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Fleet of the Future: A Balancing Act

An exploratory case study of what factors and strategies that contribute to balancing economic and environmental impact in an electric HDV fleet system

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Abstract: As one of the largest emitters of carbon dioxide, the transportation industry is undergoing a significant transition, where Electric Heavy-Duty Vehicles (HDVs) emerge as a promising solution. However, regardless of their potential in emission reduction, electric fleets do not inherently guarantee environmental sustainability. Consequently, fleet managers must navigate a complex landscape to balance environmental sustainability and economic viability in electric HDV operations. Drawing on Resource Orchestration Theory (ROT), this thesis investigates what factors and strategies contribute to balancing economic and environmental impact within the electric HDV fleet system. A qualitative case study was employed, combining interviews and observations at Company X to capture insights across the organization. The findings reveal eight interrelated factors and strategic areas that influence the balance of economic and environmental impact in an electric HDV fleet system. By developing a conceptual framework, the study demonstrates how *Industrial Environment Configuration* and *System Optimization* can be orchestrated to achieve this balance. This thesis contributes to the early developed literature on electric fleet management by extending ROT into a sustainability context, illustrating how such processes enable firms to achieve sustainable impact without compromising on profitability. Practically, it provides actionable insights for fleet managers and practitioners seeking to realize the true benefits of electric freight by optimizing the system from an economic and environmental standpoint.

Keywords: Electric Fleet Management, Resource Orchestration Theory, Sustainability.

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Term	*Definition*
Electric HDV (Heavy-Duty Vehicle)	Battery-electric trucks which are used for freight transportation. Characterized by having one of the lowest lifecycle impact on the climate (Gillström, 2024).
Electric Fleet Management	The strategic management of electric HDVs within a logistics system, including how they are acquired, developed, and deployed (Redmer, 2016).
Resource Orchestration Theory (ROT)	A theoretical framework describing how firms structure, bundle, and leverage their resources to achieve performance outcomes (Sirmon et al., 2011).
Original Equipment Manufacturer (OEM)	Manufacturer and supplier of electric HDVs.
Carrier	Transporter of goods from one location to another.
Shipper/Customer	The owner of the goods that initiates the process of transportation.
Lifecycle Emissions	Total amount of emissions associated wth a vehicle throughout its lifecycle, including production, use, and disposal (Lal et al., 2023).
Vehicle Utilization	A metric measuring a vehicle's operational capacity through distance traveled or time in service (Shi et al., 2019).
Buyback Agreement	Contractual agreement with an OEM supplier enabling a swap option (Ansaripoor & Oliveira, 2018).
Service Level Agreement (SLA)	Agreement defining the expected level of service.

1. Introduction

Climate change is one of the most challenging global threats, driving international efforts to reduce greenhouse gas emissions and shift to more sustainable practices. The transport sector is one of the largest contributors to carbon emissions, accounting for 23.8% of total emissions in the European Union (EU). With this, Heavy-Duty Vehicles (HDVs) alone contribute to over 6% (European Parliament, 2024; European Commission, n.d.). In response to global sustainability goals (United Nations, 2025), the transportation industry is undergoing a significant transition, marked by a growing demand for sustainable freight solutions (Shi et al., 2019). Electric HDVs are increasingly regarded as a viable alternative to diesel vehicles in freight transport driven by advancements in battery technology, stricter emissions regulations, and growing societal pressure for sustainability (Al-Hanahi et al., 2021). However, despite their potential to reduce transport-related emissions electric fleets do not inherently guarantee sustainability. Fleet operators must still implement strategic measures to optimize operations and balance environmental and economic outcomes. Such efforts are essential not only to realize the full benefits of electric freight (Gillström, Jobrant, et al., 2024) but also to maintain long-term competitiveness (Andersson et al., 2022). Consequently, fleet managers must navigate a complex and evolving operational landscape, where achieving an optimal balance between environmental sustainability and economic viability in electric HDV operations remains a significant challenge.

Electric HDVs entail higher upfront acquisition costs compared to diesel, necessitating innovative financing models alongside government support in the form of subsidies, tax incentives, and favorable depreciation schemes to improve cost-effectiveness (Gillström, 2024; Danielis et al., 2025). From an environmental standpoint, the evaluation of Battery-Electric Vehicle (BEV) acquisitions extends beyond cost to include lifecycle emissions, environmental impact from production, and end-of-life strategies (Lal et al., 2023). These considerations introduce additional layers of complexity to fleet investment and disposal decisions. Additionally, constraints such as limited driving range, capacity constraints and charging requirements demand more complex route optimization (Al-Hanahi et al., 2021), further limiting flexibility and opportunities for freight consolidation. To achieve operational efficiency and high fleet utilization (Shi et al., 2019), transport planning must be supported by data-driven tools and software solutions (Dintén et al., 2023; Dönmez et al., 2022) to secure both economic feasibility and minimal environmental impact (Alarcón et al., 2023). Ultimately, these factors add significant complexity to electric fleet operations by slowing adoption, introducing trade-offs, and complicating integration into existing fleet management systems.

Existing research on electric fleet management reveals several limitations and gaps. Gillström, Jobrant et al. (2024) underscore the need for a deeper understanding of how sustainability influences system performance and the effects of electric truck adoption on sustainability outcomes. Given the lack of studies addressing the balance between economic and environmental impact in electric fleet systems, this research aims to enhance understanding of how to realize the economic and environmental potential of these systems. Moreover, as electric fleet management remains an emerging field, both practical and theoretical insights are needed to bridge current empirical gaps concerning the impact of electric HDV adoption on logistics systems (Gillström, 2024; Alarcón et al., 2023). In particular, there is an increasing need to understand how electric freight operations disrupt traditional logistics configurations where system performance has long been a cornerstone of the sector.

To address these gaps and explore the factors and strategies that contribute to balancing economic and environmental impact in an electric HDV fleet, this thesis adopts a resource-based perspective. Building on Wernerfelt's (1984) conceptualization, the electric HDV fleet is viewed as a system of interdependent resources that must be strategically managed to optimize performance. *Resource Orchestration Theory (ROT)* provides a useful framework for understanding how firms manage their resources to gain competitive advantage (Sirmon et al., 2011). However, Andersén (2023) suggests that ROT can be applied to achieve both economic and environmental benefits, implying that the theory can aid in understanding how to balance these elements. Still, research on how specific ROT processes can be managed to balance the economic and environmental benefits remains limited (Andersén, 2023). In this context, Soleymanzadeh & Hajipour (2025), further emphasize the need for additional research on a range of related topics. Accordingly, examining how an electric HDV fleet system can be strategically orchestrated to generate both environmental and economic impact represents a timely and valuable opportunity to deepen understanding of managing ROT processes for dual benefits.

1.1. Purpose & Research Question

The purpose of this study is to investigate what factors and strategies that contribute to balancing the environmental and economic impact within electric HDV fleet systems in the transportation and logistics industry in Sweden. Drawing on *Resource Orchestration Theory (ROT)*, the study analyzes how these factors and strategies influence the ability of firms to align environmental goals with economic performance. To explore this, a single case study of Company X's electric HDV fleet is conducted, using interviews and participant observations with relevant stakeholders to collect empirical data. Based on this research aim the following research question has been formulated:

What are the factors and strategies that contribute to balancing the economic and environmental impact in electric HDV fleet systems?

1.2. Contribution

This study aims to provide both practical and theoretical contributions. On a practical level, it offers insights for fleet managers and practitioners in the transportation and logistics industry seeking to navigate an electric HDV fleet system from both economic and environmental perspectives. Theoretically, the study contributes to the field of electric fleet management and sustainability by addressing the research gap concerning strategically balancing environmental and economic impact. Furthermore, it extends the application of ROT by demonstrating how the framework can be used in the context of electric HDV fleet systems. In doing so, it adds to the limited research applying ROT to sustainability-oriented contexts by highlighting how firms can orchestrate resources to achieve balance between economic and environmental benefits.

1.3. Delimitations

To fulfill the purpose of this study, several delimitations have been made. First, the study is geographically limited to Sweden, as aspects of electric fleet management are influenced by national factors such as governmental incentives, infrastructure availability, energy and vehicle supply, and cultural attitudes toward sustainability. Second, the research focuses exclusively on

Company X, an electric freight company operating a fleet of electric HDVs. To the authors' knowledge, Company X is one of the few firms in Sweden with a sufficiently large electric fleet to support an in-depth analysis. Accordingly, all references to electric trucks or BEVs in this thesis refer specifically to electric HDVs. Third, the electric HDV fleet of Company X is conceptually treated as a system of interrelated resources that must be strategically managed to achieve desirable environmental and economic outcomes. Finally, the study focuses only on the environmental and economic dimensions of sustainability, while the social dimension is excluded from the research scope.

2. Literature Review

The following chapter reviews the literature on (2.1.) Electric fleet management, (2.2.) The Concept of Sustainability, and (2.3.) Managing Resources. The research gap is further described in section (2.4.) prior to the presentation of the theoretical framework in section (2.5.).

2.1. Electric Fleet Management

According to Redmer (2016), strategic decision-making in fleet management revolves around three key areas: vehicle investment, operational optimization, and fleet replacement strategies. Traditionally, fleet optimization models have been developed to minimize long-term costs for diesel vehicles (Redmer 2022; Beaujon & Turnquist, 1991). However, as the logistics and transport sectors remain significant contributors to global greenhouse gas emissions, fleet strategies increasingly need to integrate sustainability objectives alongside cost considerations (Shi et al., 2019). One of the most prominent alternatives in sustainable transportation is the adoption of BEVs (Gillström, Jobrant et al., 2024; Lebeau et al., 2015). The transition from diesel trucks to BEV trucks introduces new layers of complexity into supply chain and logistics management. This includes adjustments to fleet operations, energy infrastructure and planning processes to ensure BEV adoption is both operationally and economically viable (Alp et al., 2022). Several scholars highlight these challenges. For instance, Gillström, Jobrant et al. (2024) and Alarcón et al. (2023) call for more research into how electric HDVs affect logistics systems. Malladi et al. (2022) further emphasize that a key difficulty lies in developing strategies that reduce environmental impact without compromising economic performance. This tension underscores the importance of finding solutions that make BEV transitions financially viable while preserving operational reliability and efficiency. In this context, Gillström, Jobrant et al. (2024) and Gillström (2024) further highlight the need to explore how logistics performance is shaped by the adoption of electric trucks and what effects an electric fleet system has on broader sustainability outcomes.

2.1.1. The Economic & Environmental Considerations of Fleet Investments

Fleet management begins with vehicle acquisition, a process traditionally guided by make-or-buy decisions (Nikolarakos & Georgopoulos 2001; Maltz & Ellram 1997). Historically, purchasing used vehicles has been the most cost-effective strategy due to lower upfront costs (Kampf et al., 2016). However, electric HDVs require significantly higher initial investments, shifting the economic calculation for fleet operators (Danielis et al., 2025). In response to this, many operators favor leasing electric HDVs, largely due to uncertainty surrounding residual values, technological developments, and battery performance over time (Gillström, Björklund et al., 2024). Leasing options with buyback agreements also help mitigate risks related to battery degradation and evolving vehicle capabilities. Additionally, when combined with robust lifecycle management processes, leasing can also support environmental sustainability by ensuring better utilization and end-of-life handling of vehicles (Ansaripoor & Oliveira, 2018). From a sustainable perspective, BEV acquisition should be evaluated beyond cost and short-term performance. Key factors include lifecycle emissions, the environmental footprint of battery production, and end-of-life recycling and repurposing strategies (Lal et al., 2023). In this regard, scholars argue that integrating circular economy principles such as battery repurposing for energy storage or vehicle manufacturing, can enhance both sustainability and long-term fleet value (Cui et al., 2024). Additionally, the financial feasibility of BEV acquisition is shaped not only by purchase-versus-leasing decisions but also by external mechanisms such as government subsidies, tax incentives, and depreciation models (Gillström, 2024; Danielis et al., 2025). Policy instruments including carbon taxes, carbon credit incentives, and emissions standards increasingly support BEV adoption by improving the total cost of ownership (Gillström, Björklund, et al., 2024). Ultimately, these factors collectively shape how firms assess the economic and environmental viability of electric HDV investments.

2.1.2. Optimizing Fleet Operations: Balancing Economy & Environment

Effective fleet operations are influenced by demand fluctuations (Redmer, 2022) and rely on route optimization, vehicle scheduling and energy management strategies to ensure operational viability (Alarcón et al., 2023). A foundational approach to optimization is the Vehicle Routing Problem (VRP), originally developed to reduce mileage and costs (Dantzig & Ramser, 1959).

Modern adaptations such as Mixed Fleet VRP (MFVRP) and Electric VRP (eVRP) integrate battery constraints, charging schedules, and grid dependencies to reflect the realities of electric vehicle operations (Dönmez et al., 2022). Technological advancements further support this optimization through enabling real-time monitoring of driver behavior, energy consumption, and vehicle location that generates data supporting informed decision-making (Dintén et al., 2023). By leveraging such technologies, fleet managers can enhance operational efficiency and sustainability through improved knowledge sharing and data-driven planning. However, capacity still remains a major challenge for electric HDVs. Compared to diesel vehicles, they typically offer reduced payload capacity and limited freight consolidation opportunities which can diminish their environmental benefit (Al-Hanahi et al., 2021). One other critical factor is vehicle utilization, as underutilized trucks lead to higher emissions per unit transported (Shi et al., 2019). Research suggests that BEV fleets are most effective in high-utilization, short-haul, and last-mile delivery contexts, where frequent charging and low energy consumption enhance overall performance (Castillo & Álvarez 2023).

Furthermore, access to charging infrastructure is seen as an operational challenge, where BEV feasibility is heavily influenced by regional grid capacity and electricity availability (Alp et al., 2022). Fleet operators must therefore consider infrastructure accessibility and cost-effectiveness when planning electrification strategies (Imre et al., 2021). This includes assessing electricity pricing models, optimal charging times and load-balancing strategies to minimize peak-hour demand and associated costs (Castillo & Álvarez, 2023). Moreover, the environmental impact of the charging infrastructure must be considered. While its expansion supports BEV adoption, unregulated charging peak periods can increase reliance on fossil-fuel-based energy sources, undermining carbon reduction efforts (Al-Hanahi et al., 2021). Government incentives, such as subsidies and off-peak charging regulations, play a critical role in reducing investment burdens and supporting more sustainable charging behaviors (Al-Hanahi et al., 2021). As Gillström, Jobrant et al. (2024) argue, further research is needed to understand how logistics planning evolves when charging infrastructure is explicitly factored into operational strategies.

2.1.3. Fleet Replacement Strategies & Lifecycle Considerations

Fleet replacement decisions significantly affect both cost management and environmental sustainability. The replacement theory of capital equipment, first introduced by Eilon et al., (1966), provides a foundation for determining optimal vehicle lifespans using cost-benefit analysis. In the context of electric HDVs, replacement strategies must account for battery degradation, recycling potential, and uncertainty around long-term vehicle performance (Zhou et al., 2023). This concern aligns with Hartman & Tan's (2014) call for more research into challenges associated with uncertain replacement timing, such as that introduced by variable battery lifespans. Cui et al. (2024) further argue that integrating battery repurposing into fleet replacement planning can reduce lifecycle costs, support sustainability goals and facilitate technological upgrades. One key consideration is how the frequency of vehicle turnover impacts both economic and environmental outcomes. For example, fleet managers must assess whether to intensify the use of electric HDVs within a shorter timeframe or extend lifespans through lighter usage and maintenance strategies (Koh et al., 2016). However, due to the relative novelty of electric HDVs, limited aftermarket infrastructure and evolving disposal alternatives, identifying the optimal replacement timing remains highly complex (Alp et al., 2022).

Another relevant factor is the maintenance of BEVs. Due to having fewer moving parts than diesel vehicles they generally involve lower maintenance costs and can support longer operational lifespans (Alanazi, 2023). As a result, proactive maintenance plays a crucial role in minimizing costs and environmental impact. Fleet operators can benefit from maintaining rigorous service schedules to prevent premature replacements and resource inefficiencies. Neglecting these aspects can increase operational risks, including insufficient vehicle availability, higher costs, and increased environmental footprints due to additional resource use (Crespo del Castillo & Parlikad, 2024; Maletic et al., 2015). Hence, a data-driven approach to maintenance and fleet health monitoring can help address these challenges through sensors and algorithms that keep track of the vehicles' health and performance (Crespo del Castillo & Parlikad, 2024). This further facilitates a more data-driven strategy regarding the fleet's economic and environmental impact over the vehicles' lifecycles, assists in ensuring the efficiency and reliability of the fleet (Alanazi, 2023).

2.2. The Concept of Sustainability

2.2.1. Sustainability: A Burden or Benefit

In the 1960s, Keith Davis phrased one of the earliest definitions of Corporate Social Responsibility (CSR) describing it as *"Businessmen's decisions and actions taken for reasons at least partially beyond the firm's direct economic and technical interest"* (Davis, 1960, pp. 70). Since then, numerous definitions of CSR have emerged (Carroll, 1979; McWilliams & Siegel, 2001), but there remains ongoing debate regarding the role firms should play in addressing societal issues. A contrasting view was famously presented by Milton Friedman, who argued that *"There is one and only one social responsibility of businesses - to use its resources and engage in activities designed to increase its profit so long as it stays within the rules of the game, which is to say that, engages in open and free competition without deception or fraud"* (Friedman, 1970). While these early debates focused on whether firms should engage in social or environmental responsibility at all, the conversation has since shifted. Increasing global environmental challenges and heightened stakeholder expectations have pushed firms to reduce their environmental footprint, not merely as a moral obligation but as a strategic necessity to remain competitive (Andersson et al., 2022). Today, the question is less about whether sustainability should be integrated and more about the degree to which it must be embedded into core business strategies.

In this context, the link between sustainability efforts and economic performance has been extensively discussed under the concept of the business case for sustainability. Scholars have examined whether engaging in sustainability initiatives leads to measurable economic gains (Maletic et al., 2015; Busch et al., 2024; Yadav & Mankavil Kovil Veettil, 2022). Maletic et al. (2015) argue that companies adopt sustainability practices not out of normative concerns but because such actions must contribute to competitiveness and profitability. While this logic may apply to many firms, levels of sustainability commitment vary significantly depending on industry context and strategic orientation. Some companies have embraced sustainability as an integral part of their value proposition and business model (Luzzini et al., 2015; Engert et al., 2016). Prior empirical research has reported mixed results regarding the relationship between sustainability and firm performance. Some studies indicate a positive correlation (Wagner, 2010; Albertini, 2013), while others report either a negative relationship or no clear association at all (Horváthová, 2010).

Despite this ambiguity, firms continue to pursue sustainability goals although it presents substantial challenges. Luo et al. (2020) note that balancing economic and environmental performance remains difficult yet increasingly necessary. In response, companies seek strategic configurations where environmental improvements align with financial performance. Van der Byl & Slawinski (2015) refer to this as the search for "win-win" solutions that allow firms to pursue sustainability without compromising profitability. However, as Maletic et al. (2015) emphasize, there is still limited understanding of how firms can practically achieve this balance.

2.2.2. Balancing Economic & Environmental Impact

The concept of Triple Bottom Line (TBL), proposed by Elkington (1997), emphasizes that true sustainability is achieved when social, environmental, and economic dimensions are considered equally. As a consistent construct, TBL assumes equal weighting among the three pillars, placing pressure on firms to perform across each area simultaneously (Elkington, 1997). Thus, TBL aims to more accurately value assets and leverage resources in order to make sure that the capital is employed as effectively and efficiently as possible by providing a measurement framework for the performance and success of businesses (Hammer & Pivo, 2017).

In the context of electric fleet management, balancing economic and environmental objectives depends heavily on how efficiently resources are acquired, developed, and deployed (Redmer, 2016). Although research explicitly linking electric HDV fleet management to sustainability remains limited, studies in related fields such as supply chain management have consistently shown strong connections between operational efficiency and environmental performance (Huo et al., 2019; Wojtkowiak & Cyplik, 2020; Magon et al., 2018). These studies suggest that responsible resource use, reduced waste and extended resource lifecycles contribute to both improved environmental outcomes and cost savings. For instance, Koh et al. (2016) argue that resource optimization enhances environmental performance while Maletic et al. (2015) highlight its financial benefits. Nonetheless, trade-offs often emerge in practice. According to Andersén

(2023), strategic actions significantly influence the level of sustainability a firm can achieve, given its available resources. As a result, the balance between economic and environmental performance is shaped both by what a firm possesses and how it chooses to act. Sustainability, in this view, is not only a question of resource availability but of resource orchestration.

2.3. Managing Resources

2.3.1. The Origin of Resource Literature

The literature on resources has a long history, where research goes back to The Penrosean Theory (Penrose, 1955) suggesting linkages between a firm's resource utilization, productive opportunities and profitable growth. Despite this early work, resources received limited attention in literature at the time, until the emergence of the Resource Based View (RBV) decades later. RBV emerged as a complement to the industrial organization (IO) perspective by asserting that firm performance is primarily driven by internal resources rather than external industry structure (Bain, 1968; Porter, 1979; Mahoney & Pandian, 1992). Additionally, Grant (1996) later extended the earlier resource theory with the Knowledge-Based View (KBV) and meant that knowledge also can be seen as a key strategic resource and the primary source of competitive advantages.

Nonetheless, across the literature, resources are commonly defined as tangible or intangible assets semi-permanently associated with the firm (Caves, 1980; Maijoor & Witteloostuijn, 1996; Spanos & Lioukas, 2001). Wernerfelt (1984) further categorized resources to include firm attributes such as knowledge, technology, organizational processes, capital, personnel, and physical assets. While early definitions often treated resources and capabilities interchangeably, later literature established a clearer distinction. Amit & Schoemaker (1993) emphasized that resources are assets controlled by the firm, whereas capabilities refer to the firm’s capacity to deploy and integrate those resources effectively. This focus on how resources are mobilized led to further theoretical development where Teece et al. (1997) introduced the concept of *Dynamic Capabilities,* addressing a key limitation of RBV as its inability to explain how firms maintain competitive advantage in rapidly changing environments.

2.3.2. The Rise of Resource Orchestration Theory

In response to critiques of the RBV and the concept of Dynamic Capabilities, scholars began to emphasize the role of managerial action in realizing the value of firm resources. These developments led to the emergence of Resource Management (RM), which integrates insights from both RBV and the Knowledge-Based View (KBV) to explain how firms transform resources into value (Soleymanzadeh & Hajipour, 2025; Mahoney, 1995; Priem & Butler, 2001; Sirmon & Hitt, 2003). RM highlights that superior performance depends not only on possessing valuable resources (Hansen et al., 2004), but also on how those resources are integrated and deployed (Mahoney, 1995; Priem & Butler, 2001; Sirmon et al., 2007). In parallel, the concept of Asset Orchestration (AO) emerged, building on the interaction between KBV and Dynamic Capabilities (Teece, 2007; Helfat & Peteraf, 2003; Helfat et al., 2007). AO focuses on the strategic processes by which firms create, extend, and modify their resource base to maintain competitiveness in dynamic environments. These decisions involve bundling and reconfiguring assets to generate value, especially in the face of change (Sirmon & Hitt, 2009). Furthermore, in the light of nascent research in RM and AO Sirmon & Hitt (2009) empirically indicate combining these two frameworks to achieve superior firm performance. From this view, *Resource Orchestration Theory* (ROT) emerged from the work of Sirmon et al., (2011) when aiming to address the managerial aspect of realizing the potential of strategic resources. By integrating the two frameworks and considering a more comprehensive review under ROT, Sirmon et al. (2011) provide a basis for further empirical work in the areas of capability and resource-based logic.

2.3.3. Previous Literature & Critique of Resource Orchestration Theory

Following the foundational work of Sirmon et al. (2011), a growing body of research has emerged around ROT. Soleymanzadeh & Hajipour (2025) identify five dominant themes in this literature, including entrepreneurship and innovation, supply chain management, information technology, intangible resources, and small firm performance. While this reflects the broad applicability of ROT, it also highlights fragmentation in the field. As such, Soleymanzadeh & Hajipour (2025) call for additional research to address remaining empirical gaps by noting that ROT remains a relatively nascent framework. For instance, Soleymanzadeh & Hajipour (2025) state that *"further research could focus on unpacking the "black box" between organizational resources and performance".* Thus, understand how to develop and implement business-level strategies for superior firm performance.

As mentioned, several studies have emphasized the link between supply chain management and achieving superior firm performance based on ROT (Queiroz et al., 2022; Gong et al., 2018; Wong et al., 2018). Much of this work emphasizes the role of technology, IT and data in enabling effective resource orchestration (Queiroz et al., 2018; Liu et al., 2016; Mohaghegh et al., 2024). Other studies have explored connections between ROT and supply chain resilience (Queiroz et al., 2022; Chunsheng et al., 2019) and sustainability-related objectives (Gong et al., 2018; Wong et al., 2018). However, direct applications of ROT within the context of fleet management remain largely absent from the literature, despite the integral role of fleet operations within broader supply chains. This presents an opportunity to explore how resource orchestration principles might support superior performance in electric fleet management.

Another related and increasingly relevant area of research investigates the intersection between ROT and sustainable development. Although ROT was originally designed to explain economic value creation from a firm-level perspective, recent work has begun to extend its application to environmental performance (Soleymanzadeh & Hajipour, 2025; Andersén, 2023). Several studies are now examining how ROT processes might help firms limit their environmental footprint while maintaining competitiveness (Andersén, 2023; Wong et al., 2018). This reflects a broader shift in managerial priorities, as environmental sustainability becomes an essential component of overall firm performance, driven by rising environmental expectations and stakeholder pressures (Andersson et al., 2022). In this evolving context, ROT's foundational assumption of purely economic value established by Sirmon et al. (2011) is expanded to accommodate sustainability, however, the proposition of economic performance remains the central role.

Nonthelsess, Andersén (2023) has been particularly influential in this shift, arguing that ROT can provide a useful lens for understanding environmental management practices. Some studies support this view by exploring ROT's impact on environmental performance (Andersén et al., 2020; Chavez et al., 2021), while others focus on the critical role of managing resources (Tatoglu et al., 2019; Andersén, 2021). In attempting to extend ROT's original scope, Andersén (2023) proposes that firms can simultaneously generate economic and environmental value through strategic resource orchestration. In this light, Andersén (2023) suggests that further research should look into how specific ROT processes can be managed to achieve economic as well as environmental benefits.

2.4. Synthesis and Research Gap

This literature review reveals that research on electric fleet management remains limited, particularly regarding how firms can balance economic and environmental impact within electric HDV systems. Gillström, Jobrant et al. (2024) and Alarcón et al. (2023) point to significant research gaps in understanding the adoption of electric HDVs in logistics operations. The introduction of electric fleets challenges traditional logistics configurations, where system performance has long been central to the sector. Moreover, there is a noted lack of empirical studies using primary qualitative data to investigate these shifts, which this study aims to address (Gillström, Jobrant et al. 2024). Specifically, prior research has called for deeper insight into how logistics performance is affected by electric truck adoption, and how electric fleet systems influence sustainability outcomes (Gillström, Jobrant et al., 2024; Gillström, 2024).

At a broader level, Maletic et al. (2015) highlight the need to understand how organizations can optimize performance while balancing environmental and economic impact. This raises important questions about how firms can manage this balance strategically in the context of electric fleet management. ROT offers a promising lens for addressing this challenge. However, Andersén (2023) emphasizes that more research is needed to explore how specific ROT processes can be leveraged to achieve both economic and environmental outcomes. This aligns with broader critique from Soleymanzadeh & Hajipour (2025), who stress that ROT remains underdeveloped in several areas and call for empirical studies to unpack the "black box" between resource orchestration and firm performance. All in all, by connecting the research gaps highlighted above, an interesting area of study emerges. Understanding what factors and strategies contribute to balancing economic and environmental impact in an electric fleet system with the help of ROT practices is crucial for advancing both theory and practice.

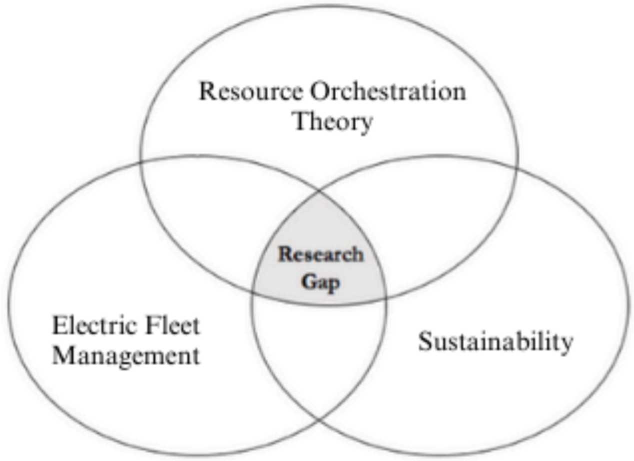

Figure 1: Research Gap

2.5. Theoretical Framework

Following Wernerfelt's (1984) conceptualization of strategic resources, this study views the electric HDV fleet as a system of resources that must be strategically orchestrated to optimize overall performance. In the context of electric fleet operations, performance is no longer defined solely in economic terms. Fleet managers must also meet environmental performance objectives, which requires them to navigate complex decisions (Malladi et al., 2022). These include selecting vehicles based on lifecycle performance, planning routes within charging constraints, managing utilization and capacity, and addressing end-of-life considerations (Al-Hanahi et al., 2021). Given the impact of these factors on both economic and environmental performance, it is crucial to identify the strategies that enable a balance between the two, yet prior research has shown that achieving this remains a significant challenge (Gillström, Jobrant et al., 2024; Gillström, 2024; Alarcón et al., 2023).

To explore this challenge, this study applies ROT, drawing on Andersén's (2023) proposition that ROT can be used to generate both economic and environmental value. ROT offers a framework for examining not only the configurations of electric HDV fleet as a system of resources but also the managerial actions that shape the strategic aspects of resources. Ultimately, this theoretical lens facilitates a deeper understanding of the trade-offs and synergies involved in balancing economic and environmental impact in the system and assists in answering the research question.

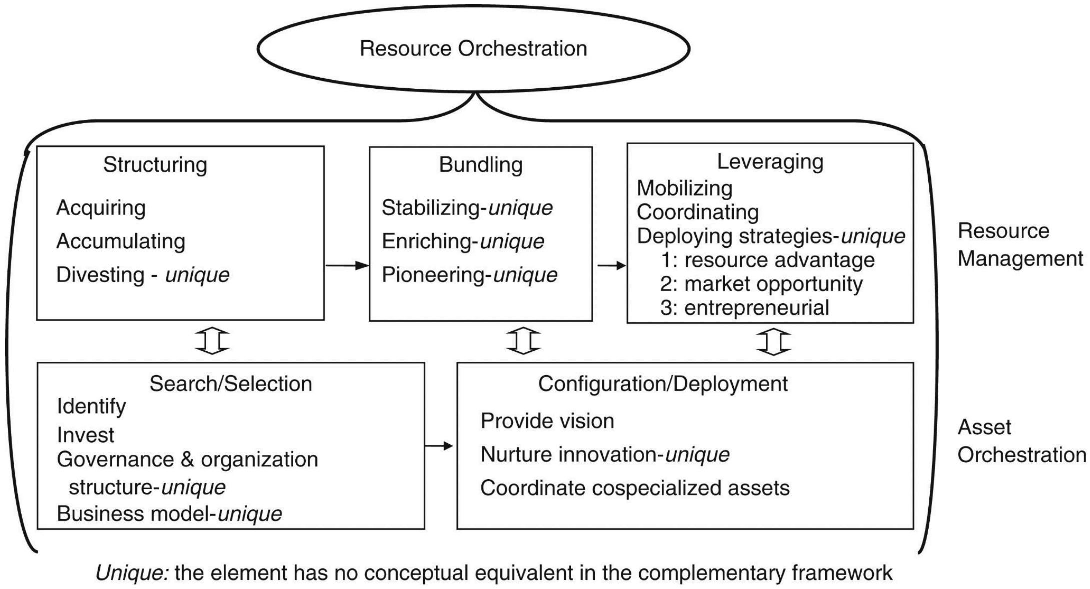

Figure 2: Resource Orchestration Theory Framework by Sirmon et al. 2011

The framework developed by Sirmon et al. (2011) consists of three primary ideas involving *structuring* the portfolio of resources, *bundling* resources to build capabilities, and *leveraging* capabilities in the marketplace for value creation. Each idea includes specific subprocesses that require coordination to enable value creation and sustained performance. *Structuring* involves acquiring, accumulating, and divesting to shape the fleet system. *Bundling* refers to stabilizing, enriching, or pioneering capabilities, which involves integrating resources to form capabilities. *Leveraging* includes mobilizing, coordinating, and deploying capabilities to achieve performance outcomes, focusing on how fleet resources are used in practice to generate value. Further, ROT also incorporates two overarching orchestration processes, where the *search/selection* process involves identifying, investing in, and organizing around valuable resources. The *configuration/deployment* process focuses on aligning and coordinating co-specialized resources, promoting innovation, and ensuring coherent execution. (Sirmon et al., 2011).

In sum, the theoretical framework presents the idea that an electric HDV fleet system can be orchestrated to achieve both economic and environmental impact. By applying ROT to this empirical setting, the study aims to explore how the theory applies in an empirical context of electric fleet systems to achieve a strategic balance between economic and environmental impact.

3. Methodology

In the following section, the scientific research approach and process will be presented by first introducing (3.1) the methodological fit, (3.2.) study design, (3.3.), data collection method, (3.4.) the method for data analysis, and last (3.5.) the quality of the study will be clarified.

3.1. Methodological Fit

Given the novelty of electric fleet management research, its intersection with resource orchestration theory and the strategic balancing of economic and environmental objectives remains unexplored in academic literature. Specifically, there is a limited understanding of how companies orchestrate their resources to adapt electric fleet management strategies while ensuring economic and environmental impact. Considering this, an exploratory study has been conducted to generate new insight into this novel phenomenon (Neuman, 2014). By trying to understand "*What are the factors and strategies that contribute to balancing the economic and environmental impact in electric HDV fleet systems?"*, this thesis delved into this nascent field with an open mind. Given the evolving nature of electric fleet strategies, a qualitative approach is therefore more suitable than a quantitative one, as it allows for an in-depth examination of how firms orchestrate their resources (Edmondson & Mcmanus, 2007).

Considering the nature of reality, this thesis takes its ontological stance in constructionism, where the authors have viewed the world as shaped by social actors through interactions, constantly changing (Bell et al., 2019). This perspective recognizes resources, practices, and strategies as continuously evolving to influence the world around them when new technologies, competition, and sustainable pressure change, further allowing this research to understand the phenomena in its context. Moreover, from an epistemological standpoint, this study adopts an interpretivist perspective, recognizing valid knowledge and the researcher's role as closely linked to the phenomena being studied, where knowledge is derived from subjective evidence (Collis & Hussey, 2014). This allowed the authors to view reality from key organizational members possessing knowledge, influencing electric fleet management in the organization.

Furthermore, as this research concerns both an empirical and academic gap that is rather nascent, an abductive approach enabled the authors to have an iterative knowledge creation process between theory and empirics (Bell et al., 2019). Even though a nascent phenomenon of balancing economic and environmental impact in electric fleet management might call for a more inductive approach, the authors could not ignore prior research in the fields of electric fleet management, ROT, and sustainability, as well as the authors' pre-understandings. However, by viewing this research as a continuous dialogue between the data and the authors' pre-understandings, Alvesson & Kärreman (2007) mean that this is essential for allowing the researchers to stay open-minded to insights from the data rather than merely using it to validate prior assumptions. Even though many researchers mean that pre-understandings influence objectivity and are seen as a source of biases ultimately shaping knowledge production, the authors of this study argue that developing knowledge about this phenomenon is facilitated by pre-understandings (Alvesson & Sandberg, 2021). By being aware of potential biases and continuously reflecting on the author's role in the study (Lincoln & Guba, 1985), the necessity of pre-understandings generates an iterative process to the phenomena under study in line with the abductive approach. Hence, following Alvesson & Sandberg (2021) view, this study recognizes that pre-understandings bring positive effects to knowledge development.

3.2. Design of Study

Considering the research aim to gain an in-depth understanding of the novel phenomenon under research, the study adopted a single-case study design as a suitable approach (Bell et al., 2019). Thus, investigating an electric HDV fleet system, undertaking a single-case study emerged as the natural choice of study design as this provided a holistic approach for further research into this phenomenon (Yin, 2013). This enabled exploration of the *"What?"* behind electric fleet management in an empirical context, which assists in better understanding both the electric HDVs and the strategies influencing economic and environmental impact. Even though a single-case study may limit the generalizability as it focuses on understanding the complexities of a specific case in the real world (Bell et al., 2019), Flyvbjerg (2006) argues that this is overemphasized as a common misconception. He means that a single-case study is essential for social science development and that it has an important role in sound research development (Flyvbjerg, 2006). However, by undertaking a single-case study, the researchers have been well aware of the potential limitations of generalizability of the results and rather aim at setting out analytical interference. Regardless, considering the scarcity of prior research, it is argued that a single-case study still has the potential to best contribute to answering the research question.

3.2.1. Introduction to The Case

The authors were given the opportunity to investigate the anonymized Company X, a Swedish pioneer of electric HDV freight, operating in multiple countries within the transport and logistics industry. Company X was deemed a suitable case company due to the size of its electric fleet, its prominent knowledge on the topic and its presence in the Swedish market which aligns with the geographical delimitation of this thesis. Hence, the chosen case was selected based on characteristics deemed optimal for answering the research question and fulfilling the purpose of this study. The chosen case provided the opportunity to gather in-depth empirical data within its organizational context by contributing to further theory development in this unexplored topic of study (Yin, 2003). Company X chose to partner with this thesis project by viewing it as a strong fit with their research interests and recognizing the potential for jointly exploring this topic with the authors.

Noteworthy, Company X chose to employ the authors during the study to enable collection of first-hand data and providing an opportunity to study the case from within with full access to the firm's resources. This aligns with the abductive approach adopted in the study, which, as Ong (2024) highlights, facilitates the discovery and articulation of the insider perspective by requiring immersion in the world of organizational actors to grasp their experienced reality. Being part of the organizational settings facilitated stronger connections with employees and increased the likelihood of generating authentic insights related to the area of study (Barnard et al.,1999).

3.3. Data Collection

This study adopts multiple data collection methods to strengthen the quality and increase the validity and reliability of the findings (Bell et al., 2019). Through data triangulation, findings were cross-checked to ensure that the authors captured an in-depth understanding of the phenomenon under study and provided rich, unbiased data (Joslin & Müller, 2016). The multiple reference points used in this thesis were primarily interviews and observations, but informal discussions were also used to facilitate the author's understanding and overcome potential weaknesses in the data quality emerging from positionality, subjectivity and misinterpretations (Joslin & Müller, 2016).

3.3.1. Preparatory Work

Before conducting interviews the authors sought to develop an understanding of Company X's strategy, organizational structure and the specific case. To minimize the need for background questions during interviews, the authors engaged in informal meetings with company representatives and conducted observations. Additionally, the authors' pre-understanding of the industry under study as a result of prior work experience and educational background assisted in generating a greater understanding of the phenomena under study. This preparatory phase helped refine the interview guide, ensuring that questions were aligned with the research objective and allowed for deeper exploration of participants' experiences (Dunwoodie et al., 2022).

3.3.2. Interview Sample

Following principles of theoretical sampling (Eisenhardt & Graebner, 2007), participants were selected based on their involvement in key areas of electric fleet management to capture both depth and breadth in understanding the phenomenon. The selection criteria follow: (I) full-time employment in the department of electric freight, (II) involvement in strategic decision-making concerning electric fleet management, and (III) diversity across participants, aiming to include interviewees from all organizational levels and departments involved in electric fleet management. This approach ensured that the study captured multiple perspectives on the economic, operational and sustainable complexities within Company X.

The authors reached out to potential participants and scheduled interviews in multiple stages, following the principles of theoretical sampling (Bell et al., 2019). As interviews were conducted, the data were coded and analyzed to refinie the emerging theoretical framework and informing subsequent data collection. The number of interviews was not predetermined but continued until data saturation was considered achieved, ensuring that no new insights emerged from additional interviews (Bell et al., 2019). Initially, 15 interviews were conducted, followed by three additional interviews until saturation was considered achieved. However, to fully ensure that no additional themes and concepts would emerge, the authors conducted two more interviews beyond the point of saturation (Collis & Hussey, 2014). In total, the study conducted 20 interviews with participants from various organizational departments, including operations, finance, data & analytics, sales, charging, procurement, public funding and central office, each contributing to different aspects of electric fleet management (see Appendix I).

3.3.3. Semi-Structured Interviews

The data collection process relied on semi-structured interviews, which allowed flexibility in adapting questions based on respondents' answers (Bell et al., 2019). Widely recognized in qualitative research for capturing nuanced perceptions (Collis & Hussey, 2014; Kallio et al., 2016), this method is particularly useful in conceptualizing a vehicle fleet as a strategically orchestrated resource system. Additionally, the open-ended nature of the interviews enabled deeper exploration beyond the initial questions. This supported the generation of rich empirical data for in-depth studies (Collis & Hussey, 2014). By allowing the interviewees to guide the direction of the conversation, this approach generated valuable insights to answering the research question (Galdas, 2017).

An interview guide (see Appendix II) was developed around the key study topics, enabling adaptability for follow-up questions and enhancing the natural flow of conversations (Qu & Dumay, 2011). Adaptations were made to the questions throughout the data collection process to reflect emerging insights and ensure alignment with the phenomena. While the guide provided structure the content of the interviews was adjusted to align with each interviewee's background and area of expertise (Bell et al., 2019). To ensure a natural and engaging discussion the researchers remained attentive to the interviewees' perspectives and demonstrated genuine interest throughout the conversations. Both researchers also participated in all interviews to minimize biases, capture diverse viewpoints and ensure that no critical insights were overlooked. While interviews were primarily intended to be face-to-face some were conducted via Microsoft Teams depending on the participants' location. However, consistent with Curasi (2001), the authors argue that the mode of interview did not compromise the quality of the results. To ensure clarity concerning the meaning, structure, and quality of responses from the interviewees, all interviewees were asked if they preferred to conduct the interview in Swedish or English. As a result, 15 interviews were held in Swedish and five interviews were held in English.

The interviews lasted between 30 and 60 minutes, starting with a brief informal conversation, followed by an outline of the research purpose and scope to ensure that participants felt prepared and comfortable (Bell et al., 2019). The researchers then asked for permission to record the conversation and clearly explained the anonymity and confidentiality protections in place for study participants. The interview then followed the structure of the interview guide, beginning with warm-up questions before moving to the core topics. Given the semi-structured format, interviewees were encouraged to guide the conversation which allowed for flexibility and adaptability. Hence, probing questions were used to generate further elaboration on key topics to reveal additional insights valuable to the study (Bell et al., 2019). Finally, wrap-up questions were also asked to provide respondents the opportunity of adding any further insights or address topics not previously discussed.

3.3.4. Participant Observations

Given the authors' positionality, participant observations were incorporated as an additional data source by fully engaging with both participants and the phenomenon under study (Collis & Hussey, 2014). By adopting a participant-as-observer role, the authors gained a deeper understanding of the case and the context in which strategic decisions were made (Bell et al., 2019). Overall, the observations contributed an additional layer of understanding of the phenomenon while helping to generate pre-understandings of Company X and establish rapport (Kawulich, 2005). Though, this extended immersion also poses risks of over-identification and potentially going native according to Bell et al. (2019). Measures were thereby taken to uphold the quality of the study, which are further elaborated on in Section 3.5.

To gather additional data, specific settings were selected based on their relevance to electric fleet management, the participants' involvement, and the strategic importance of the meetings. The authors participated in six hours of strategically relevant meetings to support answering the research question. In contrast to earlier observations, the authors adopted an

“Observer-as-participant” stance (Kawulich, 2005) to maintain greater objectivity toward the phenomenon under study. This allowed the authors to observe and interact closely enough to capture an insider perspective without directly participating in key activities, thereby remaining unobtrusive (Kawulich, 2005). Structured field notes were taken during observations to complement the interview findings, and ethical considerations were addressed consistently with the research purpose clearly communicated as participants’ anonymity and confidentiality was ensured. To enhance the validity of the results the authors shared preliminary findings with participants to solicit feedback (Kawulich, 2005).

3.4. Data Analysis

As previously stated, interviews were conducted in either Swedish or English. If an interview was held in Swedish, it was first transcribed in its original form before being manually translated into English to ensure that the respondent’s intended meaning was fully retained. The interview transcripts were seen as the primary data source for this thesis but participant observations were documented through field notes as a complementary data source, supporting data triangulation (Bell et al., 2019) and thereby strengthening the credibility and reliability of the findings. Given that the study follows an abductive research method, grounded theory served as a valuable tool for uncovering new theoretical insights while allowing for an iterative interaction between data and existing framework (Timmermans & Tavory, 2012). To ensure both structure and flexibility in the analysis, this study adopted Gioia et al.’s (2013) framework which provides a structured approach to interpreting qualitative data while emphasizing concept development and grounded theory articulation. The process progresses from first-order concepts (informant-centric terms) to second-order constructs (researcher-interpreted patterns) and ultimately to aggregate dimensions (theoretical constructs). This approach ensures that emerging theoretical insights are explicitly linked to empirical data that allows for a traceable and justifiable connection between participants’ perspectives and the study’s final theoretical contributions (Gioia et al., 2013).

Following transcription, the authors independently performed first-order open coding shortly after the transcription process to preserve the authenticity of participants’ perspectives and avoid premature interpretations. The quotes and concepts were structured in Microsoft Excel to enable systematic comparison and joint analysis of the findings. This process allowed the authors to identify patterns in the data and refine the initial codes into 23 first-order concepts. Building on this, the authors engaged in second-order coding to interpret the concepts more theoretically (Gioia et al., 2013). In line with Gioia et al. (2013), some constructs were informed by theory, while others emerged as nascent concepts addressing the different aspects of the phenomenon. This analysis resulted in eight second-order constructs, which further consolidated into two aggregated dimensions: *"System Optimization"* and *"Industrial Environment Configuration"* (See Appendix III). Lastly, after finalizing the coding process respondents' statements were matched with the first-order concepts to visualize the cohesiveness of each theme (see Appendix IV).

3.5. Quality of the Study

To assess trustworthiness and authenticity, this study adopted Lincoln & Guba's (1985) criteria: credibility, transferability, dependability and conformability. The research was designed and executed in alignment with these principles. Furthermore, ethical considerations are addressed as part of ensuring research quality.

3.5.1. Credibility

Credibility ensures that the findings accurately represent the social reality under investigation and that research is conducted according to good practice (Bell et al., 2019). Given the existence of multiple interpretations of reality, credibility is determined by the plausibility and trustworthiness of the findings. To establish credibility, this study used open-ended questions, avoided leading questions, and allowed participants to validate the findings of the interviews and observations. Respondent validation was used to confirm that the interpretations accurately reflected the participants' perspectives to minimize the risk of misinterpretation and bias. In addition, both researchers participated in the data collection and analysis processes by independently coding the data to make individual interpretations. The interpretations were subsequently compared to identify common patterns and reduce potential biases. Finally, multiple reference points, including interviews and observations, were used to increase the validity of the findings (Bell et al., 2019). Both data triangulation and investigator triangulation

(Joslin & Müller, 2016) were used to cross-check findings and ensure an in-depth understanding of the phenomenon under study.

3.5.2. Transferability

Being case-specific, the findings have limited transferability to other contexts. Rather than seeking generalizability, the study is shaped by the unique characteristics of Company X and its approach to electric fleet management, thereby contributing to a *thick description* (Geertz, 1973). As the interviewees were purposefully selected from different parts of the company, the study provides a rich, detailed account of how fleet managers orchestrate resources and balance economic and environmental impact. Thus, the study presents as a valuable reference point for others seeking to understand similar challenges and enable researchers to make informed judgments about potential transferability of the findings (Lincoln & Guba, 1985).

3.5.3. Dependability

Dependability refers to the reliability and repeatability of research findings, ensured by systematically documenting each phase of the research process in line with the framework proposed by Lincoln & Guba (1985). Documentation was maintained throughout problem formulation, participant selection, interview transcription, and data analysis decisions. Regular discussions with the thesis supervisor were aligned with the research objectives. This process constituted an inquiry audit which the supervisor helped oversee to validate the methodological consistency and process stability to enhance the dependability of the study (Lincoln & Guba, 1985).

3.5.4. Conformability

Recognizing that complete objectivity is unattainable in qualitative research (Bell et al., 2019), efforts were made to ensure that the findings genuinely reflected the collected data and that the authors acted in good faith. A reflexive approach was upheld throughout the research process as the authors continuously assessed their assumptions, biases, and values to safeguard the study's confirmability (Lincoln & Guba, 1985). Being part of the organizational context under study required heightened reflexive awareness, where the researches made significant efforts to secure the study's credibility as well as enhancing the transparency and applicability of findings (Dodgson, 2019). Key components of this reflexive process included transparency around methodological decisions and ongoing self-critical evaluation. An example of this is how the method section clearly outlines how research choices were made in light of both the research aims and the authors' positionality. Another key component of reflexivity concerns the relationship between the researchers and the participants. This study addressed this by explicitly describing the settings in which the research took place and the nature of researcher involvement. However, Dodgson (2019) lastly means that the major concern about reflexivity relates to data collection and data analysis. To overcome this, the authors sought to describe in detail the process of conducting and analysing data.

3.5.5. Ethical Considerations

This thesis followed clear ethical guidelines, reinforcing the study's commitment to reflexivity and responsible research conduct. During the data collection process the authors ensured the anonymity and confidentiality of both Company X and all participants, minimizing the risk that responses were influenced by participants' roles within the organization or other contextual factors that might affect data quality (Bell et al., 2019). Before each interview participants were informed of the study's purpose and provided with assurances of GDPR compliance. Furthermore, verbal consent was obtained for both participation and audio recording. Data was thereafter securely stored throughout the transcription process, and any personal or sensitive information was removed after interview completion. Mitigating measures and reflexivity were upheld throughout the process to prevent any conflict of interest, where transparency regarding these concerns is clearly demonstrated in this thesis.

4. Empirical Findings

In this section, findings from the qualitative data are presented using the logic from the aggregated dimensions (4.1.) Industrial Environment Configuration and (4.2.) System Optimization. These sections are further divided into each dimension's second-order construct.

4.1. Industrial Environment Configuration

4.1.1. Managing Technological Uncertainty

The findings present several challenges related to the nascent technology and market of electric trucks that complicate electric fleet management. The immaturity of current vehicle models contributes to considerable downtime, as trucks frequently require service or experience reliability issues. These disruptions negatively affect the cost-efficiency of electric operations and in turn their environmental benefits. With no established electric vehicle rental market and high capital costs for acquiring spare electric trucks, Company X is often forced to rely on non-electric backup vehicles.

"When we have downtime on an electric vehicle or a delayed delivery with electric vehicles, we are forced to use HVO [Hydrotreated Vegetable Oil] as a backup. There is no available market where we could solely offer and compare the cost of an electric replacement vehicle versus HVO." - Respondent O

"What often deteriorates our business case is the quality of the vehicles. As I mentioned earlier, this is still new technology, and quite often the trucks don't deliver the uptime we would expect. That completely disrupts the lifecycle, we end up needing backup vehicles and alternative solutions just to manage the situation." - Respondent T

In addition, the findings highlight that the technological immaturity of electric HDVs generates an overall uncertainty, further requiring continuous adaptation to maintain operational excellence.

“The biggest issue right now is really all the uncertainties in the broader transition. So many players underestimate the technology shift simply because they don’t yet know the problems it involves.” - Respondent B

To further cope with technological uncertainty, Company X illustrates the importance of spreading the risk. Therefore, applying a multiple sourcing strategy assists in matching supply with demand and ensuring a high-performing fleet from both an economic and environmental perspective.

“I'll refer to it as a prototype, but it's not yet in series production. It could be that the battery and chassis are fine, but the electronics or some other aspect of the vehicle may not be up to par, indicating that it's not a fully mature product yet. We don’t see this across all OEMs [Original Equipment Manufacturers], and that's the advantage of working with almost every OEM, they have different attributes, and we can assess which ones are better or worse.” - Respondent N

The findings further suggest that the nascent nature of the electric truck market complicates fleet investment planning. Limited vehicle availability, uncertain operational performance and unclear timelines for hardware development influence key decisions. These decisions revolve around optimal ownership duration, vehicle replacement cycles and capacity planning. Respondent S further highlights this by emphasizing:

“We would prefer to invest in high-quality, long-range trucks that can serve us for several years, but the market offering is still very limited. We’re still at the early stage of mass production for these trucks, and manufacturers are still working through the technology, which also drives up the cost of the hardware.” - Respondent S

Respondents point to the need for innovative financing solutions. Hence, considerations around leasing models and buyback programs have become increasingly relevant where these approaches aim to mitigate risk for fleet operators, minimize costs and potentially strengthen the environmental case for electric vehicles.

"It's a continuous evaluation of all those types of options, like leasing versus buying. But even on the manufacturer side, there's still uncertainty, they don't fully know yet how to approach this either. It's an industry in transition at the moment. The question ultimately is, who in the system takes the risk? Because there will always be a risk." - Respondent B

"On the diesel side, buyback agreements are very common. In most business setups, there is a clear buyback strategy in place. Electrification is still not widespread, and buyback structures are still in their early stages." - Respondent C

Furthermore, continuous vehicle disposal assessments are critical according to the findings. The lack of a mature aftermarket creates ambiguity in lifecycle management, where uncertainty related to depreciation rates, resale value, and disposal options undermines confidence in long-term investment decisions. The rapid pace of technological development often outpaces actual vehicle degradation, resulting in unexpected value loss, which Respondents B and C evaluate:

"The challenge now is that technological development is advancing much faster than the actual degradation of vehicles. This means that vehicles lose value quickly, not due to wear and tear, but because significantly better products are constantly being introduced to the market." - Respondent B

"The conditions for financing electric vehicles at present are far from a mature market, driven by the fact that there is no established secondary market for used vehicles where one can predict their resale value. [...] So, for the foreseeable future, we envision that this is something that will need to be constantly managed." - Respondent O

4.1.2. Navigating System Support Structures

System support structures, such as policy and regulatory frameworks, play a critical role in shaping the trajectory of electric road freight by influencing operational feasibility and market confidence. However, although government subsidies are viewed as important in the early stages of market development, Respondent C emphasized that their strategic mindset is that long-term viability requires electric solutions to succeed on their own.

"Subsidies are important. I believe that for our cases, they stand on their own even without support. But these subsidies are still very helpful, as they can amount to very, very large sums [...]. The solution must be able to stand on its own from the beginning. Subsidies can then help enhance it and truly enable the transition. I believe that for many stakeholders, it's crucial that an electric solution works right away, if it requires too much additional effort, there's a risk they won't adopt it at all." - Respondent C

In addition, regulatory incentives such as emission and fuel taxes, increased road tolls for non-electric vehicles, and low-emission zones have contributed to improving cost competitiveness and the realization of electric freight. Respondent O further elaborates on these aspects:

"So, following policy development and how it affects things is certainly a very important issue. The next component is the direct impact in the form of subsidies or the possibility of avoiding costs, or direct costs for alternative sources. Whether we're talking about subsidies for vehicle or infrastructure investments, or the ability to avoid road tolls or fuel taxes, all of this can affect the relative cost level between electric vehicles and other cost categories. But it also affects the absolute cost level for electric vehicles, which has a significant impact." - Respondent O

Moreover, energy supply affects both the economic and the environmental impact of electric freight in terms of energy prices and energy mix. Therefore, Company X applies a green energy sourcing strategy to align with their overall strategic vision despite its increased cost, which Respondents G and F emphasize:

"*Of course, energy prices play a role, both the relative energy prices, meaning electricity from the grid compared to other energy sources such as diesel, but also the absolute level. What does electricity cost and how does it impact the transportation cost for companies?"* - Respondent G

"It's really about: Can you shape the economic model in a way that actually gives the environmental impact a chance? [...] It becomes a balancing act, a choice between using cheap, non-renewable energy or opting for renewable energy sources." - Respondent F

Lastly, to realize electric freight, overcoming infrastructure limitations and ensuring a stable charging station network is crucial. As a response, Company X has chosen to build and manage its own charging infrastructure to ensure a viable electric transport solution.

"When it comes to infrastructure, the main limiting or enabling factor is definitely the charging infrastructure, as it needs to support the charging of the large batteries required for heavy truck operations. We also have a division that builds charging infrastructure to support our business. So some of the challenges we choose to solve on our own, rather than relying on external solutions." - Respondent S

4.1.3. Market Demand Execution

Market demand execution plays a pivotal role in driving the electrification of the transport industry. However, the level of ambition that shippers show in adopting electric transport varies. Most prospects show limited willingness to pay a premium for electric transport and reducing emissions, meaning that electric vehicles must approach cost parity with diesel alternatives to be perceived as feasible. Nevertheless, certain customers with more pronounced sustainability profiles show a greater willingness to pay a premium for electrification.

"Most customers show limited willingness to pay a significant premium to achieve this. [...] However, if it were possible to be cost-neutral but still make the shift, then in most cases, they would choose electric." - Respondent O

"There are some who are willing to pay a certain premium for electric transport, either to guarantee their deliveries or because they see it as part of their brand. But for this to scale properly, it can't be significantly more expensive, it still needs to be at cost parity, or at most just a few percent more." - Respondent Q

Although sustainability is a key motivator in the push toward electrified transport, economic considerations typically are the selling point in decision-making. In addition, the technical feasibility of implementation is critical in determining whether electric freight is perceived as a viable solution. Therefore, Company X highlights that a key strategic goal for them in advancing electric freight is to ensure its technical and economic feasibility by making it comparable to conventional diesel alternatives.

"What the sustainability transition enables in these discussions is that it creates an incentive to make changes. If there hadn't been an upside to electrification from a sustainability perspective, the companies I work with would have had very little incentive to change their time windows or the way they operate. However, the priority order is usually: cost, reliability, and as a distinct third factor, sustainability." - Respondent B

Taking full operational responsibility for customers' logistics flows requires a transition from diesel to electric transport, often necessitating capabilities to redesign existing logistics systems. However, the changing nature of the logistics network and the limited operational flexibility of electric HDVs pose significant challenges for fleet operators in maintaining reliable performance. Hence, observations and interview responses further highlight these concerns:

"There's a lot in motion on the customer side, and their conditions are constantly changing. Many customers either need to scale volume up or down, or they want to move volume to different locations. They switch warehouses, and their sales and production fluctuate, which directly affects their needs. Suddenly, they might want to drive twice as far. Then the question becomes whether the vehicle can even handle that range. [...] So I'd say the customer has a huge influence, and I'd confidently say that none of our customers will have the exact same setup at the end of a three- or five-year contract as they did at the beginning." - Respondent R

"Fluctuating demand and high peaks of the customers' shipments complicates electric fleet management as the system dependencies give limited room for flexibility." - Observation

Lastly, given the constraints tied to system dependencies and the capacity limitations of electric HDVs, not all customer partnerships are viable. Company X, therefore applies a selective customer strategy, focusing on those with operational profiles that align well with electric transport capabilities. Hence, Company X has a clear strategy regarding which customers to target and with whom to extend their partnerships with.

"So, the most interesting customer at the moment has a delivery network consisting of short and medium-range routes, ideally centered around different distribution centers, warehouses, or similar facilities, where the vehicles can return to. Additionally, the customer is committed to this electrification journey." - Respondent H

4.1.4. Partnership Management

Company X actively collaborates with partners across the electric vehicle ecosystem to accelerate innovation and support the broader viability of electric freight operations. These partnerships are both operationally necessary and strategically important for pushing the boundaries of what is technologically, economically, and environmentally possible.

"What are the business requirements, and how do we create a competitive advantage for Company X three to five years from now? From there, we focus on identifying the right partners with the right capabilities, those who can support our scaling efforts and help us build that competitive edge." - Respondent T

Maintaining strong relationships with Original Equipment Manufacturers (OEMs) allows Company X to influence product development and align its operational needs with supplier roadmaps. This proactive engagement helps ensure that future vehicles and component designs are better suited to the realities of electric vehicle operations.

"Having the level of expertise we want at a good price is crucial. I believe that an essential strategy for Company X is to maintain an open dialogue with virtually all OEMs. This will push the development of both hardware and the product forward, which it absolutely must." - Respondent A

Respondent K emphasizes the strategic importance of collaboration with OEMs. In particular, relationships with suppliers are leveraged to minimize vehicle downtime through service agreements and after-sales support.

"However, we can look at it in some cases. How eager are we to work with a certain supplier? It could be because we want a strategic partnership with them, etc. We could also look at their historical uptime for that supplier or maybe that model as well. How good is their after-sales support? Do they have good workshops? Do we get quick support? And what do the R&M [Repair & Maintenance] agreements and SLAs [Service Level Agreements] look like with those customers? We use an evaluation matrix where we input all of these components so we can make a structured decision on which supplier to choose." - Respondent K

Collaboration with traditional carriers represents another important partnership maintained by Company X, particularly for bridging operational knowledge gaps during the transition to electric freight. Close collaboration with experienced carriers helps integrate transport expertise with the new requirements of electric vehicle operations.

"We need companies with a strong understanding of the transport industry, meaning carriers who also want to be part of this transition." - Respondent A

In contrast to Company X executing on market demand, existing customers are framed as strategic partners willing and committed to scale electric freight with Company X in the long run. Respondent T therefore emphasizes the importance of long-term, data-driven collaboration to co-develop future capabilities and unlock mutual economic and environmental value.

"We're developing a partnership with a customer, looking three years ahead and discussing how to establish a strategic power plan. The goal is to unlock value through end-to-end collaboration with the customer by sharing insights and data that can help them improve their products. This is a clear example of engaging in co-development." - Respondent T

4.2. System Optimization

4.2.1. Vehicle Asset Management

To fully realize the benefits of an electric fleet system, Company X must strategically manage its key resources given that electric HDV systems are capital-intensive involving significant investment allocated for vehicles. Optimal allocation and utilization of these assets are critical for achieving both cost efficiency and environmental performance in the long run.

"Rightsizing the fleets means not buying more trucks than are needed or than will have enough jobs. It also means not installing more chargers than necessary to keep the trucks charged and operational. [...] So, it's about rightsizing the number of those resources according to how many jobs we're short on. It's a balance of demand and supply." - Respondent N

"If we view it as an optimization scenario and realize that we can accomplish the same task with less vehicles, then that's where we truly add value." - Respondent C

Furthermore, in aligning fleet size with current needs, Company X also takes a proactive approach to maximize vehicle utilization altogether. Utilization efforts are positioned not merely as cost-saving measures, but also as strategies to reduce environmental impact by requiring fewer vehicles and offsetting the high manufacturing footprint associated with electric trucks.

"It's about achieving the highest utilization rate of the vehicles possible. This is the best for CO2 reduction, and it is also the best from a business case perspective for each customer account." - Respondent K

"An electric truck has a higher environmental impact during manufacturing compared to a diesel truck. But if you drive enough kilometers with the electric truck, you'll eventually catch up, and achieve a significant environmental benefit in the long run." - Respondent D

Just as acquiring the right amount of resources is essential, monitoring those assets effectively is key to realizing their full operational lifespan, leading to maximization of return on investment and a decrease in the environmental footprint. Proper maintenance practices ensure that vehicles remain reliable over time, reducing both the frequency of replacements and the risk of asset degradation, according to Respondent M:

"We need to be clearer that we have control over our fleet, not just rely on it. That's why we're working with regular inspections where we essentially want to have a sort of inspection of the vehicle. Both to check the condition of the cabin and to look for damages, worn-out tires, and so on. This makes it easier for us [to maintain high vehicle uptime], and then it leads to fewer issues in the long run." - Respondent M

Managing resources further entails strategically locating those resources to scale electric freight. In particular, Respondent J emphasizes the importance of concentrating fleet assets in key operational hubs, allowing vehicles to serve multiple customer accounts. This consolidation enhances system efficiency and supports both economies of scale and sustainability goals.

"We shouldn't have three vehicles in Örebro, two in Malmö, four in Gothenburg, five in Stockholm, and seven in Sundsvall. That's not where profitability will lie. In the end, it will be about having a consolidated fleet in a few strategic locations rather than spreading the vehicles out across different places here and there. This is where I see the biggest interest or maximum benefit is when you have a few more vehicles at one location, and there you can start to cross-secure the vehicles for multiple customers. Then it becomes very interesting, both from an economic and environmentally friendly perspective." - Respondent J

4.2.2. Data Management

The findings reveal that a highly data-driven approach is critical to fully realize the efficiencies of an electric HDV fleet system. Respondent B emphasizes the importance of systematically collecting data across its operations to understand system dependencies and optimize fleet utilization.

"Transport logistics is largely about small savings. Minor disruptions, when extrapolated, can result in significant costs, as it is a highly cost-intensive industry. It is through digitalization, by having access to data and insights, that we can target the right objectives, minimize waste, and increase utilization." - Respondent B

A foundational element in this process is real-time visibility into vehicle and battery status, which forms the basis for responsive and proactive fleet management:

"What we've been working on for a long time is data collection, which is really the first thing that needs to be in place so that we actually know what's happening. We have second-by-second telematics from all vehicles, showing what they're doing and full status on the batteries. Just having that information and receiving it continuously gives us the ability to act." - Respondent Q

Beyond simply gathering operational data, Company X is actively investing in capabilities to act on insights at scale. This enables both economic efficiencies through improved utilization and a reduction in environmental impact.

"It's about the ability to absorb as much of this data as possible, and what we're constantly developing is the capability to take in more of it and make smarter forecasts and planning based on that data. I believe that's key to ensuring both maximum economic efficiency and minimizing environmental footprint." - Respondent O

As fleet operations mature over time, so too does the quality and utility of their data. With each iteration, more data is fed into the system, allowing the development of increasingly accurate models. These models form a critical part of the company's long-term strategy to minimize waste in the system and improve operational efficiency.

"Besides collecting more and more data, it's also about how we handle the data and what we calculate with it. Our models become increasingly accurate along the electrification journey, and we are still working to improve them." - Respondent H

As data volumes grow, their value ultimately depends on how effectively it is operationalized within day-to-day fleet management. At Company X, software plays a central role in transforming raw data into actionable insights.

"But the most important aspect lies in transport planning, ensuring that the transports being scheduled for a vehicle can of course be handled by its capacity, such as range. That's the first thing. The second is that you need to plan to ensure that there is access to charging opportunities and sufficient charging capacity, while minimizing the impact on the vehicle's productivity. One example of this is to schedule charging so that it overlaps with natural breaks for the driver, such as when the maximum allowed driving time has been reached and a break is needed. It quickly becomes much more complex, requiring consideration of many more factors than for diesel vehicles. The main way we have addressed this is through strategic, tactical, and operational planning with the help of software that supports this planning." - Respondent O

"Software is key to optimize the system, which will be even more important with scale." - Observation

4.2.3. Transport Planning

Long-term strategic transport planning is crucial to secure the economic and environmental feasibility of electric freight operations. By planning network electrification several years in advance, Company X ensures its fleet expansion and infrastructure development remain aligned with future demand and sustainability objectives.

"There is this concept of planning stages that we have, starting with strategic planning, where we plan network electrification years ahead. What it means is that I create a strategic plan right now to determine how many trucks and how many chargers need to be installed" - Respondent N

Respondent N and Q further discuss operational planning as keen in managing fleet disruptions such as vehicle breakdowns, fluctuating demand of transported goods, charging challenges and other day-to-day activities to uphold operational excellence.

"We have the operational plan, where the trucks are planned on a day-to-day basis. For the sweet spots, because it's a simple flow, the operational plan is quite straightforward. But now that we're moving beyond sweet spots, the operational plan becomes more complicated." - Respondent N

"It's about leveraging the ability to create sufficient flexibility, especially in operational planning. What often prevents things from being done effectively is the presence of too many constraints. Being able to open up, for example, the time windows for when different sites can receive or dispatch goods, the more flexibility you can introduce into those fixed processes, the greater the potential for improvement and efficiency." - Respondent Q

Lastly, Respondent N concludes the necessity of both strategic and operational planning to optimize the system from an economic and environmental perspective:

"Customers that have what we call dynamic flows will need both operational planning as well as strategic planning." - Respondent N

4.2.4. Reconfiguring System Design

Beyond optimizing existing operations, Company X is also reimagining the fundamental structures of freight. Strategies to reconfigure system design involve challenging legacy logistics models and exploring how new configurations can unlock greater sustainability and efficiency in electric HDV systems. Instead of focusing on replacing diesel vehicles with electric ones on existing routes, Company X approaches transport planning from the perspective of the actual goods delivered. This enables a more flexible route design and supports greater alignment between operational design and sustainability objectives.

"There are also some barriers in how things work. It's still a very traditional industry in many ways." - Respondent A

"Our philosophy is rather to start from the transport needs. What amount of goods, and of what type, need to be transported from one place to another? If you base your approach on the

transport needs and are willing to rethink routes and scheduling to enable as much electrification as possible for that transport need, you will get a better solution. So that is the first aspect: we primarily start with the transport needs." - Respondent O

The approach to shift from fitting electric vehicles into legacy systems toward building logistics models optimized for electrification is further emphasized throughout organizational meetings, highlighted in observations:

"Operating current diesel operations with electricity will only generate small benefits in emission and profitability. Full potential comes when you redesign the operations for electricity, where you can double or triple these cost savings, which also increase the electrification rate by 50-60%, thus lowering emissions on a great scale. Showcasing the business case for going electric." - Observation

Shifting the business model toward higher efficiency directly contributes to lowering the environmental footprint of freight operations. For Company X, optimization and electrification are seen as mutually reinforcing. Greater fleet utilization not only improves economic viability but also amplifies the benefits of electric mobility, given its lower operational costs compared to diesel.

"Optimization, as we see it, goes hand in hand with electrification. The more you utilize the vehicles, the cheaper it becomes, and it's even more cost-effective with electric vehicles because the operational costs are lower. Electricity costs less to operate with than diesel, so the more you optimize, the greater the environmental impact, since electric vehicles become even cheaper to use." - Respondent Q

Lastly, the willingness to challenge established models and fundamentally rethink the structure of freight transport reflects a broader commitment to innovation. Company X's strategic vision is grounded in the belief that continuous improvement is not only necessary to stay ahead but also presents a competitive advantage over legacy operators.

"In the end, the entire existence of the company is based on our willingness to work with continuous improvements and a belief that the established players do not do so to the extent required, and which is also interesting from a business economics perspective. We allocate significant resources to have that type of capability and capacity, both operationally and by investing heavily in our technological development. We strive to constantly improve in this area and work together to build and enhance our network of partners who share the same opportunities and are willing to make investments and drive this development forward." - Respondent O

5. Discussion

This section discusses the findings in relation to the research question, drawing on the theoretical framework and relevant literature. The section is structured according to the logic of the ROT framework.

5.1. Search/Select & Structuring Processes Contributing to Balance the Economic & Environmental Impact in The Electric Fleet System

Analyzed through the theoretical lens of ROT, the findings reveal several factors and strategies that contribute to balancing the economic and environmental impact in an electric HDV fleet system. The structuring process is particularly prominent as Company X engages in acquiring, accumulating and divesting the right mix of assets and capabilities to balance economic and environmental impact within the electric HDV fleet system. Within this process, *Managing Technological Uncertainty* emerges as especially influential, affecting fleet investment decisions, operational performance, and asset end-of-life management. Consistent with previous research on fleet investments (Al-Hanahi et al., 2021; Danielis et al., 2025), the results highlight the challenge of high acquisition costs, which require innovative financing solutions. On the other hand, inconsistent with previous research (Gillström, Björklund et al., 2024), respondents emphasize technical limitations restricting possible vehicle investment alternatives, where multiple sourcing strategies are highlighted as keen to spread the risk. Consequently, even though the company aims to select the most environmentally favorable alternatives, technical feasibility and economic viability ultimately take precedence to ensure stability and performance. However, respondents noted that their ability to improve environmental performance is constrained by the limited variety of electric vehicles and the vehicles similarities in environmental performance. Considering above, the search/selection process becomes a key part of the structuring process, as managers identify and invest in assets that support both environmental and economic impact.

In addition to technological uncertainty, *Navigating System Support Structures* is equally critical in the search/selection process, as policy and regulations play a key role in shaping the development of electric road freight. Consistent with Gillström (2024) and Danielis et al. (2025), the findings reinforce the importance of subsidies, emission taxes, and carbon credits in promoting BEV adoption, reducing financial risk, and improving the long-term viability of electric freight. However, inconsistent with previous research (Gillström, 2024; Danielis et al., 2025), the results also highlight the need for electric freight solutions to function independently of governmental incentives. Therefore, Company X continuously orchestrates their efforts to ensure the viability of its transport offering from an economic and environmental perspective, even without governmental support. Beyond this, the results point out, in accordance with Imre et al. (2021), that a fleet operator must secure accessibility when it comes to the charging infrastructure to ensure a complete transport solution. Considering the current limitations in charging infrastructure Company X therefore disclosed the necessity for them to build their own charging infrastructure in order to be able to sell a complete freight solution to their customers. Henceforth, structuring processes emerge as they acquire, accumulate and divest in charging infrastructure to optimize the charging network, where search/selection processes support these strategic actions. These insights are further adding additional knowledge to what Gillström, Jobrant et al. (2024) searched for in how logistics planning evolves when charging infrastructure is explicitly factored into operational strategies.

Another key concern within the structuring process is *Vehicle Asset Management*, particularly the allocation and reallocation of vehicles to rightsize the fleet. Respondents revealed that rightsizing not only helps reduce emissions but also lowers operating costs by reducing the number of trucks required. Hence, structuring decisions of acquiring, accumulating, and divesting are shaped by both managing technological uncertainty and *Market Demand Execution* in this process. While technological uncertainty impacts investment decisions, market demand execution determines how to rightsize and operationally optimize the fleet. This includes the ambition and willingness of shippers to transition to electric freight, along with scaling their logistical flows, a factor further emphasized by Alp et al. (2022) and Gillström, Jobrant et al. (2024). However, technological uncertainty also complicates divestment decisions, as the technological immaturity, and the aftermarket ambiguity make it difficult to determine the right time for disposal and replacement. These findings reinforce Alp et al. 's (2022) insight on the challenges of managing end-of-life decisions when an aftermarket is lacking, disposal options are limited, and vehicle lifespan is uncertain. Hence, structuring and search/selection processes must continually assess strategies for optimal disposal timing and vehicle life expectancy. Accordingly, these decisions will directly contribute to balancing the economic and environmental impact of the electric fleet system.

5.2. Bundling Processes Contributing to Balancing the Economic & Environmental Impact in The Electric Fleet System

In the process of *Resource Bundling,* Company X integrates and optimizes its resources to build an electric fleet system that is both economically and environmentally balanced. Here, *Data Management* plays a key role as the collection of real-world data is essential in continuously enhancing the understanding of how electric HDV operations can be improved. However, simply collecting the data is not sufficient, rather it is the effective utilization of data that enables the realization of data-driven strategies to ensure system reliability and efficiency. A comprehensive data-driven approach that leverages real-time insights of vehicle health and performance supports managers in conducting lifecycle assessment. This, in turn, influences the resource bundling processes to optimize for both economic and environmental performance while aligning with previous research by Dintén et al. (2023) and Alanazi (2023), who highlight the necessity of data. On the other hand, respondents emphasized the need for high-quality and accurate software to enable the full potential of data utilization. In line with previous research, empirical evidence shows that data and software enable real-time responsiveness (Dintén et al., 2023) and long-term planning (Dönmez et al., 2022), thereby supporting the balance of economic and environmental impact.

Data management also directly supports vehicle asset management, which was consistently described by respondents as a central area where resource bundling is applied to configure the fleet for maximum impact. Maximizing vehicle utilization was identified as a cornerstone of this process, which aligns with findings by Castillo & Álvarez (2023) who highlights its role in balancing between economic and environmental performance. However, the results also underscore the need for ongoing monitoring through data and software to maintain efficiency, reduce downtime, prevent premature degradation and avoid overutilization. In this light, Crespo del Castillo & Parlikad (2024) emphasize the value of performance monitoring, minimizing unnecessary costs, and extending vehicle lifespan to achieve sustainable impact. Moreover, a previously novel aspect in these settings according to the authors' understanding is the strategic scaling of the fleet. Here the respondents point out that, bundling resources through consolidation and increased vehicle deployment, particularly at strategically significant locations, enhances operational performance. Strategic allocation and reallocation of vehicles to rightsize the fleet is therefore a crucial activity within the bundling process supporting the goal of balancing economic and environmental impact in the electric fleet system.

Furthermore, consistent with Alp et al. (2022), the findings emphasize the importance of *Transport Planning.* This is essential in aligning electric freight development with future demand to achieve economic and environmental impact. Still, the findings suggest that short-term planning is equally important as the ability to respond to disruptions and adapt to deviations requires responsiveness and flexibility. Together, strategic and operational planning enable the bundling of resources in ways that optimize transport systems, contributing to economic and environmental impact. Thus, building such knowledge and capabilities is important, but as highlighted by Dintén et al. (2023) and Dönmez et al. (2022), these planning efforts must be bundled with adequate data and software to achieve intended performance outcomes.

Finally, for electric freight to become a viable long-term solution, the results indicate that *Reconfiguring System Design* is critical. Since traditional logistics systems were designed for diesel operations, rigorous resource bundling processes are needed for effective implementation of electric freight solutions. While this aligns with the observations of Alp et al. (2022), the study adds to the literature by offering concrete insight into how electric HDV adoptions reshape logistics systems, an area also called out for further research by Gillström, Jobrant et al. (2024) and Alarcón et al. (2023). As a contribution, the research demonstrates that effective adoption goes beyond one-to-one replacement of diesel vehicles with electric vehicles. Rather, it involves systematic rethinking that enables higher operational optimization, which in turn enhances both economic and environmental impact. The findings suggest that aligning the system design for electric operations not only improves feasibility but also outperforms diesel in its cost efficiency when properly optimized. On that note, building the capabilities necessary for reconfiguring system design is a key bundling process for electric fleet operators to balance the economic and environmental impact.

5.3. Configuring/Deploying & Leveraging Processes Contributing to Balance the Economic & Environmental Impact in The Electric Fleet System

In the leveraging process, the firm's resources and capabilities are mobilized, coordinated, and deployed to balance the economic and environmental impact within the electric HDV fleet system. *Partnership Management* emerged as a key component in this regard, and to the best of our knowledge adding additional insights in these specific settings. The research indicates that managing relationships with OEM suppliers is particularly important, as these relationships can influence product development and mitigate vehicle downtime through service agreements. These relationships are especially essential to secure fleet performance due to the technological uncertainty surrounding electric HDVs. Also, collaborating with transport carriers is essential in enabling the transition to electric freight by helping bridge operational knowledge gaps within this traditionally rooted industry. The findings also emphasize the importance of securing long-term partnerships with customers, as shared willingness and ambitions facilitate the scaling of electric freight operations. On that note, managing its partnerships has a role to play in balancing the economic and environmental impact in the electric HDV fleet system, which is why it is foundational to build and leverage such capabilities.

Moreover, data management once again assists in strategic action, where it is used to support vehicle asset management in maximizing vehicle utilization and scaling the fleet, but also reconfiguring system design for electric freight through system-wide electric optimizations. This is where leveraging processes thrive in bringing forward the differential aspect of Company X, together with the *configuration/deployment processes* where resources are arranged, integrated, and put into use in line with the firm's strategy. In connection with navigating system support structures, the company has also made decisions to ensure the right energy mix. By exclusively using green electricity for the vehicles the company actively aligns with its overall strategic vision. Though, this also introduces a cost-related trade-off that must be balanced against economic viability. This insight supports findings by Al-Hanahi et al. (2021), who similarly point to the significance of the electricity mix in determining the emissions performance of electric freight. Furthermore, an additional consideration that is not sufficiently addressed in previous literature (Al-Hanahi et al. (2021) concerns trade-offs posed by technological uncertainty. In certain cases Company X is forced to make strategic compromises due to a lack of viable alternatives in vehicle acquisition, allocation, and disposal. One such example Company X discloses is the continuous need to manage the process of renting HVO backup vehicles to ensure stable operations. However, considering the high acquisition cost and the lack of an electric truck rental market it not only negatively influences the economic and environmental impact but also requires managing trade-offs from their strategy.

Regardless of certain trade-offs, Company X showcases a strong commitment to continuous improvements by actively seeking to reconfigure traditional logistics systems to realize electric freight. The findings reveal how optimized resource use implies both economic cost savings and environmental benefits by further aligning with previous research by Koh et al. (2016) and Maletic et al. (2015). Supporting studies by Huo et al. (2019), Wojtkowiak & Cyplik (2020), and Magon et al. (2018) also suggest that responsible resource use, reduced waste, and extended asset lifecycles contribute to both improved environmental outcomes and cost savings. As a result, this case supports the notion of a “win-win” scenario, consistent with the view of Van der Byl & Slawinski (2015), where sustainability can be pursued without compromising profitability. In this light, Andersén’s (2023) arguments of firms being able to generate economic and environmental value through strategic resource orchestration goes well in line with the findings from this study. This showcases what Andersén (2023) called for in earlier research regarding how specific ROT processes, such as electric fleet management, can be leveraged to achieve both economic and environmental outcomes. In addition, it illustrates how the electric HDV fleet system influences sustainability impact, which Gillström, Jobrant et al. (2024) and Gillström (2024) set out for further research.

Henceforth, based on the above discussion, a conceptual framework has been developed to illustrate how ROT connects to the findings and facilitates the balance between economic and environmental impact in the electric HDV fleet system. First, industrial environment configuration is needed as system limitations, challenges and complexities requiring resource orchestration processes to be managed. Second, the industrial environment configuration influences the factors and strategies required for system optimization. These, in turn, necessitate additional orchestration. Lastly, as the factors and strategies are realized through system optimization, balance between economic and environmental impact can be reached, considering that economic and environmental impact goes hand in hand when optimizing an electric HDV fleet system.

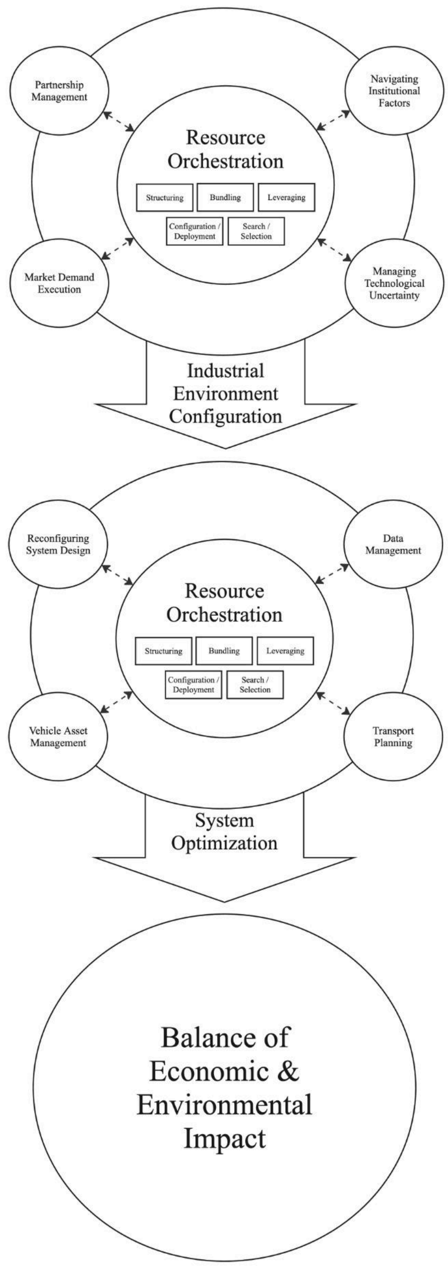

Figure 3: Conceptual Framework

6. Conclusion

The purpose of this study was to investigate what factors and strategies that contribute to balancing the environmental and economic impact in an electric HDV fleet system. Drawing on the ROT framework, the study addresses the research gap by answering the research question:

What are the factors and strategies that contribute to balancing the economic and environmental impact in electric HDV fleet systems?

Firstly, the study identified eight interrelated factors and strategic areas that collectively contribute to balancing the economic and environmental impact in the electric HDV fleet system. While each of these areas plays a role individually, the analysis highlights that the combination and synchronization of these efforts through orchestration enables an optimal balance. Secondly, although *Industrial Environment Configuration* elements of *Managing Technological Uncertainty, Navigating System Support Structures, Market Demand Execution, and Partnership Management,* originate externally, they shape the internal operating environment of electric fleet operators. As these elements define what is economically and technically feasible, they must be actively managed. Thus, resource orchestration processes are essential for configuring and navigating the industrial environment to meet both economic and environmental objectives. Thirdly, *System Optimization* is achieved through the orchestration of internal capabilities, including *Data Management*, *Transport Planning*, *Vehicles Asset Management,* and the ability to *Reconfiguring System Design*. This indicates that resource orchestration processes act across both external and internal dimensions and that internal processes are influenced by external elements and industry dynamics. Finally, in the context of balancing the economic and environmental impact of the electric HDV fleet system, orchestrating the fleet toward system optimization is essential. The findings of this study emphasize that, when effectively optimized, electric fleets offer more synergies than trade-offs between economic and environmental goals. Optimization enables these synergies to emerge, as responsible resource use, reduced waste, and extended asset lifecycles contribute to both lowering environmental footprint and costs. Thus, economic and environmental outcomes are not mutually exclusive but are closely aligned when the electric HDV fleet system is strategically orchestrated.

7. Contributions & Future Research

After concluding this study and answering the research question, this section discusses the theoretical contributions (7.1.), practical contributions (7.2.), limitations (7.3.), and lastly, further research is suggested (7.4.).

7.1. Theoretical Contributions

This thesis addresses the identified research gap in Section 2.4., where previous research called for a deeper understanding of how the adoption of electric HDVs impacts the logistics operations and influences sustainability outcomes. As such, the study contributes to identifying eight factors and strategies that contribute to balancing the economic and environmental impact within the electric HDV fleet system. The study advances the discussion on electric HDV fleet systems by highlighting how such systems can achieve sustainability without compromising operational performance. Beyond this, it also contributes to the broader sustainability literature by illustrating how economic and environmental objectives can be strategically aligned. However, in particular, the study extends ROT by demonstrating how its processes can be applied not only to enhance economic performance but also environmental outcomes, further filling the research gap of ROT from an environmental standpoint. By integrating ROT, electric fleet management and sustainability, this study provides new theoretical perspectives within each respective area but also illustrates how these perspectives are interrelated.

7.2. Practical Contributions

On a practical level, this study provides insights for fleet managers and practitioners in the transportation and logistics industry seeking to better understand how to balance electric HDV fleets from both economic and environmental perspectives. By identifying eight critical factors and strategies the study outlines what is necessary to uphold operational performance while transitioning to electric freight. The findings demonstrate how electric freight challenges existing logistical configurations and highlight the importance of a system-wide approach. Particularly, system optimization enables an optimal balance between economic and environmental impact. By illustrating limited trade-offs in this process, where economic and environmental impact can go hand in hand, these insights can hopefully contribute to fueling the electric HDV adoption further.

7.3. Limitations

Despite the contributions of this thesis, several limitations must be acknowledged. First, this research is conducted as a single case study, consisting of 20 interviews and six hours of observations at the case company. As such, the researchers are well aware that the generalizability of the results is limited, given the specific organizational setting, timeframe, and geographic scope. While the study is highly relevant within its specific context, the chosen methodology makes it difficult to apply the findings more broadly. Second, considering the nascent stage of electric HDV freight, numerous barriers and complexities such as technological immaturity and infrastructure limitations remain before the market reaches maturity. Although it is valuable to study how industry pioneers navigate these challenges, the authors recognize that different findings may emerge as the implementation of electric freight becomes more widespread and established. Finally, the authors acknowledge that, as with all qualitative research, subjectivity and researcher bias is unavoidable. However, as emphasized throughout the methodology rigorous actions have been taken to maintain the quality of the study. As outlined, especially in section 3.5, these include securing transparency and reflexivity throughout the research process.

7.4. Future Research

As this study was conducted as a single case study to explore the phenomenon in depth further research could benefit from conducting a multiple case study design to enhance the generalizability and the transferability of the findings. Additionally, quantitative methods could be employed to test and build upon this study's results which would strengthen the objectivity and trustworthiness of the conclusions. Moreover, given that electric freight remains in a relatively early stage of development a future replication of this study may yield new insights into the evolving dynamics of the field. Additionally, as this study was solely conducted through the lens of the ROT framework and focused on economic and environmental outcomes, future studies may benefit from applying alternative theoretical frameworks. Considering that ROT emphasizes system optimization through responsible resource use, waste reduction and extended asset lifecycles, exploring these processes through a circular economy perspective could offer additional depth. Finally, while this thesis focused on two pillars of the Triple Bottom Line (TBL), further research should investigate the social dimension of electric freight management to provide a more holistic view of sustainability.

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Appendices

Appendix I. List of Interviewees

Department	Role	Date	Duration	Language
Central Office	Head of Strategy	26/03/2025	53:33	Swedish
Central Office	Strategy Associate	21/03/2025	41:42	Swedish
Central Office	General Manager, Charging	20/03/2025	53:48	English
Central Office	Head of Product Strategy	26/03/2025	59:52	English
Data & Analytics	Head of Data & Analytics	28/03/2025	43:19	Swedish
Data & Analytics	Battery Operations Director	21/03/2025	44:59	English
Operations	Head of Fleet Strategy & Management	17/03/2025	59:32	Swedish
Operations	Head of Operations	25/03/2025	51:47	Swedish
Operations	Hardware Operations Specialist	25/03/2025	36:32	Swedish
Operations	E-truck Partner Manager	28/03/2025	31:47	Swedish
Operations	Operations Director	19/03/2025	50:58	Swedish
Operations	Transportation Hardware Specialist	25/03/2025	57:48	Swedish
Sales	Head of Solution Development	20/03/2025	48:23	Swedish
Sales	Head of Special Projects	18/03/2025	42:16	Swedish
Public Funding	Public Affairs Director	24/03/2025	47:09	Swedish
Finance	Business Controller	24/03/2025	57:56	Swedish
Finance	Finance Associate	18/03/2025	45:47	Swedish
Operations	Account Manager	11/04/2025	40:48	Swedish
Procurement	Head of Procurement	16/04/2025	47:09	English
Data & Analytics	Data scientist	16/04/2025	41:31	English

Appendix II. Interview Questionnaire Template

Introduction

- Brief introduction of ourselves and our research topic.
- Ask for permission to record

Warm-up Questions

- Could you tell us a bit about yourself, your role in the company, and how long you have worked for the company?
- How would you say that your work is connected to electric fleet management?

Electric Fleet Management - Economic & Environmental Impact

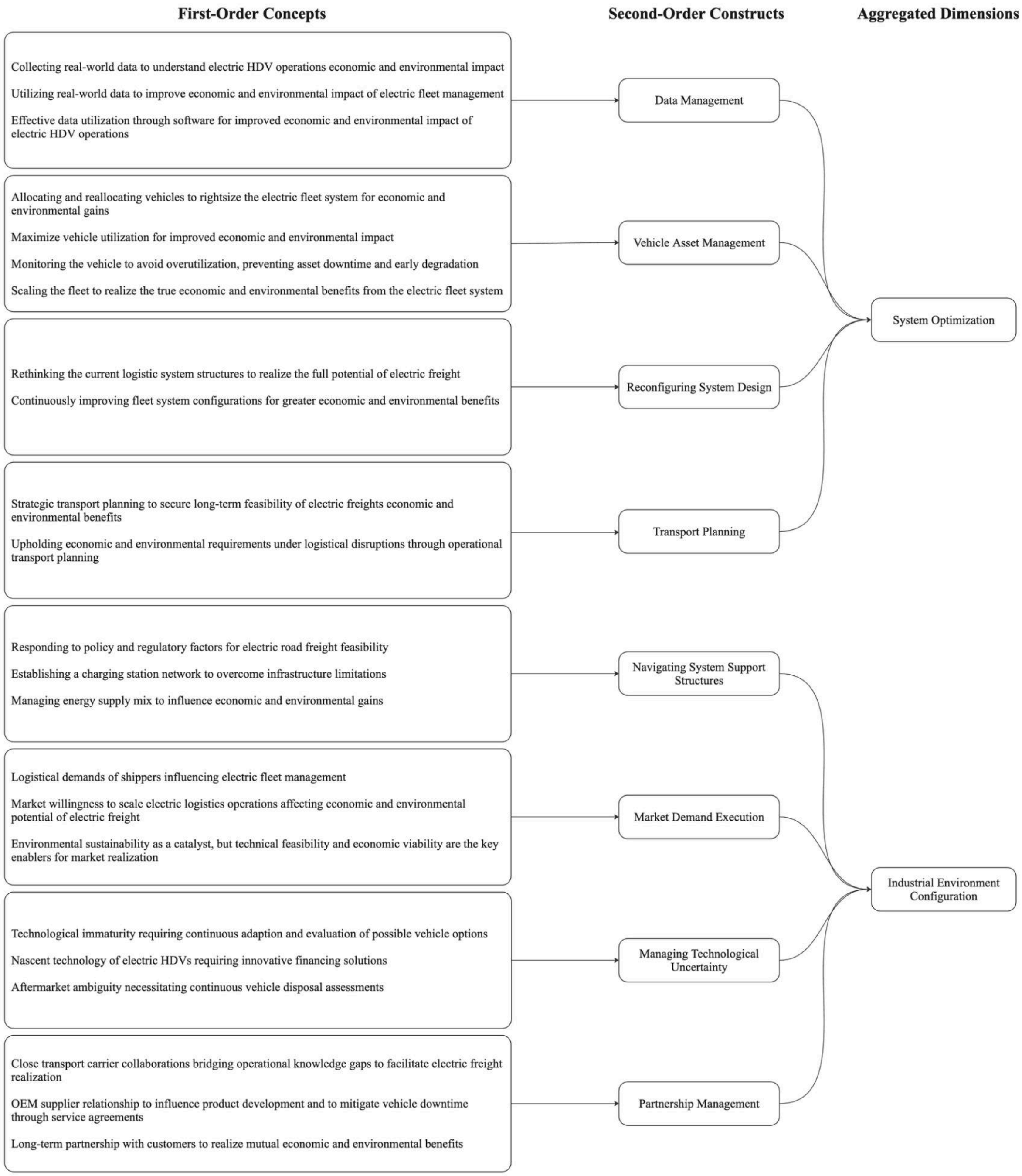
- What are the main challenges the company is currently facing in balancing economic and environmental impact in electric fleet management?
- What key factors and strategies influence the economic and environmental impact of electric fleet operations?
- What external factors (e.g. policy, market trends, technology, and infrastructure constraints) do you think have the biggest impact on electric fleet management?
- What are the key factors and strategies influencing the decisions in fleet investments from an economic and environmental perspective?
- How does the company allocate and manage resources (vehicles, charging infrastructure, workforce, technology) to optimize both economic and environmental outcomes?
- What factors and strategies are important for managing lifecycle decisions of the electric fleet from an economic and environmental perspective?
- How do customers perceive and prioritize economic and environmental trade-offs?
- How is data used to assess fleet performance and balance economic and environmental goals?
- How would the company maximize the fleet's environmental impact to the fullest?

- How would the company maximize the fleet's economic impact to the fullest?
- What are the trade-offs the company faces when managing the fleet’s economic and environmental impact?
- How are you working with continuous improvements and exploring new innovative ways of working with fleet management in order to find new ways to generate value?

Outro

- Is there anything of importance you would like to add that we have not yet talked about?

Appendix III. Data Structure



Appendix IV. Mapping Constructs and Interviewees

First-Order Concept	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
Aftermarket ambiguity influencing vehicle disposal options	X		X		X		X	X	X	X	X	X	X	X	X		X				13
Allocating and reallocating vehicles to rightsize the electric fleet system for economic and environmental gains	X	X	X	X	X			X		X		X		X		X	X			X	12
Close transport carrier collaborations bridging operational knowledge gaps to facilitate electric freight realization	X						X				X			X		X	X		X	X	8
Collecting real-world data to understand electric HDV operations economic and environmental impact	X	X		X			X				X		X	X	X		X				9
Continuously improving fleet system configurations for greater economic and environmental benefits	X	X		X	X				X	X			X	X	X					X	10
Effective data utilization through software for improved economic and environmental impact of electric HDV operations	X	X		X	X	X	X	X			X			X	X	X	X		X	X	14
Environmental sustainability as a catalyst, but technical feasibility and economic viability are the key enablers for market realization	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	19
Establishing a charging station network to overcome infrastructure limitations			X	X	X	X	X			X							X		X	X	9
Logistical demands of shippers influencing electric fleet management	X			X			X	X	X		X	X		X		X		X			10
Long-term partnership with customers to realize mutual economic and environmental benefits		X					X	X		X	X			X			X		X	X	9
Managing energy supply mix to influence economic and environmental gains	X		X	X	X	X	X						X	X	X						9
Market willingness to scale electric logistics operations affecting economic and environmental potential of electric freight	X	X			X				X	X			X	X				X	X		9
Maximize vehicle utilization for improved economic and environmental impact	X	X	X	X	X		X	X		X	X		X	X	X		X				13
Monitoring the vehicles to avoid overutilization, preventing asset downtime and early degradation				X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	16
Nascent technology of electric HDVs requiring innovative financing solutions	X		X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	17
OEM supplier relationship to influence product development and to mitigate vehicle downtime through service agreements	X			X			X			X	X	X	X	X	X			X		X	11
Responding to policy and regulatory factors for electric road freight feasibility			X	X	X			X	X	X	X	X		X	X		X	X	X	X	14
Rethinking the current logistic system structures to realize the full potential of electric freight	X	X	X	X			X	X		X	X	X	X	X	X					X	13
Scaling the fleet to realize the true economic and environmental benefits from the electric fleet system	X	X					X	X	X	X	X	X		X	X		X	X			12
Strategic transport planning to secure long-term feasibility of electric freights economic and environmental benefits		X								X	X		X	X	X		X				7
Technological immaturity requiring continuous adaption	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X		X	X	17
Upholding economic and environmental requirements under logistical disruptions through operational transport planning	X			X				X							X		X	X	X		7
Utilizing real-world data to improve economic and environmental impact of the electric fleet management	X	X	X	X		X	X	X		X									X		9
	18	13	11	17	13	7	16	15	8	17	16	10	12	20	16	8	16	9	12	13	

AI Appendix

Appendix I. Generative AI Description

In the following section, the authors describe the usage, risks, and contributions of AI tools in the process of writing this thesis, where ChatGPT-4.0, Gemini 2.0, Grammarly, Elicit and Semantic Scholar have been used.

Firstly, ChatGPT-4.0 and Gemini assisted in the initial understanding of various concepts, theories, and methodologies. By generating quick explanations, the authors used this information to further explore potential areas of interest for the research. However, given the significant risks of ChatGPT-4.0 and Gemini generating incorrect or misleading information, the authors avoided using these tools as definitive sources and continuously verified their outputs through reliable sources. ChatGPT-4.0 and Gemini were used to improve formulations and grammar in the written text. These tools contributed to the quality of the study by improving accuracy and clarity in the text. It is however important to mention that they were not used for analysis or to write complete sentences. The insights gained from using these tools suggest that they can be helpful in supporting the thesis-writing process to improve the overall quality. However, one must be cautious by always verifying information gathered to avoid inaccuracies which is why careful double-checking was consistently applied.

Grammarly was used to detect spelling and grammar errors which improved the quality of the text and enhanced the overall trustworthiness of the thesis. The tool assisted in identifying potential mistakes that can be easily overlooked during proofreading. Noteworthy, it was only used to correct individual word errors or grammatical issues and was not employed to rewrite or enhance entire sentences. With AI tools in general, there is a risk of introducing incorrect suggestions that could decrease the quality of the text. Any suggested changes were therefore carefully reviewed and only implemented when they clearly improved the text. The authors learned that spelling and grammar errors can be difficult to identify without such tools, but that critical review of suggested changes remains essential.

Lastly, the AI tools Semantic Scholar and Elicit were used to gather academic papers for the thesis. These tools supported the authors in scanning relevant research fields to build the foundation of the literature review and identify the research gap. They were used as complements to Scopus, Google Scholar, and the SSE Library Database to broaden the scope and ensure that relevant prior research was mapped as accurately as possible. To ensure the quality of the study only peer-reviewed academic sources were used. Considering that these tools often returned sources that were not peer-reviewed or relevant, the authors made sure that all suggestions were carefully reviewed for credibility. The usage of these tools however provided useful insights into the challenges of conducting systematic literature searches and illustrated their value in the scanning process. The authors did however also recognize the limitations of these tools and emphasized the importance of maintaining a critical perspective when using them.

Appendix II. Generative AI Sources

OpenAI. (2025). ChatGPT (Version 4o) [Large language model]. https://chatgpt.com/

Google. (2025). Gemini (Version 2.5 Pro) [Large language model]. https://gemini.google.com/app

Grammarly. (2025). Grammarly (Version 1.114.0.0) [Large language model]. https://www.grammarly.com/

Elicit. (2025). Elicit [Large language model]. https://elicit.com/

Semantic Scholar. (2025). Semantic Scholar [Large language model]. https://www.semanticscholar.org/