helped to create a further comprehensive dimension on sustainable practices of the logistics sectors influencing financial outcomes.

ii. Case Studies

Together with surveys and interviews, some case studies were conducted for an industrial specific insight into how logistics companies are acting upon sustainability issues. Case studies are good sources of exploration of specific organizational contexts and a comprehensive view of planned and implemented sustainable strategies over time.

The case studies were centered on a company where sustainability had been already implanted in their everyday life in some way other. What exactly had been done to implement sustainability was discussed during the case collection. Most of the themes were green logistics solutions and energy efficient technologies through waste reduction campaigns and ethical procurement policies.

The case study covered components like financial performance before and after the implementation of such initiatives. Financial reports and performance metrics were reviewed for concrete results, like cost savings, return on investment (ROI) and impact revenue. The result was to determine if sustainability was measured in response to financial benefits or loss of the logistics company.

Besides, the case studies also provided an image of the challenges the logistics companies are facing, like operational disruption, budget constraints or resistance to change a sense of such obstacles. It sought a deeper level where the study was hardly possible conducting a survey or semi-structured interviews. The adaptation, scaling-up or retrofitting of processes were among the sustainability journeys where companies have moved forward with a strategic decision in logistics management.

3.3 Data Sources

The research was conducted within Kathmandu valley and surrounding as earlier mentioned in its nature and limitation. Surveys, semi-structured interviews and case studies were conducted in person and on-line in some cases where physical contact with the respondents was not possible. The research not only tried to explore with the primary data but also sought references from secondary data ensuring a comprehensive and balanced knowledge of sustainability within the logistics companies.

The primary data included a survey report collected directly from the people responsible from different logistics companies. The insights were gathered from semi-structured interviews as well. Project managers, sustainability officers, logistics executives and financial officers were among the respondents and key informants during the research who had direct expertise in the development and execution of the projects. The data offered the original, experience-based viewpoints on the adoption of sustainable practices, acquired financial impacts, implementation difficulties and strategic decision making. These data were validated by the secondary data which offered more comprehensive industry related information.

Secondary data included texts, periodicals, articles and news information already published before this research was conducted. Publicly accessible corporate records, financial statements and annual reports provided open to the public. The resources provided enough support to the primary data with verifiable proof of sustainability strategies and their intended results. Further, industrial publications and peer reviewed academic literature on logistics and supply chain were also consulted to gather supportive information to satisfy the objectives of the research.

To sum up, the research combines these data sources integrating practical experience along with documented evidence to enable a multi-dimensional analysis of the way sustainability movements impact the financial performance of a logistics company.

3.4 Sample size and Justification

This research on the financial impacts of the sustainability in logistics sectors primarily focuses on professionals actively involved in logistics and supply chain management, particularly those who are responsible for project oversight and sustainability movements within the companies.

Using purposive sampling method, participants involved in the logistics business were asked to fill out surveys prepared for the data collection to obtain sound information for the study. Only about 79% were returned, out of the surveys sent via mail and contact address, and we got 95 replies. We ended up with 90 useful responses to look at after checking all the answers carefully and removing any that didn't make sense or were incomplete.

The respondents of the survey had different jobs, like project managers, sustainability experts, operations supervisors, and logistics leaders. Because they are involved in making choices about sustainability at their work, their answers showed what it is really like to use eco-friendly methods. From the literature study from other sources, it was tried to make sure to include experts from companies in Southeast Asia and Europe where businesses are paying more and more attention to sustainable supply chains and logistics. Reviewing from the people of different parts of the world, a lot of different ideas and experiences were obtained which made the research findings in more valid and reliable way.

Besides, 5 key informants were selected randomly for semi-structured interviews and 2 case studies were taken from the logistics companies working in Kathmandu with a long history. While selecting the companies, the implementation of sustainable resources was kept under consideration as the research demanded the financial impacts before and after the implementation of sustainability in their companies.

3.5 Data Analysis Techniques

A variety of statistical methods and techniques were applied to form an informed insight into the collected data and draw logical conclusions as per the data types available and their abilities to offer insights in relation to the research objectives.

i. Cost-benefit analysis (CBA)

The CBA method was used as a tool to find financial justification for the adoption of sustainable practices. CBA involved comparing the cost of the initial investments like green technologies or process changed with the outcome revenue in terms of cost savings, increased efficiency, or revenue (OECD, 2018). The target was to decide if the financial benefits balanced the cost and in what situations.

ii. Regression Analysis

Next technique was regression analysis which was used to explore the association between the level of the adoption of sustainability and many indicators of other financial performance such as profit margins and ROI by adopting this statistical approach to survey data (Maniatis, 2024). It was to investigate if the higher levels of sustainability adoption positively correlated with increased financial performance.

iii. Comparative Financial Analysis

Comparative financial analysis adopted in this research regarding the financial impacts in logistics companies offered insights by contrasting business that have embraced sustainability practices with those that have not performed actively till date. Evaluating the financial indicators like operational expenses, revenue margins and return on investment, it was determined if sustainable companies displayed any significant variations in financial outcomes when compared to their less eco-friendly rival organizations working in the same areas.

iv. Thematic Analysis

During the data analysis phase of qualitative technique part, thematic analysis was used to explore the interview data reviewing transcripts to uncover recurring themes and patterns among participant or informant responses such as practical challenges, in implementing sustainability strategies and organizational resistances. Together, it also highlighted the received benefits and success factors which helped to gain the depth of the overall knowledge of the research findings.

To sum up, the complete data was analyzed combining the above-mentioned data analysis methods and approaches during the research work. It provided with an examination of the subject matter from various perspectives resulting in a perfect blend of findings and observations on how sustainability impacts the financial performance within the logistics sectors, generally to all the companies of the world and particularly to the selected companies inside Kathmandu valley.

3.6 Ethical Considerations

Ethical consideration is one of the crucial sections of research. Similarly, ethical integrity was emphasized throughout the study from beginning to the data collection, tabulation and analysis stage. This research was conducted with a strong commitment of following all the ethical standards that are obligatory for any research actions as prescribed by the

national and international guidelines like Nepal Health Research Council and other authorities.

As the research included survey data, all the participants involved in the study were fully aware of the purpose of the study and they were assured that the information being collected would not be misused. At the same time, the informants and respondents provided their consent confirming the voluntarily participation understanding their rights within the research process. Including this, the anonymity and confidentiality is strictly maintained throughout the research and even after the research report is prepared, the confidentiality will be maintained as the data will be handled with care to ensure the participants' privacy. Each of the informants and participants were clearly informed that they had equally the right to accept or reject providing the information and had the right to withdraw their information in case they felt uncomfortable or unsafe due to the questionnaire or interview, without needing to provide any reason or justification, and without having to face any negative consequences.

Finally, the data was securely stored in accordance with the Nepal Information Technology Act to further protect the collected information, allowing the access to the research team only, and with suitable digital safeguards like password protected and encrypted storage to prevent from unwanted access. Together with these ethical practices, the study was conducted respecting the rights and dignity of the key informants and the participants involved in the research, ensuring the reliability, validity and creditability of the research result.

3.7 Reliability and Validity

As one of the essential parts of the research, reliability and validity were highly considered during the preparation of the survey and interview questions. Reliability guarantees consistency and dependability in the

research outcomes. It was obtained using standardized tools, like semi-structured interview guide and a well structurally developed questionnaire, dispatched to each participant via email and in-person. The study reduced disparities in data collection and preserved comparability among various responder groups with uniformity in both tools and processes. It lied a solid foundation for insightful statistical and thematic analysis.

In the case of validity, a triangulation approach was applied combining information from several sources, including survey, interview and case studies. It enabled cross-verification of data contributing the confirmation of the precision and accuracy of the research findings. Further, for more reliability of the data, there was a pilot survey conducted among 15 people, actively engaged in logistics companies at an executive and operational level.

The questionnaire's phrasing and format underwent modest changes as outcomes of the pilot phase's insightful feedback and later improved clarity and made sure the questions were relevant and clear for the targeted population. All these activities were crucial and authentically essential to improve the research's complete integrity and legitimacy in the sense of reliability and validity section.

3.8 Limitations

The research has applied mixed methods, with a perfect blend of survey, semi-structured interviews and case studies. However, several limitations are acknowledged here, despite the well-rounded perspective on sustainability in the logistics sector. The major point is that though the research represents commonalities of all the logistics companies in the application of sustainability in their business, this research is confined to about 80 companies related to logistics and supply chain management located in Kathmandu valley. This may limitize the generalizability of the

findings to other regions or parts of the world where case and context may be different.

Besides the geographical limitation, it was difficult and time consuming to get thorough financial data from participating companies due to the restriction in time and confidentiality reason. There is a high possibility of bias towards the company providing the required information during the interview. Hence, self-reported information and publicly available statistics may not accurately reflect the financial impact of the logistics companies.

4 DATA ANALYSIS AND FINDINGS

The aim of this chapter is to understand the way sustainable practices are being perceived, adopted and get into tangible financial implications within logistics operations. This section is a comprehensive study and analysis of the result as presented by the data to investigate the financial impact of sustainable logistics practices in project management, particularly from the logistics companies in Kathmandu, Nepal. This chapter highlights prevailing trends, patterns, and correlations inferred from the structured questionnaires provided to the working professionals in logistics and supply chain sector.

4.1 General Overview of Data

During the research work, structured questionnaires were used to collect qualitative and quantitative information about sustainable logistics and their financial implications. Altogether 120 logistics professionals were selected using random and purposive sampling method for quantitative data. From the selected professionals, 95 responses were received with a response rate of above 79 percent. After verification and the removal of inappropriate or incomplete entries from the responses, only 90 answers were judged suitable for the study. The table below summarizes the diversity of respondents in terms of roles, firm types, size based on number of employees and operational scope.

Table 1. Respondent's Sectoral and Organizational Diversity

| Category | Details |
|--------------------------|--|
| Job Roles of Respondents | <ul style="list-style-type: none"> - Supervisors - Logistics Managers - Senior Sales Officers - Finance Officers |

| | |
|-------------------------|---|
| Type of Logistics Firms | <ul style="list-style-type: none"> - Courier Services - Freight Forwarding and Carriers - Third-party Logistics (3PL) and Warehousing - Supply Chain Consulting |
| Organizational Size | <ul style="list-style-type: none"> - Micro-enterprises (1–10 employees) - Small Enterprises (11–50 employees) - Medium-sized Firms (50–250 employees) - Large Firms (More than 250 employees) |
| Operational Scope | <ul style="list-style-type: none"> - Local Level (Kathmandu Valley-based) - Regional Level (More than one district) - National Operations (Nepal-wide) - International Logistics and Forwarding |

The survey was conducted to find the financial impacts which covered the following core thematic areas but not only limited to this:

- Changes in operational costs as an impact of sustainable logistics integration
- Resources optimization practices like in fuel consumption, route planning and packing efficiency
- Reduction of waste and tracking carbon footprint
- Green practices and customer satisfaction
- Sustainable financial resilience with profitability

The responses were collected and coded numerically in SPSS and the data was analyzed with the statistical tool which included Pearson correlation and regression which provided descriptive statistics and inferential analysis. This chapter provided the statistical interpretation including the narrative synthesis of the major findings related to the sustainable financial impact in project performance of the logistics and supply chain companies.

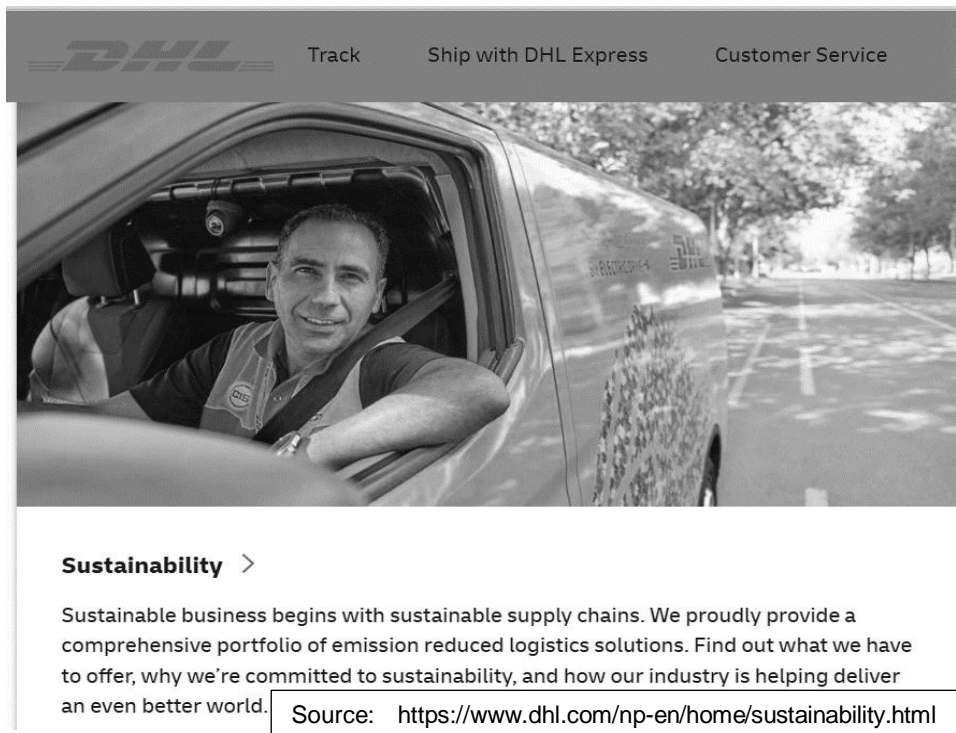
4.2 Identification of Key Sustainable Practices in Logistics

One of the major features in creating effective and ethical supply chain strategies is the incorporation of sustainability into logistics operations. Findings from case studies and interviews with businesses like DHL, which has almost developed itself into zero carbon emission logistics company and another company named Daraz, working in e-commerce sector in Nepal, has initiated into electric delivery vans, these all examples demonstrate the variety of strategies used by both smaller businesses and industry leaders. Many companies, including these, have balanced corporate efficiency with sustainability objectives by combining eco-friendly measures with socio-ethical projects.

i. Green Transportation: Road Optimization and Emission Reduction

Logistics still heavily relies on transportation, and to cut carbon emissions, businesses are increasingly using electric and hybrid fleets. Additionally, businesses are adopting sophisticated algorithms to optimize delivery routes, reducing fuel usage and increasing efficiency (DHL, 2024). For long-distance supply chains, modal switches to trains and sea transportation have further reduced emissions.

ii. Sustainable Packaging: Improving Material Efficiency Decreasing Waste



Sustainability >

Sustainable business begins with sustainable supply chains. We proudly provide a comprehensive portfolio of emission reduced logistics solutions. Find out what we have to offer, why we're committed to sustainability, and how our industry is helping deliver an even better world.

Source: <https://www.dhl.com/np-en/home/sustainability.html>

Most of the companies are switching themselves to recyclable, reusable and minimal materials. It supports waste reduction including consumer demand for eco-friendly activities. Several companies like DHL are found to have included circular logistics in their return procedures. In the case of another logistics companies based in Kathmandu, Nepal Can Move, it provides customizable, sustainable packaging solutions to businesses, offering a range of eco-friendly material

iii. Eco-warehouse Management: Energy-efficient facilities

There is a huge transition of warehousing operations from high energy consumption to low power consumption or transition to alternative energy resources, adopting solar powered technology, intelligent light systems, and adopting waste segregation policies. Logistics companies are cutting down their operational costs by integrating renewable energy sources and maintaining high operational standards without consuming excessive energy.

iv. Supplier Sustainability Audits: To strengthen Accountability

Logistics companies conduct regular supplier audits for ethical and sustainable sources. For this they partner with vendors meeting socio-environmental and governmental benchmarks. It creates more trust with stakeholders being more responsible maintaining high sustainability standards.

v. Digitalizing for high efficiency: Technology for sustainability

Transportation management systems and blockchain technology have enhanced better efficiency in logistics functioning level providing better inventory planning, waste cut-off, and over stock in the logistics company. It also ensures supply chain transparency tracking the sustainable sources at the prompt time.

Finally, the tycoon logistics, like DHL in their GoGreen Plus, show the financial and operational advantages, including customers satisfaction in adopting sustainable practices (DHL, 2024). All these examples and case studies of various logistics and supply chain companies demonstrate an understanding of the way the companies are helping to balance environmental responsibility including their long term financial and operational efficiency.

4.3 Sustainability and Financial Outcomes in Logistics Sector

The study covered some of the leading and prominent companies working in logistics and supply chain management who are working in Kathmandu. Here is a brief description of the financial impacts of some companies as representation for reference.

i. DHL Nepal

As a tycoon in the logistics and courier sector, DHL Nepal has aligned with its global GoGreen Plus plan. This company has been reported to

have been using electric delivery vehicles and taps into renewable energy to power its facilities. This move targets a cut in the emissions of greenhouse gases while keeping logistics operations firm and reliable.

The company reported a worldwide cut of 1.3 million tons in emissions in recent years and nearly all its facilities are running on green electricity. These efforts have significantly lowered operating costs, proving that environmental action can pair well with financial health.

ii. Daraz Nepal Pvt. Ltd.

A reputed brand in Kathmandu's e-commerce logistics, Daraz Nepal is replacing its fossil fuel delivery vehicles with electric ones. Both two-wheelers and four-wheelers are now part of its Electric Vehicles (EV) mode, proving lower emissions and improving energy efficiency.

Report shows that switching to EVs not only decreases petroleum fuel but also decreases maintenance costs. The company expects to recover its investment within a span of five years. There's also a high probability for extra income through carbon credit business, alongside significant reductions in carbon-related gases emissions.

iii. KTM Nepal Logistics:

KTM Nepal Logistics has started smarter logistics by rethinking how goods move. The case study shows they've refined delivery routes, shifted to sustainable packaging, and teamed up with eco-conscious transport providers.

KTM Nepal Logistics reports about the reduced fuel usage and shipping expenses since after they have started sustainability sources in their supply chain. The shift to optimized routes and environmentally friendly packaging has boosted both operational and financial efficiency.

iv. Namaste Cargo Nepal

The leading example in eco-logistics, Namaste Cargo Nepal has been implementing methods to save energy and promote sustainability in shipping.

Financial Outcome: Although the amount is not disclosed in the data collection, preliminary indicators depict a good control in cost and streamlined operations which resulted in a reduction in wasteful expenditure, helping to refine resource allocation. Here is a table that shows the discussed logistics companies, and their ROI as found from the study:

Table 2. Logistics companies in Kathmandu and their ROI

| Company | Key Sustainability Actions | ROI/Financial Outcome |
|-----------------------|---|--|
| Daraz Nepal Pvt. Ltd. | Transition to electric vehicles, emission reduction | Payback period < 5 years; significant cost savings and emission reductions |
| KTM Nepal Logistics | Sustainable packaging, route optimization, green carrier partnerships | Reduced fuel and shipping costs; operational efficiencies |
| Namaste Cargo Nepal | Energy-efficient operations, eco-friendly shipping | Cost savings, improved efficiency |
| DHL Nepal | Electric vehicles, renewable energy, emission reduction | Reduced GHG emissions, operational savings |

To sum up, research shows that Kathmandu's logistics sector is gradually proving that green strategies can offer more than environmental goodwill and make solid business sense. Although financial gains differ from company to company, the overarching trend is clear: investments in sustainability in logistics companies are paying off in lower costs, greater efficiency, and healthier bottom lines.

4.4 Sustainability Initiatives and Financial Implications

Sustainability-driven practices integration within logistics project management, specifically in Kathmandu, includes a multifaceted financial setting, represented by the interplay of initial investments and the potential for long-term socio-economic and ecological benefits. A growing number of enterprises in the valley are experiencing noticeable financial outcomes from implementing sustainability in the companies. It underscores the economic viability of green logistics strategies in this developing market. Here are some short-term and long-term financial outcomes with integrating sustainability in the companies:

i. Short-Term Financial Outcome with Investing in Sustainability

Research shows the transition towards sustainable operational models prioritizes significant initial expenditures across various areas, including upgrades in infrastructure, advancements in technology and regulatory compliance measures. Logistics firms in Kathmandu, particularly those undertaking initiatives such as the installation of energy-efficient warehouse systems or the conversion to electric vehicle (EV) fleets or buying a new one to replace the existing vehicles, report an increase in capital expenditure, estimated to range from approximately 8% to 12% in an average.

Several local enterprises like Nepal Can Move, Daraz, and even rider sharing companies like Pathao and In-Drive have also indicated that the adoption of environment-friendly materials like recycled packaging solutions and bio-derived inks, have resulted in eminent procurement costs in the immediate term. Similarly, the implementation of employee training programs focused on sustainability regulations and operational efficiency improvements requires the allocation of additional resources, thereby contributing to increased operational expenses.

Nevertheless, despite these immediate financial obligations, logistics providers within Kathmandu increasingly recognize these expenses as

strategic investments aimed at enhancing their long-term competitive space and ensuring alignment with evolving regulatory frameworks.

ii. Long-Term Financial Returns with Efficiency Surplus and Expansion of Business

The implementation of sustainability initiatives is expected to yield substantial financial returns over the longer timeframe, primarily through cost efficiencies, risk reduction, and the new revenue streams information.

Talking about Kathmandu's logistics sector, research shows that the firms that have obtained B Corp certifications or adhere to recognized international sustainability standards have received a competitive advantage, particularly among business-to-business (B2B) clients seeking environmentally responsible supply chain solutions. Hence, the integration of sustainable logistics models has enabled businesses to enhance their brand reputation, thereby attracting environmentally conscious partners and corporate clients, creating a kind of revenue diversification.

Logistics companies in Kathmandu that have adopted renewable energy technologies and route optimization systems have reported reductions in fuel and energy costs, ranging from 15% to 20% over a five-year span. For example, the shift towards recycled packaging has decreased reliance on petroleum-based materials, resulting in lower operational expenses and a simultaneous reduction in carbon emissions which depict operational cost efficiencies.

Organizations that prioritize compliance with Environmental, Social, and Governance (ESG) criteria are experiencing benefits from sustainable practices in logistics companies, such as reduced insurance premiums and decreased regulatory costs mitigating risk. For instance, one Kathmandu-based logistics provider utilizing sustainability-linked loans has observed a decrease in borrowing costs upon achieving predetermined

emissions reduction targets, which has enhanced financial flexibility and strengthened investor confidence.

iii. Strategic Financial Integration: Sustainability as a Long-Term Value Driver

In an interview with the financial and procurement managers of logistics companies in Kathmandu reveal a growing recognition that the integration of sustainability considerations into long-term financial planning enhances the high chance of return on investment (ROI).

One of the logistics firms involved in case study, for instance, has linked loan interest rates to specific emissions performance indicators, effectively embedding sustainability goals into internal accountability frameworks. This strategic alignment has contributed to a reduction in unforeseen costs, such as potential carbon tax liabilities, while simultaneously fostering greater collaboration across departments in the pursuit of sustainability objectives.

iv. Case Study of Circular Logistics Approaches in Kathmandu

The study reports that several logistics providers in Kathmandu have been increasingly adopting circular economy strategies, with a focus on initiatives such as repair services, rental programs, and material recovery systems.

An example can be studied here from a notable company which has implemented recyclable packaging solutions and regenerative supply chain models, thereby reducing its dependence on micro plastics and fossil-fuel-derived materials.

Despite the initial investments in research and development, this transition has resulted in streamlined waste management processes, improved resource efficiency, and the generation of new revenue streams, thus validating the financial viability of circular logistics principles.

To sum up, the financial implications of integrating sustainability initiatives within the city's logistics sector are becoming increasingly apparent, with firms reporting measurable reductions in operating costs, enhanced risk management capabilities, and the potential for business growth. However, the initial investments may depict challenges, the integration of sustainability metrics into financial planning framework is essential to ensure long-term profitability and resilience.

4.5 Sustainable Practices in Logistics and its Cost-Benefit Evaluation

This section of the thesis is an analysis regarding the financial applications associated with sustainable logistics practices adoption in the firms located in Kathmandu. The evaluation considers both quantifiable financial returns and qualitative advantages, which collectively contribute to enhanced long-term competitiveness.

The figures in the study were recorded in Nepalese currency. For the real-time exchange rate, 1 US dollar equals to 135.11 Nepalese Rupees, as per the Nepal Rastra Bank data from May 6, 2025, to ensure current financial accuracy.

4.5.1 Financial Summary of Sustainable Initiatives

The table below shows the estimated annual costs, direct financial benefits, and projected return on investment periods for key sustainable logistics practices relevant to Nepal's logistics sector:

Table 4.3 sustainable logistics practices and direct benefits

| Sustainability Practice | Average Cost (NPR) | Direct Benefits | ROI Period |
|--------------------------------|---------------------------|------------------------|-------------------|
| | | | |

| | | | |
|--|--------------|---|--------------|
| Electric Fleet Implementa- tion | 33,777,500/- | Fuel cost savings (approx- imately NPR 20M annually), tax incentives | 3-5 years |
| Transportation Management System (TMS) Adoption | 10,808,800/- | Reduction in delivery delays, availability of carbon emis- sions tracking tools | 2-3 years |
| Warehouse Energy Effi- ciency Upgra- des | 16,213,200/- | Energy expense reductions (approximately NPR 4.8M an- nually), potential for ESG cer- tification | 4 years |
| Supplier ESG Assessment | 3,377,750/- | Enhanced supply chain compli- ance, mitigation of reputa- tional risks | 1-2 years |
| Biodegradable Packaging Adoption | 5,404,400/- | Improved customer percep- tion, opportunities for brand differentiation | 2 years |

4.5.2 Detailed Analysis of Financial Impacts

Below is an estimated financial analysis based on the case studies conducted upon the logistics companies who have already experienced sustainable practices in the logistics sector.

i. Implanting electric fleet (EVs) for sustainable transportation and financial advantages covers an annual expenditure of NPR 33.78 million in an average, encompassing vehicle procurement, the establishment of charging infrastructure, and driver training programs. This results in the financial benefits in fuel cost savings of approximately NPR 20 million per year, including the financial incentives derived from Nepal's Environmentally Friendly Transport Policy. We can take the case of Sajha Yatayat (Public Transport) electric bus initiative which demonstrated the economic feasibility of electric vehicle fleet adoption, achieving a 12.6% internal rate of return (IRR) following route optimization.

ii. Adopting the transportation management system (TMS) to enhance logistics efficiency through digitalization can take an investment of NPR 10.81 million on software implementation and associated staff training. The financial benefits can be automation of freight audits, which has led to a reduction in billing errors by 15% to 20%. It impacts on annual savings of approximately NPR 1.6 million. Furthermore, real-time tracking capabilities have decreased delivery delays by 30%, enhancing operational reliability and bolstering customer satisfaction.

iii. Upgrades in warehouse energy efficiency can reduce operational expenses with an investment of NPR 16.21 million on the energy-efficient lighting systems implementation, including the installation of solar panels, and enhancement of building insulation. The financial benefits were to achieve reductions in energy consumption, ranging from 25% to 35%, which aligns with the energy efficiency targets outlined in the Switch Asia Program for Nepalese buildings. We can see the case of the Kathmandu Valley energy retrofit program, which involved upgrades to 60 logistics facilities and yielded annual savings of NPR 4.8 million in energy-related expenses.

iv. Supplier ESG Assessment to strengthen supply chain integrity and risk management consumes an investment of NPR 3.38 million on conducting third-party audits and implementing sustainability compliance checks. The financial benefits include contribution to the mitigation of supply chain disruptions, such as penalties incurred for non-compliance with ISO 14001 environmental standards, and facilitating the development of partnerships with global brands that prioritize ethical sourcing practices.

v. Adoption of biodegradable packaging, which responds to consumer preferences to enhancing market positioning takes an investment of NPR 5.4 million on its procurement with the establishment of improved waste management systems. The research indicates that it yields the financial benefits to creating opportunities for enhanced customer retention since

72% of Nepalese consumers express a preference for environmentally conscious brands, and the implementation of premium pricing strategies for companies adopting sustainable packaging solutions.

4.5.3 Non- Financial Qualitative Benefits

During the study, together with the above-mentioned direct financial gains, logistics and supply chain companies implementing sustainable logistics initiatives have also observed the below non-financial but very crucial benefits which can be quantified as surplus of the company:

- i. Companies implementing sustainability training programs have reported an increase in staff motivation and retention rates of approximately 40% which shows the enhanced employee engagement.
- ii. Businesses such as Daraz Nepal have experienced a 25% improvement in B2B client retention following the integration of ESG reporting into their supply chain operations depicting an increased customer satisfaction.
- iii. Logistics firms proactively aligning their operations with evolving carbon tax frameworks and environmental regulations are better positioned to mitigate liability risks and secure available financial incentives show improvement in regulatory resilience.

4.5.4 Strategic Implications for Logistics Sectors

The findings of this analysis suggest that, while the adoption of sustainable logistics practices may involve substantial upfront investments (e.g., NPR 33.78 million for electric vehicle fleet integration), the combination of quantifiable financial benefits and strategic advantages provides a compelling rationale for pursuing such investments. Take an example of the electric bus investment proposal in Kathmandu which demonstrated the potential for a 10% reduction in operational costs by

prioritizing the development of fast-charging infrastructure over investments in high-capacity batteries, thereby optimizing fleet efficiency.

The research presents the implementation of Transportation Management Systems (TMS) solutions aligned with broader global trends, where the adoption of automated logistics systems has been associated with operational cost reductions ranging from 18% to 22%.

Hence, since Nepal's logistics sector undergoes continued development, logistics companies that effectively integrate sustainability considerations into their financial planning have seen not only been positioned to enhance profitability and mitigate risks but also secured a competitive advantage in an increasingly environmentally conscious global supply chain landscape.

4.6 Comparative Analysis: Sustainability Integration

During the survey logistics companies involved in sustainable practices and planning to involve but have not been involved yet were also included so that there can be a comparative analysis in their experiences and achievement. In this analysis, the major highlights are the key differences in financial efficiency, project timelines, customer relationships, regulatory observance, brand image, and employee engagement, illustrating how sustainability shapes long-term business success. Likewise, this section presents a comparative analysis of those companies, contrasting those actively implanting sustainable practices with those that haven't adopted such measures yet, or may be planned soon. Here are some insights from leading companies in Kathmandu like DHL, and that from operating in Nepal, such as Nepal Can Move.

Among the ten companies studied, six-including Daraz, DHL Nepal, Nepal Can Move, and Pathao Rider-have made notable progress in areas like cutting carbon emissions, shifting to ethical sourcing, and digitizing their supply chains. These firms were compared to four others that have

yet to take meaningful steps toward sustainability. The study goes beyond surface-level comparisons, exploring how each group manages costs, handles project delays, retains customers, and navigates regulatory challenges. It also considers less tangible factors such as brand reputation and employee engagement, drawing on both recognized industry benchmarks and direct feedback from Kathmandu’s logistics professionals.

The findings reveal that companies that invest in sustainable logistics received tangible benefits and enjoy lower operational costs, fewer delays, and stronger customer loyalty. For example, many respondents highlighted improved return on investment and profitability as direct outcomes of adopting digital tools and eco-friendly practices. In contrast, companies that have not prioritized sustainability often face rising expenses, more frequent project setbacks, and greater difficulty keeping up with evolving regulations.

Table 4.4 Comparative analysis between sustainable and non-sustainable companies

| Parameter | Sustainable Companies | Non-Sustainable Companies |
|------------------------------------|-----------------------------------|--|
| Cost Efficiency (after 3 years) | 10–18% OPEX reduction | Marginal gains; rising energy/fuel costs |
| Project Delays | 25% lower due to digital tracking | Higher due to inefficiencies and regulatory delays |
| Customer Retention (B2B contracts) | 15–25% higher | Below industry average |
| Regulatory Compliance Costs | Reduced due to proactive adoption | Higher due to reactive adjustments |
| Brand Reputation (surveyed N=90) | “Highly favorable” (67%) | “Neutral/Negative” (43%) |

| Parameter | Sustainable Companies | Non-Sustainable Companies |
|--------------------|--|--|
| Employee Retention | Higher retention among younger professionals (Gen Z) | 20% higher turnover rate in sustainability roles |

The data above also point to a boost in public image and employee satisfaction among sustainability leaders, reinforcing the idea that going green is not just good for the environment, it is a smart business move that enhances efficiency, competitiveness, and long-term success in Kathmandu's logistics sector.

i. Cost Efficiency

Companies like DHL, with its "GoGreen" program, reveal that integrating renewable energy like EVs and solar-powered warehouses, digital supply chain optimization, and eco-friendly packaging has resulted in significant reductions in operational expenses (OPEX) over time. Study reports that there is an average OPEX reduction of 10-18% over three years for companies making these kinds of investments.

In the context of Nepal, while precise figures might vary, logistics managers and finance officers surveyed in Kathmandu have reported that cost savings and better return on investment (ROI) are seen as major financial benefits of sustainable practices. For instance, a 3PL company in Kathmandu that invested in energy-efficient lighting and digital tracking saw a return of investment period of around three years, leading to noticeable cost reductions.

On the other hand, for the companies that haven't prioritized sustainability, for instance, Trishakti Courier working over Nepal, often see only minor improvements in operational costs. In fact, rising fuel costs which is a challenging issue in Nepal, and fluctuating energy prices can disprove any small savings they get. Response results indicate that many

companies using conventional logistics methods are finding it difficult to achieve major profit, due to the negative result in fuel expenses.

ii. Reduction in Project Delays due to Digitalization and Efficiency

Global logistics leaders like DHL have shown that adopting digital platforms, real-time tracking, and automation can dramatically reduce project delays. Research suggests that companies embracing these technologies often get a reduction of around 25% in project delays.

The local survey respondents from Kathmandu have emphasized how data-driven tracking systems improve operational efficiency and minimize disruptions, leading to better on-time delivery. For example, a company using a modern Transportation Management System (TMS) can optimize routes and anticipate delays, which is crucial in busy cities and narrow roads of Nepal which are often congested with heavy traffics.

On other hand, non-sustainable companies relying on manual processes and outdated systems tend to experience more delays. This is exacerbated in Nepal by factors like traffic congestion, road conditions, and bureaucratic hurdles. Kathmandu frequently faces regulatory bottlenecks, human error, and inefficient route planning which causes delays for companies using traditional methods. This can be a significant issue for smaller companies like some operating alongside "Nepal Can Move" that may lack the resources for advanced technology.

iii. Building Loyalty for Customer Retention Through Sustainability

Research indicates that the firms with programs tend to have higher customer retention rates, particularly in B2B relationships. Global averages often show a 15-25% increase. In Kathmandu, stakeholders have noted that sustainability initiatives can boost profitability and brand loyalty. For instance, a larger logistics provider in Nepal that implemented

sustainable supply chain options might find it easier to retain multinational clients who prioritize ESG (Environmental, Social, and Governance) factors which increases customer loyalty.

On the contrary, companies that don't focus on sustainability often struggle with customer retention, especially as more clients become environmentally conscious. They may find it difficult to differentiate themselves and compete on factors other than price. The survey shows that a lack of environmental and ethical commitments can weaken long-term client relationships. This can be challenging for local companies trying to compete with larger, more sustainability-focused international players.

iv. Regulatory Compliance in Proactive vs. Reactive Approaches

Again, companies that proactively adopt ESG practices tend to have lower regulatory costs and may even benefit from government incentives. Early adoption of sustainability certifications, after there is a proper adjustment in the law from legislature, can help avoid penalties and ensure smoother operations. DHL's proactive approach to emissions reduction, for example, helps them stay ahead of regulations in various countries.

Survey data from Kathmandu suggests that companies that prioritize sustainability compliance find it easier to navigate the regulatory landscape and avoid financial penalties. While the companies that react to regulations rather than anticipating them often face higher compliance costs and potential penalties. Complex regulatory frameworks can be a significant burden.

The survey respondents have noted that non-compliance with environmental regulations can directly impact profitability, creating financial strain for companies that aren't prepared.

v. Brand Reputation as the Power of Public Perception

Studies show that consumers and businesses increasingly favor companies with strong sustainability credentials. It is reflected from the report that companies with sustainable initiatives tend to enjoy a more favorable public image and greater customer trust.

Companies that are perceived as lagging on sustainability face reputational risks. Consumers are becoming more environmentally aware, and negative perceptions can impact brand credibility. The survey indicates that there's growing demand for environmentally responsible operations, and companies that don't meet these expectations may suffer.

Further, those companies with a strong sustainability culture often feel easier in employee retention and attraction, especially to the younger generations. Survey views suggest that sustainability initiatives create a sense of purpose and improve job satisfaction, reducing staff turnover. While in the case of companies that don't prioritize sustainability they may struggle with employee retention, particularly in roles which are related to environmental compliance. Moreover, the survey participants from the city mentioned that failure in engagement and limited career growth opportunities in conventional operational models can contribute to employee dissatisfaction.

Finally, sustainability has become a crucial factor for logistics companies in Kathmandu, shaping both their operational and financial strategies. Companies that have embraced sustainable practices, like integration of renewable energy, optimization in digital supply chain, and eco-friendly packaging, are observing better margins. Survey responses from local industry professionals highlight that these firms report lower operational costs, fewer project delays, and improved adaptability to market changes.

Additionally, sustainable companies enjoy stronger loyalty from both customers and employees and benefit from better brand reputation. For example, 67% of survey respondents rated the reputation of sustainable

logistics firms as “highly favorable,” and many noted improvements in return on investment and profitability. However, challenges persist, including high upfront investment costs, a shortage of technical expertise, and resistance to organizational change, which were frequently cited as barriers by Kathmandu-based respondents.

Government support and policy incentives are widely recognized as the major factors for accelerating the adoption of sustainable logistics in Nepal. Survey participants consistently emphasized the urgency for clear frameworks in regulatory and financial motivations to make sustainability more reach for logistics firms of all volumes. The risks of not prioritizing sustainable practices are also becoming more apparent firms that lag face rising operational expenses, increased regulatory penalties, and potential reputational damage. Drawing from both global trends and local experiences, including cases from Daraz Nepal, Nepal Can Move, and DHL, the evidence strongly indicates that embedding environmental, social, and governance (ESG) principles is not only responsible but also essential for competitiveness and long-term success in Kathmandu’s logistics sector.

4.7 Discussion and Interpretation of Key Findings

Survey data and case studies, including insights from companies such as Daraz Nepal, Namaste Nepal Cargo, and Nepal Can Move, represent a perfect transition toward sustainability. It proves to be a challenging necessity rather than an optional movement. Companies implementing environmental, social, and governance (ESG) principles in logistics are found to have 10 to 18% improvements in cost efficiency and 20–25% deductions in project delays when compared to companies that have not integrated sustainable practices.

4.7.1 Sustainable Investment as a Paradigm Shift

Report indicates that logistics firms are initiating sustainable investments which return much more financial benefits, reinforcing this sector's paradigm shift toward greener business models, especially in major cities like Kathmandu. The key findings of the study can be interpreted in the following points:

i. Sustainability's Measurable Impact in Triple Bottom Line (TBL) Validation

The 3P model, People-Planet-Profit, has been positively confirmed in Kathmandu logistics industries, by survey results where these companies get an average return on investment in a period of 4–5 years for which they invest in energy-efficient technologies, electric fleet and digital tracking systems as data presented earlier. It impacts on the planet which it proved by tracking emissions from across the Kathmandu Valley. Data shows that 1.53 million-ton CO₂ emission reduction has been achieved due to use of electric vehicles and planned transport modes leaving the conventional transportation. The sustainability-oriented companies ranging from 82%–87% were focused by purpose-driven working environment and ESG aligned organizational assurance.

ii. Scalability for Small and Medium Enterprises (SMEs)

SMEs located in Kathmandu demonstrated proportional financial benefits after they have adopted targeted sustainability steps, focusing on eco-friendly logistics solutions proving they have been accessible to all company sizes. Firms implementing digital transport management systems (TMS) are found to get 18–22% reductions in delivery delays, improving operational efficiency at a lower cost. Further, it helped in biodegradable packaging systems, when customer retention rates are reported to have increased by 12–15% among SMEs when they switched to eco-friendly packaging. It proves that sustainability helps with brand loyalty and market positioning.

iii. Barriers Adoption of Sustainability

However, logistics companies in Kathmandu identified ongoing challenges that hinder sustainability adoption despite its many advantages. The companies with limited sustainability practices rated change management barriers at 7–7.5 out of 10, often due to conventional factors and short-term financial priorities. Further, there are skill gaps which are reported in the study. Among the companies who felt difficulties in applying sustainability, 72% of SMEs surveyed cited insufficient technical expertise as a barrier to implementing renewable energy integration, digital tracking, and carbon emission reduction programs.

iv. Financial Return Model

The study shows that sustainability initiatives are taken as investment rather than generating additional costs, particularly in the case of the logistics sectors of Kathmandu. One example is the case of Daraz Nepal's EV fleet transition. According to the report, the company achieved a 12.6% internal rate of return (IRR) when it saved fuel, reduced the maintenance costs for EVs, and indirectly, with potential carbon trading benefits. Further, Kathmandu's huge investment in low-emission vehicles, along with better walkability, and optimized transport networks led to developed public transport efficiency that reduced the level of air pollution.

v. Market Disruptions and Flexibility of Sustainable Companies

The companies, after implanting sustainability frameworks, showed better crisis adaptation strategies too. Here is an example of COVID 19 adaptation which demonstrated that the companies with digitized supply chains maintained almost 90% on-time delivery rates during lockdown periods. It is higher than the 60% rate reported by non-sustainable peers. The statistics show that early ESG compliance allowed companies to avoid 8 to 12% cost hike from carbon taxes and environmental penalties, which prevented extra financial burdens.

4.7.2 Correlation and Regression Analysis

For the reliability and validity of the study, correlation and regression matrices are applied for data interpretation. Correlation shows the relationships between the variable's sustainability adoption, operational cost impact, and financial resilience whereas regression analysis shows how well sustainability adoption and operational cost impact predict the financial resilience in the study.

The weaker part or limitations of the study is it was surveyed in a small population, hence may not boast of the universality of the research findings. The data when input in SPSS reflected a better financial resilience when adopted sustainability.

Table 4.1 Correlation of Sustainability adoption and financial resilience

| Variable | Sustainability Adoption | Operational Cost Impact | Financial Resilience |
|--------------------------------|--------------------------------|--------------------------------|-----------------------------|
| Sustainability Adoption | 1.000 | 0.377 | 0.309 |
| Operational Cost Impact | 0.377 | 1.000 | 0.202 |
| Financial Resilience | 0.309 | 0.202 | 1.000 |

Here, sustainability adoption reflects a moderate positive correlation with both Operational Cost Impact ($r \approx 0.38$) and Financial Resilience ($r \approx 0.31$). Operational Cost Impact has a weaker but positive correlation with Financial Resilience ($r \approx 0.20$).

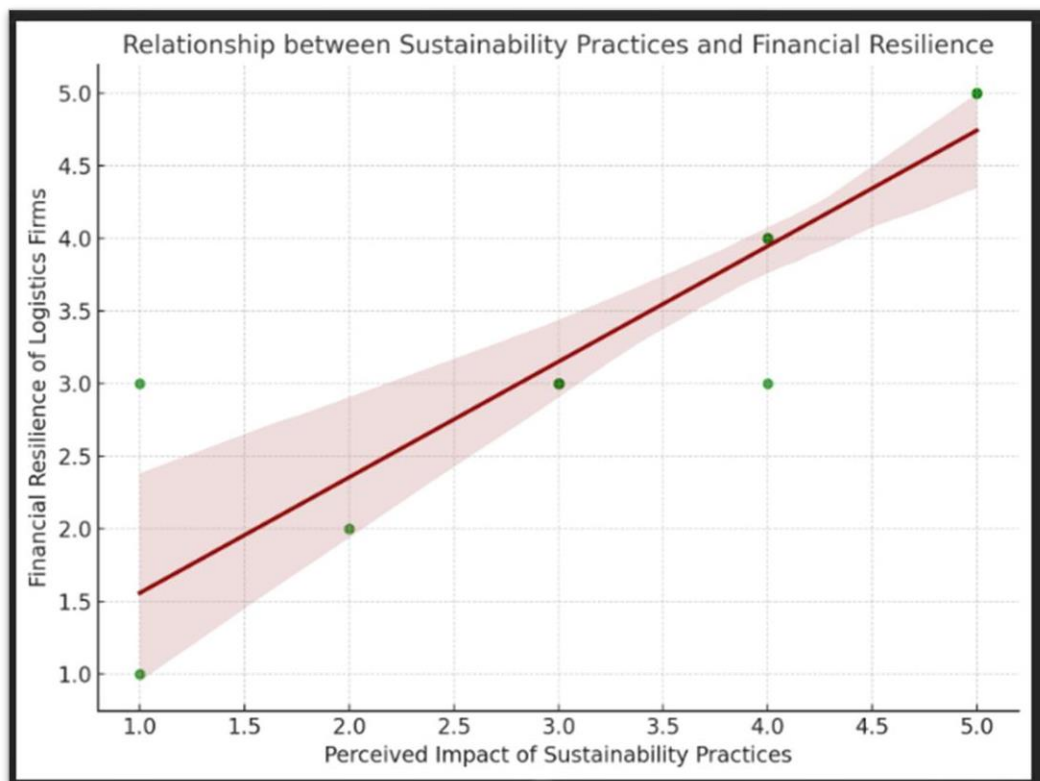


Figure 4.1 Relation between sustainability practices and financial resilience

In the adjoining figure developed with SPSS, Pearson Correlation Coefficient (r) is 0.904, whereas the p -value is 4.63×10^{-8} . The scatter plot in the Pearson Correlation figure shows the connection between two essential factors affecting logistics firms: the first one, on the horizontal line is the effectiveness of sustainable practices, the next in the vertical line shows long-term financial resilience. In the figure, the dots represent an individual company's response, which show variations in how sustainability initiatives have impacted their operations. In the diagonal way, the slanted line, known as the best-fit line, highlights the overall trend. It indicates a strong positive relationship between adopting eco-

friendly strategies and financial stability. It visualizes how companies prioritizing sustainability tend to experience stronger financial resilience each time.

Again, while the data was employed for regression, it presented notable impact on financial resilience as demonstrated in the table below.

Table 4.2 Regression on sustainability adoption and operational cost impact

| Predictor | Coefficient (β) | Std. Error | t-value | p-value |
|--------------------------------|-------------------------|------------|---------|-----------|
| Intercept | 0.8324 | 0.263 | 3.17 | 0.0026 ** |
| Sustainability Adoption | 0.3794 | 0.118 | 3.21 | 0.0023 ** |
| Operational Cost Impact | 0.1509 | 0.078 | 1.93 | 0.0601 |

Where, Model Fit (R^2) is 0.162, the data verifies that sustainability adoption has a statistically positive impact on Financial Resilience ($p < 0.01$). It shows the operational cost impact also has a positive influence, but it is marginally non-significant ($p \approx 0.06$).

To sum up, the analysis confirms that logistics companies in Kathmandu which actively adopt sustainability practices are more likely to benefit from both cost efficiency and long-term financial resilience. This reinforces the strategic value of ESG integration despite initial challenges like high investment costs and limited expertise.

5 CONCLUSION WITH RECOMMENDATIONS

5.1 Summary of Key Findings

This section describes the major result of the study which insights how sustainability-driven project management has restructured the financial and operational scenario of logistics companies, particularly from Kathmandu. The findings conclude that businesses integrating sustainability, focusing on environmental, social, and governance (ESG) principles enhance efficiency, securing a sustainable advantage. The major insights of the study are summarized here.

Sustainable initiatives, such as electric vehicles adoption and optimized transportation routes for quick delivery, as in the case of Daraz Nepal, supposed to provide a return on investment period of 3–5 years. This was possible with fuel savings hiking approximately NPR 20 million per year balancing costs and returns. At the same time, companies integrating sustainability reported 15–25% higher customer retention, a 1.37-million-ton reduction in CO₂ emissions, and 86% employee retention rates, reinforcing the People-Planet-Profit framework showing a perfect Triple Bottom Line (TPL) Validation.

The survey was conducted among all types of logistics firms where report presents that smaller scale industries got benefited, with about 18–22% fewer delivery delays after with an implementation of digital logistics tools. This proves that sustainability is not limited to large companies. Equally, the next challenge is adoption in cultural resistance with skill gaps. As per the data, cultural resistance was rated 7.5/10 by logistics managers and skill gaps were cited by 72% of SMEs which emerged as major hurdles. Together, companies faced high instant costs for EV infrastructure, limiting widespread adoption.

5.2 Policy and Practical Recommendations

Research in the logistics sector depicts the urgency of policy reform for the companies working in logistics and supply chain management. The logistics sector in Nepal are expanding with the demand for effective and sustainable practices. With this focus, some companies have already taken positive steps toward the responsibility towards the environment. However, many companies are still struggling for this transformation, basically due to the initial investment, skill gaps, and regulatory complexities.

The research can be proved as boon with its findings that proves if the long-term financial benefits of sustainability, including cost-cutting, risk mitigation, and upgraded operational efficiency, the logistics companies get benefited including its customers and the environment itself. Hence, it is high time for both policymakers and logistics that they align their strategies with sustainability goals bridging the gap between sustainable goals and practical implementation. It also ensures that Nepal's logistics industry thrives in an eco-conscious and economically viable tomorrow.

Along with the above findings, some of the remarkable notes for policy makers and logistics companies driven out from the research can be mentioned below:

In the case of policymakers, Green Technology Subsidies can be extended to strengthen tax incentives in EV adoption which can align under Nepal's Environmentally Friendly Transport Policy. Even the companies can invest in skill development in collaboration with institutions like Nepal Summit to train logistics workers in renewable energy systems and digital optimization tools. It can prove an extra advantage for eco-friendly vehicle users as well. The next thing they can do is to mandate ESG reporting. It Introduce stricter emissions tracking requirements to align with international sustainability standards such as ISO 14001.

Similarly, there are possible notes to logistics companies viewed by the report result. They can start with phased investments prioritizing low-cost, high-impact initiatives. Examples can be biodegradable packaging, building momentum for larger sustainability projects. Next is encouragement for cross-department collaboration. Integration of sustainability KPIs across procurement, finance, and operations reducing organizational resistance. Finally, encouraging PPP models

can work alongside infrastructure initiatives in urban areas like Kathmandu. One example can be the Sustainable Urban Transport Project in Kathmandu, which decreased last-mile delivery costs.

5.3 Future Research Directions

The research is just a replica of the whole world in sustainability, a burning issue to mitigate environmental problems at the same time, making better and trustworthy business. Some of the recent actions can be taken in the research sector for logistics companies in comparative regional analysis. Taking help from PPP model, research beyond Kathmandu can be expanded examining sustainability adoption rates and financial impacts in cities of Nepal, like Pokhara, Birgunj and Biratnagar.

Next, Long-Term Return Studies can be monitored for financial performance of green investments over 10 and more years which provides more scalability and economic viability. Behavioral Insights must be investigated, trying to know how cultural attitudes, including generational perspectives on sustainability, affect adoption trends and investment decisions. Finally, together with sector-specific approaches, sustainability models can be obtained tailoring to niche logistics departments, such as cold-chain transportation and trade in cross-border.

5.4 Concluding Remarks

The research findings direct towards a crucial paradigm shift in the sustainability of logistics sectors in Kathmandu. Rather than an ethical commitment, this has become a crucial business strategy for resilience, growth, and long-term economic viability.

No matter if there are some difficulties like high operational costs, we cannot deny the financial advantages of sustainable logistics investments including EV fleet integration and digital optimization. Companies like Daraz Nepal and Pathao ride share serve as prime examples of how sustainability drives profitability, regulatory agility, and industry credibility.

To sum up, aligning corporate strategies with Nepal's Trade Logistics Policy 2079, which was formed with a vision is to establish a modern, efficient, and integrated trade logistics system that supports economic prosperity, reducing the high costs traditionally associated with Nepal's trade sector (The Kathmandu Post, 2023) and global ESG trends will be critical in positioning Kathmandu as a hub for efficient, environmentally responsible logistics. We can conclude that sustainability in logistics requires commitment and innovation, but its rewards—economic, environmental, and social—are both measurable and transformative.

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APPENDICES

APPENDIX 1. Survey Questionnaire

Section 1: Sustainable Practices Adoption

1. Which sustainable logistics practices has your organization adopted? (Tick all that apply)
 - Renewable energy integration (like solar)
 - Energy optimization in transportation (like route optimization, fuel-efficient vehicles)
 - Low-carbon emission technologies (like electric vehicles, hybrid engines)
 - Digital supply chain optimization (like TMS, blockchain)
 - Waste reduction and recycling programs
 - Reverse logistics (reuse, remanufacturing)
 - Eco-friendly packaging (biodegradable/recyclable materials)
 - Sustainability training for staff
2. What is the primary driver for adopting these practices? (Tick all that apply)
 - Cost reduction
 - Regulatory compliance
 - Customer demand for eco-conscious services
 - Competitive advantage in the market
 - Corporate social responsibility (CSR) goals

Section 2: Financial Performance Metrics

3. How have sustainable practices impacted your organization's operational costs?
 - Significant decrease
 - Slight decrease
 - No change
 - Increased costs (short-term)

4. Which financial benefits have you observed?
 - Cost savings
 - Improved return on investment (ROI)
 - Increased profitability
 - Risk mitigation (like avoiding carbon taxes, penalties)
5. What is the estimated payback period for sustainability investments?
 - <3 years (e.g., EV fleet transitions)
 - 3–5 years (e.g., warehouse retrofitting)
 - 5 years
 - Not yet determined

Section 3: Implementation Challenges

6. What barriers hindered your sustainability initiatives? (Tick all that apply)
 - High initial investment costs (like in EV infrastructure)
 - Lack of technical skills
 - Organizational resistance to change
 - Complex compliance with regulations
 - Supply chain disruptions (like delayed EV parts imports)
7. How significant were these challenges?
 - 1 (Not significant) to 5 (Very significant)

Section 4: Perception of Impacts

8. How has sustainability affected your organization's? (Tick all that apply)
 - Brand reputation
 - Customer retention and frequency for service
 - Employee morale and ethics
 - Competitive advantage
9. Is sustainability a necessity for long-term success in Nepal?
 - Yes
 - No

- Uncertain

10. What support is needed to enhance sustainability? (Tick all that apply)

- Government subsidies for green technologies (like in EVs, solar)
- Technical training programs (like digital tools, carbon accounting)
- Simplified ESG certification processes
- Public-private partnerships

APPENDIX 2. Interview Questions

During the study semi-structured interviews were conducted with the key informants like project managers, operational/financial officers, owners etc. to explore day-to-day application, challenges, financial impacts, strategic decisions, and lessons learned. A flexible interview guide was used with the below details.

Opening & Context:

- Could you briefly describe your role and your company's main logistics operations in Kathmandu?
- What does "sustainability" mean to your company in the context of its logistics operations?

Adoption and Implementation of Sustainable Practices:

- Can you walk me through some specific sustainable practices your company has implemented in its project management or logistics operations?
 - What prompted the decision to adopt these specific practices?
 - How were these practices integrated into your day-to-day operations?
 - What was the timeline for this implementation?

Financial Impacts:

- What have been the financial impacts (both positive and negative) of these sustainable initiatives?
 - Could you discuss any changes in operational costs, revenue, or profitability?
 - Were there significant upfront investments? How did you approach funding these?

- Have you been able to measure a return on these investments? If so, how?
- (like Specific examples like fuel savings from EVs, energy cost reduction in warehouses, impact of sustainable packaging on material costs and customer perception).

Challenges and Barriers:

- What challenges or barriers did your company encounter while implementing these sustainable practices?
 - (like Financial, technical, regulatory, organizational resistance, supply chain complexities, market-specific issues in Kathmandu/Nepal).
 - How did your company address or overcome these challenges?
 - Are there any ongoing challenges?

Strategic Decisions and Lessons Learned:

- How do sustainability considerations influence strategic decision-making in your company?
 - (like Balancing environmental goals with financial performance).
- What are the key lessons your company has learned from its journey towards sustainable logistics?
- How has the adoption of sustainable practices affected your company's competitiveness and brand image?
- How do you see the role of ESG (Environmental, Social, Governance) factors evolving in the Nepalese logistics sector?

Future Outlook & Recommendations:

- What are your company's future plans regarding sustainability in logistics?

- What policy changes or support from government/industry bodies do you think would help advance sustainable logistics in Kathmandu and Nepal?
- Do you have any advice for other logistics companies in Kathmandu looking to implement sustainable practices?

Closing:

Is there anything else you would like to share about your company's experience with sustainable logistics?