Investigation of the Carbon Offsetting Targets Towards Sustainability: A Focus on 3PL Companies

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Abstract - *This study examines the carbon emission reduction goals of third-party logistics (3PL) firms for sustainable activities, assessing their effectiveness and impact on sustainability. It explores the goals and methods used by these companies, their implementation challenges, and the potential effects on sustainability outcomes like reduced emissions, improved operational efficiency, and increased stakeholder participation. This aims to understand how 3PL companies reduce their carbon footprints and identify opportunities. This study examines the leading 3PL providers in the global content market using a comprehensive analysis of literature articles. The effect of carbon footprints on efficiency in third-party logistics companies is examined in the present research. With an emphasis on carbon mitigation, the effects of carbon footprints on organisations, and the tactics 3PL entities employ to lower their carbon footprints, it included 76 research publications during 2019–2024. The study examines supply chain management, sustainability, and emission reduction using the theories of carbon management, stakeholders, and the environment. The outcomes demonstrate how well the retention of carbon techniques works to raise industrial sustainability standards. This study evaluates the interest and difficulties experienced by 3PL companies by comparing the results with those of other countries. Consequently, the goal of the research is to raise the general understanding of environmental issues and accomplish long-term sustainability objectives in the transportation industry, as a finding of this research, Direct, indirect, and fugitive carbon footprints have considerable impacts on the environment and economy. Compared to individuals, businesses are more responsible for global warming, which damages infrastructure, disrupts supply chains, and lowers productivity. 3PL companies can employ carbon mitigation strategies, such as waste reduction, renewable energy investments, and environmentally friendly transportation while interacting with stakeholders and governments to minimise the negative environmental effects. Likewise,20% of the world's greenhouse gas (GHG) emissions come from the transportation sector, which includes 3PL companies.*

Keywords: Carbon Footprint, GHG Emissions, Supply Chain Management, Sustainability, Sustainable Practices, Third-Party Logistics

I. INTRODUCTION

A growing number of businesses are considering the benefits of sustainable practices because of increased worries about the destruction of the environment and climate change. The logistics industry is vital to the economy, and 3PL companies are essential to the nation's potential to manage operations. Nevertheless, a lot of 3PL businesses still run their operations without clear goals or strategies to lessen their carbon impact. This is due to sustainability becoming increasingly recognised as important. For businesses, determining their degree of sustainability is challenging due to the absence of standardised carbon emission standards or benchmarks. Furthermore, measuring and comparing carbon dioxide emissions across several companies is made more challenging by the absence of accountability and openness in reporting emissions.

https://doi.org/10.54389/YQVI2686

The idea of carbon emission has drawn a lot of attention lately to minimise the harmful effects that carbon emissions have on the environment. Carbon emissions are financial contributions made to initiatives like forestry, energy efficiency projects, and preservation of energy that aim to lower or eliminate greenhouse gas emissions from the planet (Downar et al., 2021). The transportation sector is accountable for around 14% of the world's GHG emissions, according to the IPCC (Downar et al., 2021), considering it among the main causes of carbon emissions worldwide. As a result of that, they make it easier for goods and services to move between different supply chains, 3PL companies are vital to the transportation sector. Due to the substantial harm large corporations create to the environment, there is an increasing need to lower carbon emissions and adopt sustainable practices. The substantial growth of the logistics sector is a result of the country's growing business and economic growth, which places more pressure on 3PL businesses to embrace sustainable practices and decrease their carbon footprint via stakeholders and regulatory organisations. However little research has been done on the carbon-offsetting goals and programs of 3PL businesses (De Silva et al., 2022).

Other competitors have also surfaced, such as new companies and partnerships with domestic and foreign companies (Lapshin, 2023).Since the transportation sector contributes significantly to GHG emissions, 3PL businesses face increased pressure to lower their carbon footprints. The transportation sector's carbon footprint and emissions have increased due to its significant dependence on fossil fuels, particularly diesel at the time (Guerrero-Lucendo et al., 2022). Clogged ports and a weak roadway system that has resulted in extended inactivity are further variables contributing to emissions. Furthermore, as businesses expand, so do transit volumes, adding to the strain on the nation's already overburdened infrastructure and raising emissions (Diebel, 2023).

Consequently, to satisfy the growing needs of regulatory bodies as well as the ecological demands of their clientele, 3PL businesses are compelled to use more ecologically friendly procedures and lessen their effect on the environment (Zampou et al., 2022). This study aims to assess the sustainability accomplishments of 3PL organisations and explore their carbon reduction goals.

Finally, the research contributes to existing knowledge on decarbonisation and sustainability in the logistics industry. It will provide practical recommendations to 3PL businesses on improving their environmental impact and global sustainability efforts. Although earlier research has concentrated on carbon emissions in developed countries, this study examines how they are applied in the global 3PL industry, offering unique situation-specific information.

II. METHODOLOGY AND EXPERIMENTAL DESIGN

This study focuses on examining how carbon emissions affect sustainability in third-party logistics (3PL) firms. Therefore, no specific analysis was found, contrary to a thorough search. This study examines what carbon emission is, the Carbon emission on Business, the Carbon emission Logistic industry, Third-party Logistic Companies, and Carbon emission reduction Strategies Used by 3PL that succeeded in incorporating 76 research publications, published in ScienceDirect, Emerald, Sustainability & etc between 2019 and 2024 by employing a keyword search and included high rated articles only. However, it was reluctant to add research articles that were primarily unpublished during this time. Additionally, the selections did not include research articles which do not promote ‘Sustainability’, or ‘Carbon emission’ and have fewer similarities related to the ‘Logistics Industry’. Likewise, Carbon management theory, stakeholder theory, and environmental

theory are all utilised throughout the research. These theories are generated using the theoretical framework of the present investigation and have implications for supply management, sustainability, and carbon emission. The current research provides a qualitative perspective that documents the practical problems and tactics of the 3PL stakeholders, frequently absent from the quantitative research on logistical sustainability. Table 01 shows, the theme codes used for thematic analysis in identifying the important topics in the literature in the table below.

Table 1. Thematic analysis Theme codes

Keyword	Themes Code	Research article
Carbon Footprint	1. Carbon emissions 2. Globalization and energy 3. Reduce carbon emissions 4. Carbon disclosure 5. Carbon footprint 6. Sustainable supply 7. Sustainable development	(Alshubiri and Elheddad, 2019) (Ghosh et al., 2020) (Lai et al., 2022a) (Yang and Meng, 2020) (Zen et al., 2021) (Sofijanic et al., 2021) (Downar et al., 2021) (Guerrero-Lucendo et al., 2022) (Zampou et al., 2022) (Diebel, 2023) (Adeleye et al., 2023) (Adikari et al., 2023)
GHG Emissions	1. Climate Change	(Cattaneo et al., 2019)
Supply Chain Management	1. Supply chain network design 2. Supply chain management 3. 3pl companies 4. Green supply chain 5. Carbon management 6. Green supply chain	(Zimon et al., 2019) (Fremstad et al., 2019) (Mardani et al., 2020) (Ghosh et al., 2020) (Mardani et al., 2020) (Abbasi et al., 2021) (Paththinige and Rajapakse, 2021) (Feng et al., 2022) (Kalaiarasan et al., 2022) (Yu et al., 2022) (Zampou et al., 2022)
Sustainability	1. Sustainability practices 2. Component of Sustainability 3. Business impact on sustainability	(Fremstad et al., 2019) (Zimon et al., 2019) (Karaman et al., 2020) (Ghosh et al., 2020) (Suh and Pomeroy, 2020) (Mardani et al., 2020) (Zen et al., 2021) (Morashti et al., 2022)

	4. Logistic impact on Sustainability 5. Sustainability in 3PL companies	(Lapshin, 2023) (Zhang and Liu, 2023) (Dimitrov and Saraceni, 2023) (Glavas and Visentin, 2024)
Third-Party Logistics	1. Definition of 3PL companies 2. 3PL practices 3. Global 3Pl companies 4. Strategies used by 3PL companies 5. Green practices I 3PL companies 6. Carbon emission in 3Pl companies 7. Carbon emission reduction in 3PL companies	(Karaman et al., 2020) (Perera et al., 2021) (Sivaloganathan, 2021) (Abbasi et al., 2021) (De Silva et al., 2022) (Lapshin, 2023) (Otte, 2024)

Source: Authors' compilation.

III. LITERATURE REVIEW

This literature overview investigates how carbon emissions affect society, the environment, and the economy. It covers the idea of carbon emissions, methods for reducing them, and how they affect company performance. It also covers the involvement of third-party logistics (3PL) firms in the logistics sector and their environmental impact reduction tactics. The analysis also covers the strategies global 3PL businesses employ to lower carbon emissions. Figure 01 mentioned below, shows the literature pathway of this research.

A. Carbon Footprint

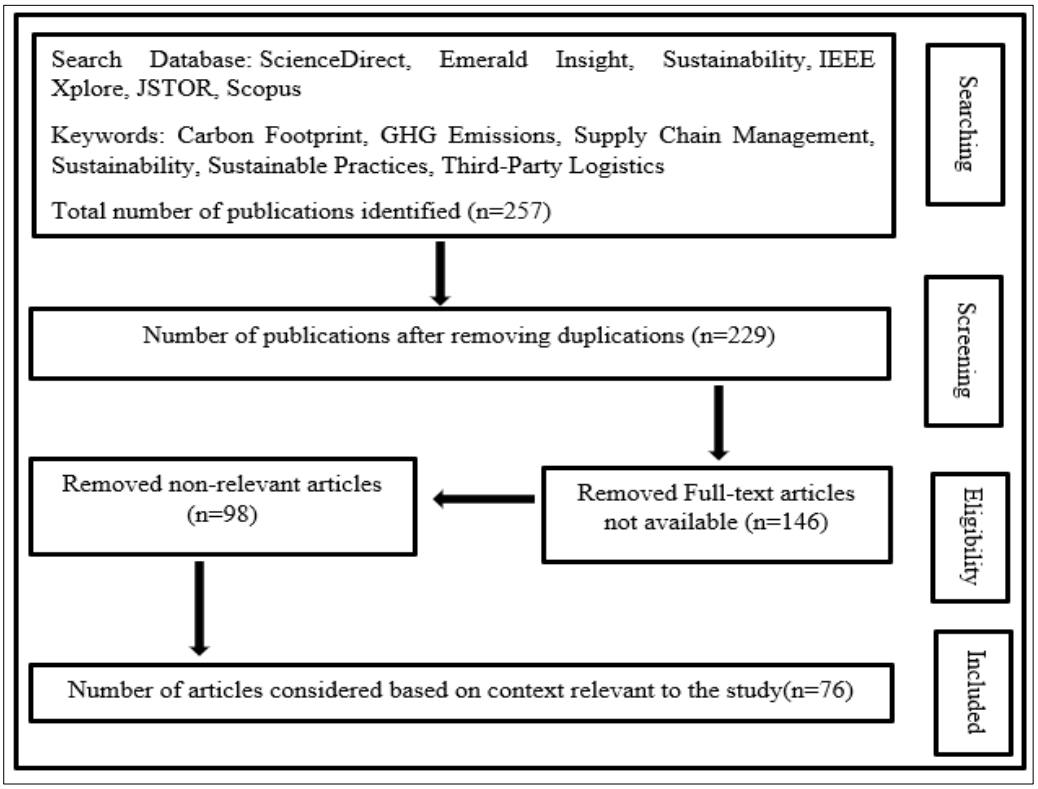
Carbon emissions are the total amount of gases that humans generate into the atmosphere due to energy utilisation, industrial processes, travel, and refuse management. Among these gases are CO_2 and other carbon-containing molecules. Direct, Indirect, and Fugitive emissions are the three primary categories of carbon emissions (Lai et al., 2022b).

- Direct emissions: Generated by the burning of fossil fuels in automobiles, power plants, and various other industrial activities (Lai et al., 2022b).
- Indirect emissions: Generated during the extraction and preparation of raw materials (Lai et al., 2022b).
- Fugitive emissions: Occur from igniting fossil fuels, farming, landfills, and the release of methane and nitrous oxide into the environment (Lai et al., 2022b).

The total amount of GHG emissions that can be linked to a person, group, activity, occasion, or product is called their "Carbon Footprint" and is expressed in CO_2 comparison (Yang & Meng, 2020). The amount of GHG, especially CO_2, created by human activity is an estimate of its effects on the surroundings. These gases are released into the surroundings by every action, such as driving and manufacturing things, which

affects the climate. The carbon footprint serves as a tool to promote emission limitations and increase knowledge about an individual's or organization's ecological effects. The entire quantity of GHG released is measured and is commonly stated in tonnes of CO_2 emitted yearly. This aids in determining the degree to which human activity contributes to the environment and global warming (Zen et al., 2021).

Figure 1. Literature Pathway



Source: Authors' compilation.

Companies worldwide are increasingly concerned about their carbon footprint, as it impacts society, the economy, and the environment. Research shows that a business's average carbon footprint is larger than that of an individual, potentially leading to catastrophic global warming. Carbon footprint calculations are becoming essential tools for managing greenhouse gas emissions. As corporations become more aware of climate change implications, it's crucial to consider environmental implications beyond GHG emissions, as more reliable carbon footprint computation tools are developed (Zen et al., 2021).

The field of calculating carbon footprints is still in its infancy, but nations must make deliberate policy decisions to promote sustainable development. The United Nations' Sustainable Development Goals aim to address social, economic, and environmental concerns (Lai et al., 2022b). Carbon footprint analysis measures the impact of human activity on the environment, such as human migration, harsh weather, and climate change. However, the most effective techniques for calculating carbon footprints remain debated (Yang & Meng, 2020).

According to report, emphasises the substantial negative effects that carbon emissions have on the ecosystem and the economy (Suh & Pomeroy, 2020). These effects include melting glaciers, increasing sea levels, and an increase in extreme weather occurrences due to the climate change that these emissions generate (Cattaneo et al., 2019). The effects of carbon emissions on the economy are of special importance. According to research, the world economy might drop upwards of 11.5% of what it produces by the decade of 2100 if carbon emissions increase uncontrolled (Alshubiri & Elheddad, 2019).

Climate change can cause significant economic damage due to extreme weather, including extreme temperatures, droughts, and infrastructure destruction. These events can lead to decreased output, production chain disruptions, and infrastructure damage. In 2012, the US recession caused $12 billion in damages, while the 2013 European heatwave caused €10 billion (Zen et al., 2021). Carbon dioxide releases can also indirectly impact the economy by altering precipitation and temperature patterns, causing losses for industry and farmers (Zhang & Liu, 2023).

Long-term economic effects may result from carbon emissions' impact on the abundance of natural resources (Downar et al., 2021). Variations in ocean temperature and acidification have an effect on aquatic ecosystems and fisheries, which in turn affects tourism and the fishing industry (Suh & Pomeroy, 2020). For policy decisions and mitigation plans, better knowledge, modelling, and predicting of weather and climate hazards is required (Suh & Pomeroy, 2020).

The way that carbon emissions affect natural resources, moisture and climate designs, severe weather, and future economic implications, they also have major impacts on the economy (Zen et al., 2021). Acquiring a thorough understanding of these consequences is crucial to alleviating the consequences of climate change and guaranteeing a sustainable economic future (Downar et al., 2021).

Natural disasters attributed to climate change may cause disruptions to international supply networks, resulting in shortages and higher prices for goods and services (Yang & Meng, 2020). According to a 2013 study, climate change may have a detrimental effect on the economy and could result in enormous financial losses due to floods in large coastal communities (Ghadge et al., 2020).

There could be a 2% GDP loss as a result of climate change's substantial effects on the global employment market (Downar et al., 2021). Variations in temperature, migration, urbanisation, and job opportunities are some of the factors that contribute to this. Temperature variations have the potential to impact industry production, resulting in job losses and skill shifts. There may be a manpower shortage in some areas while urbanisation and migration raise the demand for skills. Employment trends may also shift, with jobs in the fossil fuel sector declining and jobs in the sustainable and renewable energy industries perhaps rising. To create mitigation plans, it is imperative to comprehend the implications of climate change (Alshubiri & Elheddad, 2019).

Higher food prices, output of crops, and economic growth are some of the unanticipated effects of climate change on the worldwide economy (Adikari et al., 2023). Economic growth may be constrained by rising food prices resulting from decreased agricultural productivity. Long-term preparation may become challenging as a result, and consumer purchasing power may decline. Changes in the distribution of pests, the availability of water resources, and harsh weather can all have indirect financial effects. For instance, if agricultural output decreases by 10% by 2050, the world GDP may have decreased by 10% (Suh & Pomeroy, 2020). Gaining a deeper understanding of these

effects will assist businesses and governments in taking steps to lessen them and guarantee a more flexible and sustainable economy (Fremstad et al., 2019).

Same way, carbon emissions have substantial negative effects on the environment and the economy, such as altered labour markets, deteriorated infrastructure, interruptions to supply chains, and unintended consequences on agricultural output and adaptation expenses (Zen et al., 2021).

B. Carbon Emission on Business Performance

According to a study, businesses that lessen their carbon footprint see increases in their brand value, profitability, and return on investment. Better-quality brands are associated with companies that have higher CSR scores (Glavas & Visentin, 2024). Beyond just a company's ability to make money, reducing carbon footprints can increase employee engagement and retention rates. The study emphasises how crucial it is to reduce carbon footprints to be environmentally conscientious (Downar et al., 2021).

Business processes in industries including production, services, and technology that do well in social and environmental aspects (Adikari et al., 2023). The positive correlation is stronger in nations with strong environmental laws due to companies operating there are more willing to cut their carbon emissions to adhere to the law and preserve good public relations (Zen et al., 2021).

Corporations are dealing with both direct and indirect costs, such as carbon emissions and restrictions (Lai et al., 2022b). By fixing these mistakes, carbon emissions can be decreased. Inefficient practices can result in higher carbon emissions. Businesses that disregard sustainability run the risk of facing legal ramifications, hence a strong reputation and brand image (Adeleye et al., 2023). Businesses can gain a competitive edge by implementing sustainable practices since consumers are more inclined to support companies that care about the environment. (Lai et al., 2022b).

Additionally, studies have demonstrated the substantial effects that carbon emissions can have on organisations, especially with costs associated with reputation and finances (Zhang & Liu, 2023). The research found that a company's stock price dropped by $1.25 for each tonne of carbon dioxide produced (Ryszka, 2024).

This indicates that businesses could be able to avoid large financial losses if they make cutting their carbon footprint a top priority. Moreover, a study suggests that cutting carbon emissions by 10% might save up to $1.5 million in expenditures (Ghosh et al., 2020). Moreover, investigations discovered that carbon emissions might adversely affect a business's reputation, especially with environmentally sensitive clients (Lai et al., 2022b). An increasing body of evidence indicates that businesses that prioritise lowering their carbon footprint can reap significant financial and reputational rewards.

C. Carbon Emission on the Logistic Industry

The transportation industry is responsible for 12% of the world's CO_2 emissions, placing a heavy burden on the logistics sector (Sofijanic et al., 2021). By encouraging the use of renewable energy sources, recycling, and trash minimisation, green logistics may contribute to lessen its negative effects on the environment (Fremstad et al., 2019). By putting green logistics ideas into practice, businesses can potentially cut their carbon footprint by up to 20%. Other benefits of green logistics implementation include lower emissions, increased operational efficiency, and cost savings (Zhang and Liu, 2023).

To decrease its effect on the environment, the logistics industry is realising how important sustainable supply chain management is. Strategies including resource

conservation, GHG emission reduction, and promotion of sustainable behaviours are all part of SSCM (Ghosh et al., 2020). Transportation makes up to 20% of the total (Lapshin, 2023). Logistics companies may be forced to implement sustainable practices, such as eco-friendly wrapping, renewable fuels, environmentally friendly factories, and optimising modes of transportation, as a result of climate change disruptions (Yu et al., 2022). According to research, the use of sustainable practices, like green packaging, alternative fuels, and route optimisation, can lower the environmental impacts of transportation activities (Downar et al., 2021). Given how important SSCM's future is, sustainability needs to come first (Yu et al., 2022).

The logistics sector has a large carbon footprint and contributes significantly to greenhouse gas emissions (Lai et al., 2022b). The majority of worldwide CO_2 emissions are attributed to transportation-related activities, with the logistics sector contributing around 10% of these emissions (Diebel, 2023).

However, logistics organisations are unwilling to implement sustainable practices due to concerns about the added complexity and expense (Mardani et al., 2020). As a result, logistics firms must prioritise lowering their carbon footprint to lessen their impact on the environment and maintain their position as industry leaders. Approximately 9% of GHG emissions worldwide come from the logistics industry (Ghosh et al., 2020). The logistics industry is impacted by the carbon footprint in multiple ways (Ghosh et al., 2020). For example, studies have shown that using alternative fuels, like electric or hybrid vehicles, can help lower the carbon emissions related to transportation. Optimising routes will also aid in lowering transportation-related pollutants (Ghosh et al., 2020).
Furthermore, minimising energy consumption and raising energy effectiveness may be beneficial in lowering carbon emissions from warehousing and storage (Dimitrov and Saraceni, 2023). Additionally, studies have demonstrated that implementing sustainable supply chain techniques can lower carbon emissions caused by supply chain operations (Zen et al., 2021).

The study's (Ghosh et al., 2020) conclusions indicate that businesses that make cutting their carbon footprint a top priority can reap significant financial and reputational rewards (Ghosh et al., 2020). Road transport should be replaced with rail or maritime transport, according to studies, as one of the specific techniques for lowering the logistics industry's carbon footprint (Sofijanic et al., 2021). Furthermore, studies have demonstrated that lowering carbon emissions from warehouse activities can result in increased energy efficiency (Lapshin, 2023).

D. Third-party Logistic Companies (3PL Companies)

Third-party logistics organisations are outside businesses that offer other businesses supply chain management services. Among these services are delivery, storage, administration of transportation, and management of inventories (Premkumar et al., 2021). By customising these services to each customer's unique demands, businesses can outsource their administrative duties to a specialised provider and concentrate on their core competencies (Diebel, 2023).

In terms of logistics operations, a 3PL provider can provide many advantages such as lower expenses, more effectiveness, more flexibility, and better customer service. In addition, 3PL companies can offer customers certain knowledge and assets that enhance the competitiveness and productivity of their supply chains (Pratap, 2020). The need for 3PL companies has grown due to the intricate nature of global supply chains (Pratap, 2020). These suppliers offer advantages such as improved operational effectiveness,

reduced costs, and more flexibility. These service providers, especially in sectors with complicated logistical needs like medicines or e-commerce, can offer specialised knowledge, shorten lead times, save transportation costs, and improve customer service (Lapshin, 2023). Companies may focus on their core competencies, lower the risk of a supply chain disruption, and become more competitive by engaging with these providers. However, companies would find it difficult to match the capacity for expansion and adaptability provided by 3PL suppliers.

With an assortment of offerings to fulfil the expanding demands of both local and international organisations, 3PL companies have developed as a key part of the that is the logistics sector (Yu et al., 2022).The third-party logistics market has grown significantly in recent years, mostly due to the country's growing need for cost-effective and efficient logistics solutions (Perera et al., 2021).

Chartered Institute of Logistics and Transport survey results show that the nation's 3PL companies have made major investments in infrastructure, technology, and labour to provide amenities like inventory management, shipping, and warehousing (Paththinige & Rajapakse, 2021). Additionally, the companies are concentrating on offering value-added services like wrapping, packaging, and quality control to set one another apart from rivals (Sivaloganathan, 2021).

Several third-party logistics organisations are pursuing international certifications, including ISO 9001 and ISO 14001, as an additional indication of their dedication to sustainability and quality (Paththinige & Rajapakse, 2021). A combination of the country's advantageous position in the Indian Ocean and extremely educated labour collection, the 3PL industry is expected to flourish and expand in the future (Zampou et al., 2022).

E. Third-party Logistic Companies (3PL Companies)

The report emphasises how supply chain management has changed from being primarily focused on risk and compliance to being more proactive and giving sustainable development and community engagement a priority (Premkumar et al., 2021). To lower GHG emissions, improve supply chain resilience, and boost stakeholder participation, 3PL firms are implementing energy-efficient technologies, optimised transportation routes, and replacement fuels. Using sustainable practices gives you a competitive edge and financial savings (Sánchez-Flores et al., 2020).

The desire to reduce the effects on the environment, preserve social responsibility, and preserve financial stability has made sustainability a key idea in supply chain management. Over the last 20 years, as a result of changes in customer behaviour, regulatory frameworks, and technology, sustainability initiatives have shifted from following rules to adopting proactive steps that will ultimately benefit businesses and society (Zimon et al., 2019).

As per academic study articles, third-party logistics firms have implemented several tactics to mitigate their carbon emissions (Otte, 2024). One such tactic is the use of biodiesel and biofuels, which have been demonstrated to cut greenhouse gas emissions from conventional fossil fuels by as much as 80% (Diebel, 2023).

In addition, 3PL businesses are progressively implementing environmentally friendly transportation strategies, like cutting back on pointless miles and streamlining routes to save up to 15% on carbon emissions. Additionally, typical diesel vehicles' carbon emissions can be reduced by up to 70% by switching to electric or hybrid vehicles (Dimitrov & Saraceni, 2023).

3PL organisations are achieving a 30% reduction in energy consumption through energy-efficient warehouse architecture, LED lighting, HVAC systems, and automation technologies like robotics and conveyor systems, which reduce labour costs and energy consumption while boosting output and efficiency (Feng et al., 2022). Similarly, to minimise waste and carbon emissions by up to 50%, 3PL companies are using sustainable packaging materials including recyclables and biodegradable plastics (Morashti et al., 2022).

The supply chain and communication solutions are being used by 3PL organisations to boost productivity, cut costs, and improve inventory control (Pratap, 2020). Transit times are discovered to be shortened and carbon emissions are found to be reduced by 10% with real-time tracking and monitoring systems (Kalaiarasan et al., 2022).

Additionally, research indicates that by bringing collective planning and forecasting systems into place, supply chain transparency may be increased, stockouts and overstocking can be decreased, and up to 20% of carbon emissions can be avoided (Otte, 2024).

This research differentiates itself apart by concentrating on the actual application of carbon balancing techniques in 3PL companies, a subject that has received little attention in the literature present. In conclusion, this literature analysis explains carbon emissions, how they occur, how to mitigate them, and how the logistics industry and 3PL companies are involved.

IV. RESULTS AND DISCUSSION

According to the result of the literature review, most companies use renewable energy such as solar power, wind power, and rainwater as a solution. As per the literature review, carbon emissions which comprise Direct, Indirect, and Fugitive emissions have a major effect on the economy and the environment (Lai et al., 2022b). Fossil fuel burning produces direct emissions, Raw material processing produces indirect emissions, and landfills and agricultural practices produce fugitive emissions (Lai et al., 2022b). These emissions and their effects on the ecosystem are quantified by carbon footprint, expressed in CO_2 (Downar et al., 2021). Effective emission control solutions are necessary since businesses contribute more to global warming than individuals do due to their higher carbon footprints (Yang & Meng, 2020).Therefore, carbon emissions that are not checked, have the potential to have a significant negative impact on the world economy by up to 11.5% by 2100 (Zen et al., 2021). These effects could include reduced productivity, supply chain disruptions, and damage to infrastructure (Millner & Dietz, 2015). Furthermore, emissions-driven climate change has an impact on food security, natural resources, and the labour market, leading to job losses and economic instability (Downar et al., 2021). Achieving sustainable development objectives and reducing these effects require smart technological investment, policy support, and stakeholder involvement (Yang & Meng, 2020).

The significance of carbon emissions for 3PL businesses in for reducing their environmental impact is covered in the article. By making investments in renewable energy sources, cutting waste enhancing recycling, and implementing eco-friendly transportation practices, 3PL businesses can implement carbon emission measures (Otte, 2024). Performing an environmental impact assessment, purchasing solar or wind turbines, cutting energy use, creating waste reduction plans, working with clients, implementing eco-friendly transportation options, and streamlining routes and timetables are just a few of the suggestions (Guerrero-Lucendo et al., 2022). Implementation of

carbon emissions will assist the economy by reducing costs and enhancing brand reputation in addition to promoting environmental sustainability (Sánchez-Flores et al., 2020). Engaging with stakeholders, such as suppliers, staff, and customers, is crucial for 3PL businesses to make sure that everyone is working towards the same sustainability objective (Morashti et al., 2022). Governments and regulatory agencies can be extremely important in this regard by offering rewards to businesses that use sustainable practices and enforcing punishments against those that don't (Karaman et al., 2020).

V. CONCLUSION

According to previous research, the logistics industry significantly contributes to carbon emissions (Karaman et al., 2020). Likewise,3PL companies are involved in using fossil fuels for their operations in addition to that at present government, stakeholders and other parties mostly demand sustainability practices (Abbasi et al., 2021). As a result, many 3PL companies move to use environmentally friendly strategies (Zampou et al., 2022). The research focuses on how different carbon emission reduction strategies affect 3PL companies' sustainability. The purpose of the present investigation is to solve the absence of knowledge on carbon emissions in the third-party logistics sector. The research is necessary to identify the importance of sustainability practices in the 3PL sector. Engaging important stakeholders will yield insightful information for companies looking to cut their environmental impact cost-effectively and reasonably.

It highlights the necessity of raising funding for carbon management technology, establishing relationships with environmental groups, and creating laws that are supportive of them. It also highlights how crucial it is to inform interested parties about the advantages of carbon emissions to promote national and international environmental goals. By analysing the carbon emissions strategies used by 3PL enterprises, this study seeks to promote environmentally responsible business practices, sustainable logistics practices, and economic growth. We are only using literature review methods here but can do an empirical study using both qualitative and quantitative techniques that can potentially be used to further improve this. Furthermore, 3PL firms can have a better understanding of the impact of carbon emissions by investigating the primary contributors to carbon emissions of other logistic industries, as well as the practices and potential difficulties. Although a wide range of studies are covered in this review, there are certain limitations to be aware of. While looking at carbon emissions for sustainability, 3PL companies should receive particular attention. Furthermore, even though the companies had revealed their carbon emission strategies, there remained a dearth of transparency. In finding out which 3PL companies are implementing strategies to maintain good sustainability inside the organisations, according to information we had from previous research publications. This is due to the lack of application in the Sri Lankan context.

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