THE CHALLENGES OF IMPLEMENTING INTELLIGENT TRANSPORTATION MANAGEMENT SYSTEM AMONG THIRD PARTY LOGISTIC COMPANIES IN MALACCA

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STUDENT DECLARATION

"I confirmed that this project is the consequence of my personal research excluding as cited in the references. This research project has not been for any degree and is not concomitantly submitted in candidature of any other degree"

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DEDICATION

To begin, I want to express my gratitude for the opportunity to finish the research project I've been working on. I would want to express my gratitude to my family members, who have been there for me in terms of both spiritual and material support, as well as to my cherished supervisor and panel, who have always been there to help me through the research process. In conclusion, I would want to express my gratitude to all of my close friends and classmates who have always been there for me and who have provided me with both emotional and practical support during the process of conducting this study.

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ABSTRACT

The implementation of Intelligent Transportation Management Systems (ITMS) poses significant challenges for third-party logistics (3PL) companies in Melaka. This research focuses on exploring the barriers that impede the successful integration of ITMS within the logistics industry. Through qualitative research methods, including semi-structured interviews and case studies, this study investigates the specific obstacles faced by 3PL companies in Melaka when adopting ITMS. By examining factors such as cost implications, data quality management, employee resistance, and security concerns, the research aims to provide a comprehensive understanding of the challenges associated with ITMS implementation. Furthermore, the study seeks to identify effective strategies to overcome these barriers and enhance the adoption of ITMS among 3PL companies in Melaka. The insights gained from this research not only contribute to the existing body of knowledge in logistics and supply chain management but also offer practical recommendations to facilitate smoother and more successful ITMS implementation within the Melaka logistics sector.

Keywords: Intelligent Transportation Management Systems (ITMS), third-party logistics (3PL), Melaka, challenges, barriers, implementation, logistics industry, strategies, adoption.

ABSTRAK

Implementasi Sistem Pengurusan Pengangkutan Pintar (ITMS) menimbulkan cabaran yang besar bagi syarikat logistik pihak ketiga (3PL) di Melaka. Penyelidikan ini memberi tumpuan kepada mengeksplorasi halangan-halangan yang menghalang integrasi yang berjaya ITMS dalam industri logistik. Melalui kaedah penyelidikan kualitatif, termasuk wawancara semi-struktur dan kajian kes, kajian ini mengkaji halangan-halangan spesifik yang dihadapi oleh syarikat 3PL di Melaka apabila mengadopsi ITMS. Dengan mengkaji faktor-faktor seperti implikasi kos, pengurusan kualiti data, rintangan kakitangan, dan kebimbangan keselamatan, penyelidikan bertujuan untuk memberikan pemahaman yang komprehensif mengenai cabaran yang berkaitan dengan pelaksanaan ITMS. Selain itu, kajian ini bertujuan untuk mengenal pasti strategi yang berkesan untuk mengatasi halangan-halangan ini dan meningkatkan penerimaan ITMS di kalangan syarikat 3PL di Melaka. Maklumat yang diperolehi daripada penyelidikan ini bukan sahaja menyumbang kepada badan pengetahuan yang sedia ada dalam logistik dan pengurusan rantaian bekalan tetapi juga menawarkan cadangan praktikal untuk memudahkan pelaksanaan ITMS yang lebih lancar dan lebih berjaya dalam sektor logistik Melaka.

Kata kunci: Sistem Pengurusan Pengangkutan Cerdas (ITMS), logistik pihak ketiga (3PL), Melaka, cabaran, halangan, pelaksanaan, industri logistik, strategi, pengambilan.

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LIST OF ABBREVIATIONS AND SYMBOLS

ITMS- Intelligent Transportation Management System

ROI- Return of Investment

WMS- Warehouse Management System

ITS- Intelligent Transport System

TMS- Transportation Management System

3PL- Third Party Logistics

GPS- Global Positioning System

LMS- Logistics Management System

2PL- Second Party Logistics

ERP- Enterprise Resource Planning

CRM- Customer Relationship Management

IT- Information Technology

IV -Independent Variable

DV -Dependent Variable

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter will begin by providing background information on the study's focus on the challenges of implementing intelligent transportation management system among third party logistics in Malacca. This chapter will define the problem statement in light of the study context. As a result, the research's research questions and research objectives will be determined. The study's limits and scope will be discussed later. The research's relevance section follows, giving readers information and specifics on how the study benefits 3PL on implementing ITMS. This chapter's last section, the thesis outline, will describe how the research in chapters one through five flowed.

1.1 Research background

According to D.H.S. Abeydeera (2020), An Intelligent Transportation Management System (ITMS) is a technologically advanced system that integrates data collection, analysis, and communication technologies to optimize the operation of transportation networks In the realm of logistics, an Intelligent Transportation Management System (ITMS) acts as a digital brain for a company's transportation network. This software platform leverages data analytics and communication technologies to optimize various aspects of deliveries. ITMS gathers real-time data on vehicle location, traffic conditions, inventory levels, and even driver performance. By analyzing this data, ITMS recommends the most efficient routes, allocates resources like drivers and vehicles strategically, and proactively identifies potential problems within the network. Ultimately, ITMS empowers logistics companies to make data-driven decisions that optimize delivery times, reduce costs, and enhance overall transportation efficiency.

Third-party logistics (3PL) providers can reap significant benefits by implementing Intelligent Transportation Management Systems (ITMS). As evidenced in a study by Lee and Rha (2021), ITMS streamlines transportation operations by

optimizing routes, reducing empty miles, and facilitating better load consolidation. This translates to cost savings on fuel, labor, and overall logistics expenses. Not only that, ITMS provides real-time tracking of shipments, allowing 3PLs to monitor progress, identify potential delays, and proactively communicate with clients. This transparency builds trust and strengthens client relationships. ITMS analyzes vast amounts of transportation data, enabling 3PLs to make data-driven decisions on route planning, carrier selection, and pricing strategies. This not only optimizes operations but also strengthens their competitive edge.

Although ITMS provide numerous benefits to the third party logistic companies , there are some challenges faced by these third party logistics company in order to implement ITMS in their organization. This context is supported with the evidence that the initial investment in ITMS hardware, software, and system integration can be substantial. 3PLs need to carefully evaluate the return on investment (ROI) and secure budget approval before implementation (Hesse & Neumann, 2022). Not only that, ITMS relies heavily on integrating data from various sources like transportation management systems (TMS), GPS devices, and external traffic data feeds. Ensuring seamless data flow and compatibility across different formats and systems can be a complex challenge (Mokhtari 2020). According to Sohal (2019), Transitioning to an ITMS requires training employees on new workflows and functionalities. Resistance to change and a lack of user buy-in can hinder successful implementation which could lead the company to face severe loss in revenue due to inefficient operation.

Although, some third-party logistic companies successfully overcame all these challenges and implemented ITMS in their company, still they need to face challenges of managing the ITMS. ITMS collects and stores sensitive data like location information and cargo details. Implementing robust cybersecurity measures and adhering to data privacy regulations poses ongoing challenges, and resulting in data security and privacy concerns. ITMS requires ongoing maintenance to ensure smooth operation and address emerging security threats. Additionally, staying updated with the latest software versions and adapting to evolving technological advancements necessitates continuous effort (Lee & Rha, 2021). Quantifying the true ROI of ITMS

can be challenging. 3PLs need to develop clear metrics to track improvements in efficiency, cost savings, and customer satisfaction to demonstrate the system's value.

Third-party logistics companies (3PLs) can leverage a variety of ITMS software and hardware to optimize their operations. One example is **telematics hardware** installed on vehicles. This hardware collects real-time data on location, fuel consumption, and driver behavior. ITMS software then analyzes this data to optimize routes, minimize empty miles, and identify opportunities for fuel savings (Ahn et al., 2020). Additionally, 3PLs can utilize **warehouse management software (WMS)** with ITMS integration. This allows for real-time inventory tracking and visibility throughout the supply chain. ITMS software can then factor in inventory levels at various warehouses when optimizing shipment routes and carrier selection, leading to faster deliveries and improved customer satisfaction (Wang et al., 2020). Finally, some 3PLs might invest in **transportation management systems (TMS)** that integrate seamlessly with their ITMS. This combined solution streamlines processes like freight procurement, carrier management, and shipment tracking, providing 3PLs with a comprehensive overview of their transportation network and enabling data-driven decision-making (Sohal et al., 2019).

In conclusion, Intelligent Transportation Management Systems (ITMS) offer significant potential for third-party logistics (3PL) providers. ITMS can streamline operations, enhance visibility, and improve decision-making, leading to cost savings, increased efficiency, and a competitive edge (Lee & Rha, 2021). However, implementing ITMS is not without its challenges. 3PLs must navigate upfront costs, data integration complexities, and user adoption hurdles before reaping the benefits (Hesse & Neumann, 2022). Despite these challenges, the potential of ITMS to optimize logistics operations and strengthen client relationships makes it a compelling investment for forward-thinking 3PL companies.

1.2 PROBLEM STATEMENT

The logistics industry in Malaysia is experiencing significant growth, driven by e-commerce and regional trade expansion. Third-Party Logistics (3PL) companies play a crucial role, providing outsourced logistics services. Intelligent Transportation Management Systems (ITMS) offer substantial benefits for 3PL companies, including optimized transportation planning, improved fleet management, and enhanced supply chain visibility. These advancements can lead to cost reductions, improved efficiency, and ultimately, increased customer satisfaction. However, research suggests that ITMS adoption rates among 3PL companies in Southeast Asia, including Malaysia, remain lower than anticipated. A clear understanding of the specific barriers hindering ITMS implementation in Melaka's 3PL sector is currently lacking. This study aims to bridge this knowledge gap and provide valuable insights for overcoming these challenges.

By analysing the identified barriers, the research will pinpoint the single most significant factor hindering successful ITMS implementation within Melaka's 3PL sector. This could be related to financial limitations, a lack of technological infrastructure, or cultural resistance within companies. Focusing on the most critical barrier allows for targeted solutions and recommendations to be developed with the greatest potential impact.

By investigating the challenges of ITMS implementation in Melaka's 3PL sector, this research aims to bridge the current knowledge gap. This study will identify the most significant barriers faced by 3PL companies in Melaka, analyze the root causes of these challenges, and explore potential solutions. The findings can provide valuable insights for 3PL companies in Melaka to overcome these hurdles and successfully implement ITMS, ultimately contributing to a more efficient and competitive logistics landscape in the region.

Considering the specific context of Melaka's 3PL companies and the identified barriers, this research will investigate effective strategies and best practices to overcome these challenges. This may involve exploring strategies like cost-effective ITMS solutions, tailored training programs for employees, or data security measures to address privacy concerns. By formulating targeted solutions, this research aims to

facilitate successful ITMS adoption in Melaka's 3PL sector, ultimately contributing to a more efficient and competitive logistics landscape in the region.

1.3 RESEARCH QUESTIONS

a) What are the barriers hindering the implementation of ITMS among 3PL companies in Melaka?

b) What strategies can be implemented to effectively overcome these barriers and facilitate successful ITMS adoption?

1.4 RESEARCH OBJECTIVES

a) To explore the barriers of implementing intelligent transportation management systems (ITMS) among third-party logistics (3PL) companies in Melaka

b) To investigate effective strategies to overcome barriers of implementing Intelligent transportation management systems (ITMS) among third-party logistics (3PL) companies in Melaka

1.5 Significant of Study

Firstly, this study aims to shed light on the challenges faced by third-party logistics (3PL) companies in Melaka when implementing Intelligent Transportation Management Systems (ITMS). This research holds significance for several reasons. Firstly, it will contribute valuable material for future researchers in the field of logistics and supply chain management, specifically regarding the challenges of integrating ITMS into 3PL operations. Through this study, we can explore the current level of ITMS adoption among 3PL companies in Melaka and identify the specific obstacles they encounter during implementation. This research will also explore the perspectives of various stakeholders within the logistics industry on ITMS adoption, providing valuable insights to guide future developments and implementations.

While Intelligent Transportation Management Systems (ITMS) offer significant potential benefits for optimizing logistics operations, their implementation in third-party logistics (3PL) companies in Melaka can be hindered by several challenges. The initial investment in ITMS software and hardware can be a significant barrier for 3PL companies, especially for smaller firms with limited financial resources. The cost of ITMS can vary depending on the features offered, the size and complexity of the 3PL company's operations, and the number of users requiring access (Gligor & Wierzbicka, 2020). Additionally, integrating ITMS with existing logistics management systems can be complex and require specialized expertise. These existing systems may utilize outdated technologies or lack compatibility with the data formats used by ITMS (Gligor & Wierzbicka, 2020). This can lead to delays in implementation and additional unexpected costs if unforeseen compatibility issues arise. The need for specialized expertise to handle the integration process can further increase the overall project cost (Gligor & Wierzbicka, 2020).

The effectiveness of ITMS relies heavily on the quality and accuracy of data input. Inconsistent or incomplete data can lead to inefficiencies and inaccurate results. For instance, inaccurate data on vehicle capacities or incorrect dimensions of packages can lead to inefficient route planning and wasted resources. An ITMS

might recommend an unsuitable route for a vehicle with an overloaded capacity, exceeding weight limits and potentially causing safety hazards (Wang, 2021). Similarly, incorrect package dimensions could lead to wasted space on a truck, reducing overall efficiency and potentially increasing transportation cost. 3PL companies may need to invest in data cleansing processes and staff training to ensure data quality. This can involve establishing clear data entry protocols that standardize how information is entered into the system. Implementing data validation checks within the ITMS can also help to identify and rectify any errors before they lead to operational problems. An ITMS might recommend an unsuitable route for a vehicle with an overloaded capacity, exceeding weight limits and potentially causing safety hazards (Wang et al., 2021). Similarly, incorrect package dimensions could lead to wasted space on a truck, reducing overall efficiency and potentially increasing transportation costs (Wang et al., 2021). 3PL companies may need to invest in data cleansing processes and staff training to ensure data quality. This can involve establishing clear data entry protocols that standardize how information is entered into the system. Implementing data validation checks within the ITMS can also help to identify and rectify any errors before they lead to operational problems (Wangl, 2021).

Furthermore, implementing a new technology like ITMS can lead to resistance from employees accustomed to existing workflows. Employees may be apprehensive about learning new systems or concerned about potential job displacement due to automation (Sohrabi Bourmand, 2020). For instance, employees responsible for manual route planning tasks might worry that ITMS will automate their jobs and make their positions redundant. Providing adequate training and support is crucial for ensuring employee buy-in and successful ITMS adoption. Training programs should not only focus on the functionalities of the ITMS but also address employee concerns. Training can be designed to highlight the benefits of ITMS for improving overall efficiency and job. For example, employees might learn how ITMS can automate tedious tasks, freeing them to focus on more strategic aspects of their work, such as customer service or problem-solving. According to Sohrabi Bournmand, 2020 training can emphasize how

ITMS can provide valuable data insights that can help employees make better decisions and improve their overall performance .

ITMS deals with sensitive data related to shipments and transportation routes. This data can be attractive targets for cyberattacks, and a security breach could expose sensitive information or disrupt critical logistics operations (Li 2021). For instance, cyber attackers might target ITMS to steal information about shipment schedules or locations, potentially putting valuable cargo at risk. A security breach could also disrupt critical logistics operations by making it impossible to track shipments or communicate with drivers (Li 2021). Additionally, unauthorized access to ITMS data could compromise intellectual property related to a company's logistics strategies. 3PL companies need to implement robust cybersecurity measures to protect this data from cyberattacks and ensure system integrity. These measures may include firewalls, data encryption, and regular security audits. Firewalls act as a barrier between the ITMS and external threats, while data encryption scrambles sensitive information to make it unreadable in case of a breach. Regular security audits can help to identify vulnerabilities in the system before they can be exploited by attackers. It's also crucial to develop a comprehensive incident response plan to address potential security breaches effectively. This plan should outline the steps that will be taken to contain a breach, mitigate the damage, and restore normal operations as quickly as possible.

By understanding these challenges, 3PL companies in Melaka can develop effective strategies to facilitate a smooth and successful ITMS implementation process. These strategies can help to minimize costs, ensure data quality, address employee concerns, and implement robust cybersecurity measures.

1.6 Scope and Limitations of The Research

This research focuses on investigating the challenges faced by third-party logistics companies (3PL companies) in Melaka when implementing Intelligent Transportation Management Systems (ITMS) using qualitative methods. The study will explore the perspectives of various stakeholders within the Melaka 3PL sector to gain a deeper understanding of the challenges associated with ITMS adoption. Specifically, the research will employ semi-structured interviews and case studies to examine challenges related to cost and integration complexities, Data quality management and utilization, Employee resistance and training needs and Security concerns and data protection.

This research is limited by its reliance on qualitative methods, such as interviews and case studies. While these methods provide valuable in-depth data, they may not be generalizable to the entire Melaka 3PL sector. The findings might be influenced by selection bias, as the participants' experiences may not represent the experiences of all 3PL companies in Melaka. Additionally, the number of interviews and case studies conducted might limit the comprehensiveness of the research.

To address these limitations, the research will strive to ensure participant selection reflects the diversity of Melaka's 3PL sector. This may involve interviewing representatives from companies of various sizes and focusing on different ITMS functionalities. Furthermore, the research will employ data triangulation techniques, potentially by incorporating data from secondary sources like industry reports or government publications, to strengthen the validity of the findings. Despite these limitations, this qualitative study offers valuable insights into the challenges faced by 3PL companies in Melaka when implementing ITMS. These insights can inform strategies to facilitate smoother and more successful ITMS adoption within the Melaka logistics sector.

1.7 Conceptual Meaning

1.7.1 Intelligent Transportation Management System

Intelligent Transportation Management Systems (ITMS) represent a conceptual leap in logistics management, promoting a more intelligent and data-driven approach. ITMS functions as a central hub, integrating data from various sources like vehicles, drivers, routes, traffic conditions, and shipment details. By analyzing this data, ITMS optimizes logistics operations through functionalities like route planning, dispatching, and real-time tracking. Furthermore, ITMS leverages its data analytics capabilities to provide valuable insights for logistics managers. This allows for identifying inefficiencies, optimizing routes, and making informed decisions about resource allocation. Finally, ITMS enhances visibility and control over transportation operations by enabling real-time shipment tracking, driver performance monitoring, and proactive response to potential disruptions. In essence, ITMS aims to streamline logistics operations, improve efficiency, and empower 3PL companies with greater control over their transportation processes.

1.8.2 Logistics

The conceptual meaning of logistics encapsulates the intricate flow of goods, information, and services across the entire supply chain, from origin to final consumption. This multifaceted process relies on meticulous planning and coordination, encompassing activities like demand forecasting, material procurement, transportation scheduling, and inventory management. The physical movement and storage of goods are central functions, achieved through various transportation modes (road, rail, air, sea) and warehousing facilities. Integration and visibility are crucial throughout the supply chain, requiring collaboration with suppliers, manufacturers, distributors, retailers, and transportation providers. Ultimately, logistics strives for efficiency and cost-effectiveness, optimizing routes, minimizing storage expenses, and streamlining processes to reduce delays and waste. In essence, logistics acts as the invisible engine of global trade, ensuring the smooth flow of products that reach consumers in the right place, at the right time, and in the right condition.

1.7.3 Third Party Logistics

The conceptual meaning of Third-Party Logistics (3PL) revolves around companies forging strategic partnerships with specialized logistics providers to outsource their logistics functions. This allows companies to leverage the expertise, infrastructure, and resources of a dedicated 3PL company. These providers offer a comprehensive suite of services encompassing warehousing, transportation management, inventory control, order fulfilment, and even value-added services like packaging and labelling. By outsourcing logistics, companies can free up internal resources and expertise to focus on their core business activities. This is particularly advantageous for companies lacking the in-house capabilities or resources to manage a complex logistics operation. Furthermore, 3PL providers offer scalability and flexibility, allowing companies to adapt their logistics needs based on demand fluctuations without the burden of maintaining their own logistics infrastructure. Potentially, companies can even achieve cost optimization through 3PL partnerships. 3PL providers benefit from economies of scale and expertise in negotiation, potentially securing better rates for transportation and warehousing compared to what a company could achieve independently. In essence, 3PL represents a strategic approach for companies to enhance efficiency, gain access to logistics expertise, and optimize their overall supply chain operations.

1.7.4. Freight Management

Freight management, an integral part of modern logistics, focuses on the efficient planning, organization, and optimization of goods transportation to balance cost-effectiveness, time efficiency, and sustainability. Recent research highlights the role of advanced technologies, such as intelligent transportation systems (ITS), in revolutionizing freight operations. Jain (2020) emphasized the significance of digital platforms like online freight exchanges, which enhance transparency and decision-making through real-time data integration. Urban freight management has also garnered attention, with Holguín-Veras et al. (2020) identifying strategies to reduce congestion and environmental impacts while maintaining operational efficiency. These developments align with the growing demand for sustainable and adaptive solutions, as reflected in Kayikci's (2020) work on intermodal logistics systems, which

address urban logistics challenges through multi-modal integration. In the context of Melaka, integrating ITS into third-party logistics operations could significantly enhance efficiency, sustainability, and responsiveness to market demands, providing a pathway for transformative improvements in the local logistics industry.

1.8 Summary

In this chapter, the purpose of this study is to discuss the research problem, research question, and attempt to establish the research goals of the effect that Malacca's challenges of implementing Intelligent Transportation management system among third party logistic companies. Aside from that, this chapter included an introduction to the subject of the research as well as some background information on the investigation. The scope, limitations and importance of research were covered by this chapter. Researcher would base on these introduction and carried on to second chapter which discussed about the part of literature review.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Based on the challenges of implementing intelligent transportation management system among third party logistics in Malacca. This section will explain the This section will explain the implementing intelligent transportation management system (ITMS) and discussion on the effective strategies to overcome implementing intelligent transportation management system among third party logistics in Malacca. In the section of this literature review, it will involve the overview of terms, theories and concept in detail to provide a clear understanding. Furthermore, the researcher will explain the relationship between challenges of implementing intelligent transportation management system among third party logistics in Malacca. Next, will be the proposed research framework and research hypotheses.

2.2 Intelligent Transportation Management System (ITMS)

According to Zulkarnain (2021), when transportation experts realized that electronic technologies could start to significantly improve surface transportation in 1991, the idea of intelligent transportation management systems (ITMS) was born, and the US Congress enacted the national ITMS program. Since then, there has been a significant advancement in computer, communication, and sensor technology, and ITMS systems have become widely used in public transportation and highway jurisdictions across the globe.

On the other hand, ITMS is modern wireless, electronic, and automated technologies are included in ITS with the aim of enhancing surface transportation efficiency, convenience, and safety. When combined, these technologies offer the

ability to integrate users of the system, public transportation, trucks, and private vehicles, as well as infrastructure such as roads and public transportation. Automated technology seen in vehicles include collision avoidance systems, automated guideways, bus precision docking, and real-time information that can boost driving efficiency and present drivers with the most recent road conditions. Numerous ITS systems can aid in improving air quality, minimizing needless miles or kilometers traveled, increasing the use of alternative modes, decreasing time spent in traffic, and reducing reliance on foreign oil. They can also help optimize journeys (route advice) and mode choice per trip.

According to Susan (2023), sophisticated network of technologies designed to enhance the efficiency, safety, and sustainability of transportation systems. ITMS typically integrates various components such as sensors, cameras, Global Positioning Sysytem (GPS), communication networks, and data analytics to monitor and manage traffic flow, optimize transportation routes, improve public transit operations, and provide real-time information to travelers. The primary goals of an ITMS include reducing congestion, minimizing travel times, enhancing safety, and promoting environmental sustainability. ITMS incorporates sensors, cameras, and other monitoring devices to gather real-time data on traffic conditions. This data is then analyzed to optimize traffic flow, manage congestion, and improve overall safety. ITMS provides drivers with dynamic route guidance, utilizing GPS and traffic data to suggest the most efficient routes based on current conditions. This helps reduce travel times and alleviate congestion on heavily trafficked routes.

ITMS can enhance the efficiency and reliability of public transit systems by optimizing schedules, managing vehicle fleets, and providing real-time updates to passengers regarding service disruptions or delays. Often includes smart traffic signal systems that dynamically adjust signal timings based on traffic volumes, reducing delays and improving intersection efficiency and emerging technologies such as connected and autonomous vehicles (CAVs) to further enhance transportation efficiency and safety. ITMS utilizes advanced data analytics and predictive modeling techniques to anticipate traffic patterns, identify potential bottlenecks, and optimize transportation operations proactively and integrate various modes of transportation

seamlessly, including private vehicles, public transit, cycling, and walking, to provide travelers with comprehensive transportation options and improve overall mobility.

2.3 Third Party Logistics

According on S.Samar Ali (2021), third party logistics is assigning supply chain management and logistics tasks to an outside vendor. This can involve order fulfillment, warehousing, transportation, and other associated supply chain services. Value-added services like inventory control, supply chain optimization, and specialized logistics are also available from 3PL providers. The real value is in the technology, operational know-how, and industry understanding they bring to effectively manage the logistics difficulties and guarantee flawless end-to-end coordination within your company. Businesses can get cost savings, increased operational effectiveness, better customer service, and a competitive edge in the constantly changing logistics market by utilizing 3PL services.

Third-party logistics, or 3PL, is a phrase frequently used in the logistics industry to refer to a logistical service provider. Regretfully, a lot of businesses identify as 3PLs even when they might not supply the services that a 3PL service provider would require. The creation of laws defining a 3PL as "a person who solely receives, holds, or otherwise transports a consumer product in the ordinary course of business but who does not take title to the product" was passed in 2008 in an effort to clear up any misunderstandings surrounding the concept. When a business determines it is time to contract with a third-party logistics provider (3PL), it needs more than just a delivery service. Supply chain integration, warehousing, customs clearing services, and multimodal transportation knowledge are all provided by 3PL companies. It is not necessary to provide every function in the supply chain to qualify as a 3PL, but it is necessary to handle the delivery components on the client's behalf. A key differentiator between a Second Party Logistics (2PL) and a 3PL is that the latter performs and oversees the supply chain's delivery role. The 3PL manages every aspect of the supply chain connected to delivery, even if it does not create the supply chain on behalf of a customer.

According on Yangyan (2020), the term third-party logistics (3PL) describes the practice of contracting out supply chain management and logistical tasks to an outside service provider. A variety of services, including order fulfillment, freight forwarding, inventory management, and warehousing, can fall under this category. Employing 3PL providers allows businesses to concentrate on their core competencies while cutting expenses and increasing efficiency. They handle the transportation of goods, including selecting carriers, negotiating rates, and ensuring timely delivery. 3PL companies offer inventory control and management services, using advanced technologies to track stock levels, manage reorder points, and reduce inventory costs. This includes picking, packing, and shipping orders to customers. 3PL providers often have sophisticated systems to ensure accuracy and efficiency in fulfilling orders and coordinate the shipment of goods across borders, managing customs clearance, documentation, and compliance with international shipping regulations.

2.4 Logistics

According to Robert Prieto (2021), logistics is management of inventory at motion and at rest" is one way to conceptualize logistics. Logistics as it pertains to construction includes planning, acquiring, delivering, managing inventories 2, and arranging resources for a building site. The movement of workers, equipment, and materials is at the heart of logistics, as will be covered later. Demands from construction sites are what drive these movements, which are in turn limited by supply chain capacity as well as the efficacy and efficiency of logistical flows. Throughout the whole supply chain, logistics is sometimes thought of as the "connecting arrows."

Logistics refers to the comprehensive process of planning, implementing, and controlling the efficient flow and storage of goods, services, and related information from the point of origin to the point of consumption. The goal is to meet customer requirements in a cost-effective and timely manner. The movement of goods from one location to another using various modes such as road, rail, air, and sea. Efficient transportation is crucial for timely delivery and cost control.The storage of goods in warehouses or distribution centers. This includes managing space, inventory levels, and the handling of goods to ensure they are readily available when needed. The process of ordering, storing, and using a company's inventory. This involves managing

stock levels to balance the costs of holding inventory with the need to meet customer demand. The complete process from receiving an order to delivering it to the customer. This includes order processing, picking and packing, and shipping.

According to Joanna (2023), logistics typically refers to the science and art of managing and controlling the flow of goods, information, and other resources between points of origin and consumption to meet customer requirements. This includes the integration of information, transportation, inventory, warehousing, material handling, packaging, and security. Logistics involves the coordination of various activities within the supply chain, ensuring that all parts of the supply chain are synchronized to meet customer demands efficiently. Logistics in a global context involves managing international supply chains, dealing with cross-border transportation, customs regulations, and global sourcing strategies. Increasingly, logistics research focuses on sustainable practices, looking at ways to minimize environmental impact through green logistics, eco-friendly transportation, and sustainable sourcing. Identifying, assessing, and mitigating risks in the logistics process is crucial for maintaining supply chain resilience. This includes managing risks related to transportation, natural disasters, geopolitical issues, and other disruptions.

2.5 Freight management

Freight management plays a crucial role in optimizing the transportation and storage of goods within modern logistics systems. It involves integrating various technologies such as artificial intelligence (AI), the Internet of Things (IoT), and blockchain to enhance operational efficiency and cost-effectiveness. Key components include order management, transportation coordination, warehouse organization, and real-time tracking. These systems improve visibility and compliance while reducing delays and operational overhead, as highlighted in recent studies (Manapure, 2024).

Digitization and big data analytics have become indispensable for efficient freight management, particularly in dynamic decision-making processes. A hybrid model leveraging offline and online (O2O) systems allows for real-time data analysis, enabling logistics companies to optimize routing, predict customer expectations, and

improve profit margins. This approach not only increases service efficiency but also supports better customer satisfaction and resource allocation (Selvaraj et al., 2020). The implementation of freight exchanges further enhances knowledge sharing and capacity utilization, which are critical for minimizing empty runs and maximizing operational efficiency (Sałek & Wiśniewska-Sałek, 2024).

Sustainability and innovation are central to modern freight management, particularly with the integration of advanced technologies. For instance, blockchain-based frameworks can streamline decision-making by offering secure, decentralized data management, enabling more resilient global supply chains. In addition, the emphasis on green logistics, such as multi-modal transportation and sustainable practices, is reshaping industry standards, aligning with broader environmental objectives (Nakandala et al., 2022). These advancements demonstrate the industry's commitment to innovation and sustainable growth.

2.6 Barriers Of Implementing ITMS

2.6.1 High Initial Costs

According to Shivani (2022), Intelligent Transportation Management System have challenges about High Initial Costs is purchasing and installing physical infrastructure such as sensors, GPS devices, cameras, and communication networks required to gather and transmit data. Upgrading or constructing new facilities to house ITMS equipment, data centers, and control rooms. Acquiring licenses for advanced software solutions such as transportation management systems (TMS), warehouse management systems (WMS), and other integrated logistics software. Tailoring off-the-shelf software solutions to meet the specific needs of the 3PL operations, which often involves significant additional costs. Integrating ITMS with existing enterprise systems such as Enterprise Resources Planning (ERP), Customer Relationship Management (CRM), and other legacy systems. This requires extensive customization and middleware to ensure seamless data flow and interoperability.

Other than that, engaging specialized IT personnel and consultants for the design, implementation, and integration phases.Training staff to effectively use new ITMS tools and systems. This includes both initial training and ongoing education to keep up with system updates and new functionalities. Implementing changes I management programs to help employees adapt to new processes and systems, which may include hiring consultants or developing in-house programs. Setting up ongoing maintenance contracts to ensure the ITMS infrastructure remains operational and efficient. This can be a substantial upfront cost. Establishing robust technical support frameworks to address any issues that arise during the initial implementation phase. Investing in advanced cybersecurity technologies to protect sensitive logistics data and ensure system integrity. Costs associated with selecting and contracting with ITMS vendors, including legal fees, negotiations, and initial setup costs.

2.6.2 Integration issue

Integration issues have become a significant challenge in various sectors, especially in the context of technological adoption and organizational change. One of the major concerns is the seamless blending of new systems with existing infrastructures. According to Boudia et al. (2020), integration processes often require substantial effort to ensure compatibility and avoid system disruption. This is particularly relevant in industries where legacy systems are entrenched, and upgrading them to accommodate new technologies is both costly and time-consuming. Moreover, the process often involves complexities related to data interoperability and communication across different platforms, which can hinder smooth integration and reduce operational efficiency (Benbya & McKelvey, 2021).

In the healthcare sector, integration issues are especially pronounced due to the wide variation in electronic health record (EHR) systems. Studies have shown that EHR integration requires careful attention to user requirements and system standards to ensure they meet the needs of all stakeholders, including patients, healthcare providers, and insurers (Nguyen et al., 2019). These efforts are complicated further by organizational resistance to change, lack of proper training, and fears of data breaches, which can impede successful implementation (Ram et al., 2020). Furthermore, the

integration of artificial intelligence into healthcare settings adds another layer of complexity, as it necessitates both the modification of existing workflows and the alignment of AI tools with current data systems (Anderson et al., 2021).

These integration challenges underscore the importance of strategic planning, the involvement of experienced IT professionals, and continuous monitoring to address issues as they arise. Effective integration not only improves system efficiency but also enhances the overall user experience and long-term sustainability of technological advancements (Boudia et al., 2020; Benbya & McKelvey, 2021).

2.6.3 Technical challenges

The implementation of Intelligent Transportation Management Systems (ITMS) in third-party logistics (3PL) companies presents several technical challenges that can impede their effective deployment. A significant barrier is the integration of ITMS with existing legacy systems within logistics organizations. This challenge stems from the difficulty in synchronizing modern transportation management software with older infrastructure, often leading to interoperability issues (Chien et al., 2018; Wang et al., 2020). Furthermore, ITMS requires large volumes of real-time data from diverse sources such as GPS, sensors, and weather reports. The quality and consistency of this data can impact the system's accuracy and decision-making capabilities (Bai et al., 2019). Third-party logistics companies must address data inconsistency, compatibility issues, and the need for robust data management systems to ensure optimal system performance.

In addition to integration and data quality challenges, another technical difficulty in ITMS implementation lies in the scalability and adaptability of the technology. As 3PLs handle a wide range of transportation needs, from local deliveries to international shipments, ITMS must be flexible enough to adapt to varying operational requirements. Scaling the system to accommodate diverse fleets, routes, and service levels without compromising performance is complex (Wu et al., 2021). Moreover, cybersecurity concerns related to the transmission of sensitive transportation data across multiple channels can hinder ITMS adoption. Logistics

companies must implement stringent security protocols to protect data from cyber threats, which adds to the complexity and cost of ITMS integration (Zhao et al., 2021).

2.6.4 Resistance to change

In the context of Intelligent Transportation Management Systems (ITMS) implementation in third-party logistics (3PL) companies, resistance to change is a significant barrier that impedes effective adoption. Many staff members within these organizations may experience difficulty adapting to new technologies and systems due to fear of the unknown, lack of understanding, or perceived threats to job security. This resistance often arises from a mismatch between the staff's established routines and the demands of the new system, which can lead to a lack of engagement with the ITMS. As highlighted in studies, resistance to technology adoption can stem from both organizational culture and individual employee factors, such as uncertainty and lack of trust in the technology, as well as inadequate training and support systems. Employees' reluctance to embrace change can ultimately lead to delayed or failed ITMS implementations.

To address this challenge, research emphasizes the importance of understanding the underlying reasons for resistance, including communication breakdowns and insufficient involvement of staff in the planning process. When employees perceive the implementation as top-down or when they are not adequately trained on how to use new systems, their resistance becomes more pronounced. Building trust through transparent communication, offering robust training programs, and involving staff in the decision-making process are essential strategies to mitigate resistance. Additionally, leadership commitment and the provision of sufficient resources for the adoption process are critical for overcoming barriers to ITMS implementation. These steps can significantly enhance staff buy-in, facilitate smoother transitions, and ultimately ensure the successful deployment of ITMS in 3PL companies (Abdullah & Arshad, 2020).

2.6.5 Training and change management

The implementation of Intelligent Transportation Management Systems (ITMS) among third-party logistics companies can be significantly hindered by barriers related to training and change management. Research highlights that inadequate training programs can lead to resistance from employees, poor system utilization, and ultimately, the failure of ITMS adoption. A study by Ribeiro et al. (2021) found that logistics companies in Brazil struggled with user engagement due to insufficient skills and lack of systematic training programs. Employees often lacked the technical expertise to effectively use the ITMS, leading to frustration and reduced productivity. Inadequate training can therefore prevent the realization of the full potential of an ITMS, making it a critical barrier to successful implementation.

Another key issue identified in the literature is the role of change management in overcoming resistance to new systems. Change management processes are essential for managing the organizational shift that comes with ITMS adoption. A study by Costa et al. (2020) found that poor communication and a lack of effective change management strategies were significant barriers in ITMS adoption. When logistics companies fail to address the emotional and psychological resistance of employees, they encounter delays and difficulties in system integration. The study underscores the importance of involving employees early in the process, providing continuous training, and aligning change initiatives with organizational culture to facilitate smoother transitions. Thus, both training and effective change management practices are critical to overcoming the barriers to ITMS implementation in the logistics sector.

2.6.6 Dynamic Demands

Dynamic demands represent a significant challenge in the implementation of Intelligent Transportation Management Systems (ITMS) among third-party logistics (3PL) companies. These systems are designed to streamline transportation operations, enhance efficiency, and reduce costs. However, the highly variable nature of demand in logistics—driven by factors like customer preferences, seasonal trends, and economic fluctuations—poses a barrier to successful ITMS deployment. Studies have

highlighted that these unpredictable demands complicate the development of systems capable of providing real-time, data-driven decisions. According to Lee et al. (2020), fluctuating demand patterns force ITMS to continuously adapt, which often leads to system inefficiencies or failure to meet key performance indicators. This dynamic nature of demand requires that ITMS not only integrate complex algorithms but also maintain flexibility in real-time data processing and predictive analytics, making the system's full implementation challenging.

The second major hurdle in implementing ITMS within third-party logistics companies is the adaptability of existing infrastructure and business models. Traditional logistics networks are often designed with rigid systems that struggle to accommodate the fluctuating demands that ITMS aim to address. Logistic companies need to revise their legacy systems to integrate with ITMS, which requires both technological investment and strategic alignment. As argued by Singh et al. (2021), overcoming the barriers posed by established infrastructures is crucial, as failure to upgrade may result in the technology being underutilized, thus limiting its potential benefits. This issue becomes even more pronounced when 3PL companies are dealing with high uncertainty in demand, which impacts their ability to make data-driven decisions and optimize transportation routes effectively.

2.6.7 Cost sensitivity

The implementation of Intelligent Transportation Management Systems (ITMS) in third-party logistics (3PL) companies is often hindered by cost sensitivity, as these systems can represent significant financial investments. The primary challenge arises from the high upfront costs associated with procuring, integrating, and maintaining ITMS. For many 3PL companies, especially small-to-medium enterprises (SMEs), these costs can outweigh the perceived benefits in the short term, leading to hesitation or outright rejection of adoption. Moreover, the ongoing maintenance and operational costs, such as system updates, training, and technical support, compound the initial financial outlay, making cost sensitivity a key factor in delaying or preventing full-scale implementation (Wu, 2020). The resistance to ITMS adoption

based on cost concerns is particularly evident in developing regions, where the financial constraints of logistics companies further exacerbate the barrier.

In addition to the direct financial costs, companies must consider the hidden or indirect costs associated with implementing ITMS, such as the potential disruption to existing operations and workforce training. While ITMS can lead to long-term efficiencies and reduced operational costs, the initial period of adaptation can be resource-intensive. This period often involves additional expenditures on retraining employees, adapting business processes, and overcoming technological integration challenges. Therefore, the reluctance of 3PL companies to invest in ITMS stems not only from the direct costs but also from the perceived risk of uncertain returns in the short to medium term (Sharma et al., 2021). This cautious approach is particularly prevalent in firms with lower margins, where the balance between cost-saving and investment risk plays a crucial role in decision-making.

2.7 Strategies for successful ITMS adoption

2.7.1 Training Programs

In recent years, training programs have been widely recognized as a critical strategy to overcome the barriers to implementing Intelligent Transportation Management Systems (ITMS) within third-party logistics (3PL) companies. A key challenge in adopting such advanced systems is the lack of specialized knowledge and skills among employees. Effective training programs, including both formal and on-the-job learning, play a significant role in mitigating this issue by enhancing staff understanding of the system's functionalities and ensuring smoother integration into existing processes. In fact, studies highlight that a tailored approach to training—focusing on specific technological needs of 3PL companies—helps employees overcome technical barriers, fostering a more conducive environment for successful ITMS adoption (Tarrant et al., 2021).

Furthermore, training is not only pivotal in overcoming technological barriers but also in addressing the cultural and organizational resistance that often accompanies

ITMS implementation. Resistance to change is common when introducing complex technological systems, especially in organizations with established workflows. To combat this, a well-structured training program can promote a culture of continuous improvement and innovation, which is essential for fostering acceptance of ITMS. Recent research indicates that by aligning training programs with the strategic goals of the company, employees become more motivated to embrace ITMS as a valuable tool for enhancing operational efficiency and competitiveness (Zhang et al., 2020).

2.7.2 Phased approach to adaption

The implementation of Intelligent Transportation Management Systems (ITMS) in third-party logistics companies often faces several barriers, such as financial constraints, technological complexity, and organizational resistance to change. A phased approach to adoption has been recognized as an effective strategy to overcome these challenges. This method allows for gradual integration of ITMS components, reducing the risk of failure by enabling companies to test and adjust the system in manageable stages. By proceeding incrementally, logistics companies can refine their processes, optimize system features, and ensure compatibility with existing infrastructure, ultimately minimizing the potential for large-scale disruptions. Recent studies highlight the importance of such a structured adoption process in enhancing user acceptance and providing a clear roadmap for implementation, allowing companies to achieve desired outcomes without overwhelming their resources (Zhu et al., 2020).

Further support for the phased approach comes from the observation that it provides an opportunity for third-party logistics companies to build their capacity and expertise gradually. This method also facilitates the alignment of ITMS implementation with strategic business goals, making the transition smoother and more sustainable over time. As noted by Zhang and Wang (2021), the phased adoption strategy helps companies cope with internal resistance by demonstrating the practical benefits of ITMS in a controlled environment, which leads to increased trust in the technology. Furthermore, the flexibility embedded in the phased approach encourages continuous feedback loops, allowing for ongoing improvements based on real-world

usage, thus making the full system integration more efficient and effective in the long run.

2.7.3 Utilizing government grants and fundings

The implementation of Intelligent Transportation Management Systems (ITMS) within third-party logistics (3PL) companies presents a host of challenges, particularly regarding financial barriers. One effective strategy that has been explored in recent literature is the use of government grants and funding. These financial resources can significantly reduce the initial investment burden associated with ITMS adoption, particularly for smaller or resource-constrained logistics firms. Governments, recognizing the importance of technology in optimizing transportation and logistics efficiency, have increasingly offered grants and subsidies to incentivize ITMS adoption. According to recent research, government support has proven to be a key enabler for 3PL companies in overcoming the initial financial constraints associated with advanced technological implementations (Jalil et al., 2021). These financial aids not only promote adoption but also enhance the operational capabilities of logistics companies, contributing to long-term sustainability in the competitive logistics sector.

Moreover, government funding has been identified as an important enabler for the integration of ITMS technologies into existing logistics operations. It provides a structured mechanism to encourage collaboration between logistics companies and governmental bodies to achieve national or regional transportation goals. By leveraging such funding, 3PL companies can focus on developing and customizing ITMS solutions that align with both technological advancements and regulatory frameworks. Research indicates that the availability of such funds helps mitigate the risk of technological obsolescence, thus ensuring that logistics companies stay competitive in a fast-evolving market. In this context, government grants not only serve as a financial lifeline but also act as a strategic tool that aligns the interests of private logistics firms with broader public infrastructure and environmental goals (Saroha et al., 2020).

2.7.4 Monitoring successful metrics

Monitoring successful metrics is essential to ensure the effective implementation of Intelligent Transportation Management Systems (ITMS) within third-party logistics (3PL) companies. According to recent studies, the adoption of ITMS can be hampered by various barriers, such as the complexity of technology integration, resistance to change, and the high costs of implementation (Wang et al., 2021). To address these challenges, firms must establish clear performance metrics that are aligned with strategic goals, such as operational efficiency, cost reduction, and customer satisfaction. By monitoring these metrics continuously, logistics companies can adjust their strategies to ensure that the ITMS implementation remains on track. Such metrics also serve as a tool for companies to evaluate system performance in real-time and make data-driven decisions for further optimization. Metrics such as transportation time, fuel consumption, and real-time tracking efficiency are key indicators that reflect the success of the system implementation (Wang et al., 2021).

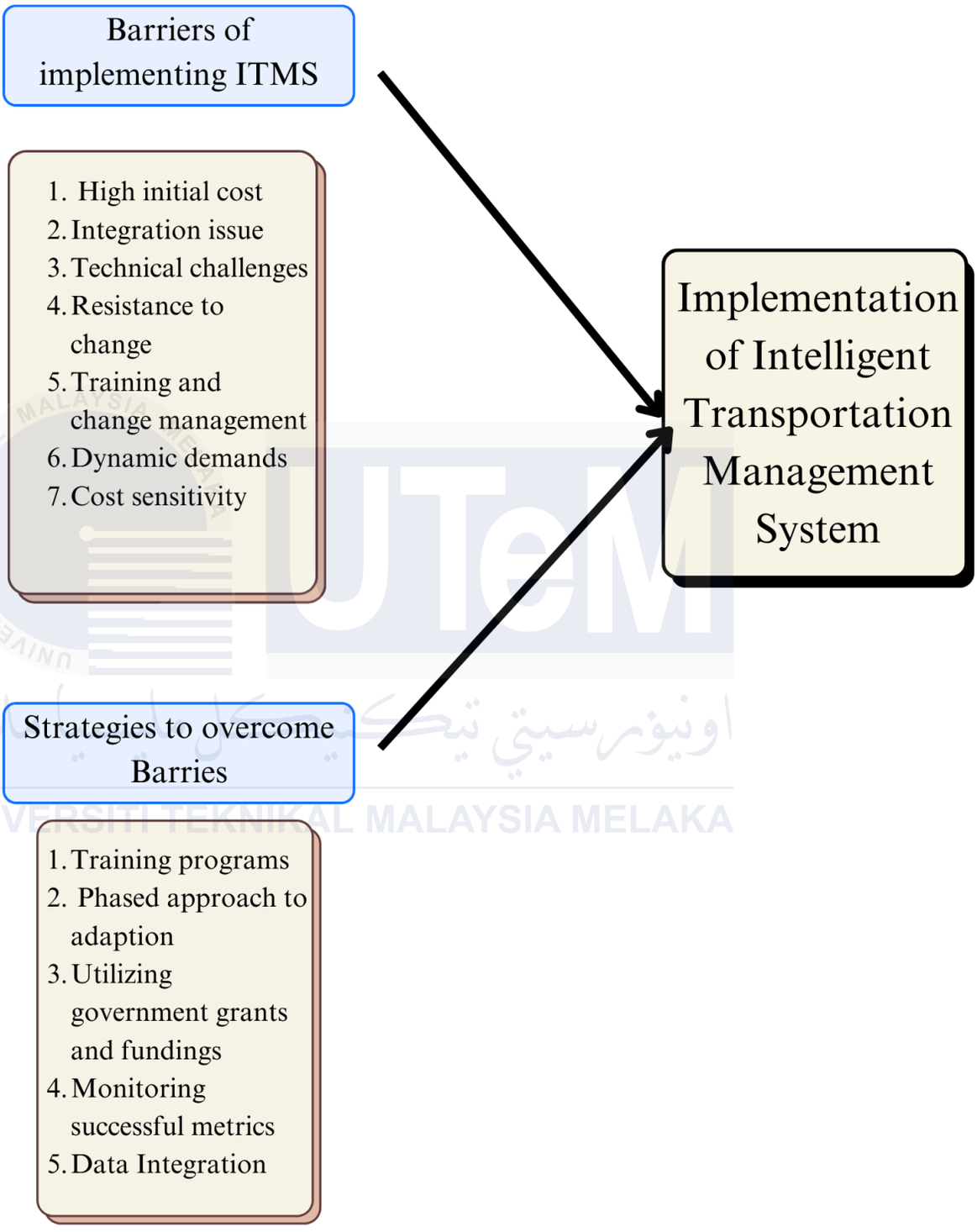
Moreover, the strategic monitoring of these performance metrics helps overcome the barriers associated with stakeholder buy-in and resource allocation, which are often seen as significant challenges in the deployment of ITMS (Zhang et al., 2022). The ability to track and report improvements through concrete, measurable outcomes provides a compelling case for the continued investment in ITMS from both a managerial and operational perspective. Studies emphasize that the involvement of all stakeholders in the metric monitoring process fosters a collaborative environment where the perceived value of ITMS is communicated effectively, addressing concerns related to costs and uncertainty (Zhang et al., 2022). This approach not only facilitates the overcoming of initial resistance but also aids in aligning the system's capabilities with the company's long-term objectives, ensuring that the ITMS delivers sustained benefits.

2.7.5 Data integration

Data integration plays a critical role in overcoming the challenges faced by third-party logistics (3PL) companies during the implementation of Intelligent Transportation Management Systems (ITMS). As 3PL companies manage complex supply chains and multiple transportation networks, fragmented data from different systems often becomes a barrier to successful ITMS implementation. Integrating various sources of transportation and logistical data such as GPS, vehicle telematics, and traffic management systems, ensures that accurate, real-time information is available for decision-making. A study by Cheng et al. (2022) emphasizes the need for data integration as a strategy to eliminate inefficiencies caused by disjointed information systems in transportation management, highlighting how integration enhances communication and coordination across logistics networks. Such integration facilitates a more adaptive and efficient ITMS that can improve operational decision-making and overall transportation performance in 3PL operations.

Furthermore, data integration not only aids in overcoming the technical barriers of implementing ITMS but also provides a competitive advantage in the logistics industry. By integrating both structured and unstructured data from various sources, 3PL companies can leverage advanced data analytics and machine learning techniques to optimize routes, predict delays, and reduce costs. According to Liu et al. (2021), a unified data architecture is essential for implementing ITMS effectively in the logistics sector. Their research shows that seamless data flow across platforms reduces system complexity and minimizes the chances of errors, fostering trust in ITMS systems. The ability to combine real-time data from diverse sources such as weather, traffic conditions, and fleet performance enables better decision-making and supports the scalability of ITMS in 3PL environments.

2.8 Conceptual Framework



2.9 SUMMARY OF CHAPTER

This chapter has presented the literature review and relevant theoretical background. In this research, the analysis focused on the Challenges in Implementing ITMS among Third party Logistic companies in Malacca.The various Machine learning-based traffic scheduling techniques for intelligent transportation system in Malacca such as challenges, awareness, adoption and strategics to enhance. The review from previous studies make the explanation more supportive. Those factors that outcome in a research framework were used to test in chapter 4. The following chapter will discuss on the methodology of this research.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this subdivision, the research methodologies for this study are discussed. In command to accomplish the research objectives, there be present several steps that have been showed through this study. The research methodology is a systematic method in the direction to analyze available the results of a specified problem on a particular difficulty. As stated by Vaneet Kaur (2020) , methodology refers to the overarching strategy and rationale of your research project. Then, the researcher need to enlighten the observed about phenomena and describe about statement with exact. Researcher has discussed about the research design, sampling method and data collection, instruments and data statistical, to attain the goal of this research which was to study about the challenges of implementing Intelligent transportation management system among third party logistic companies in Malacca. In the context of research methodology, this refers to the incorporation of theoretical techniques, experiential investigations, numerical schemes, statistical methodologies, and so on. In this chapter, the investigator primarily makes use of case studies as a research method in order to perform out this research.

3.2 Research Design

The research design acts as the blueprint for a researcher's investigation. It outlines the strategy for answering a research question by integrating theoretical and practical methods. A well-designed study ensures the data collected is relevant and aligns with the research goals. Jovancic (2020) emphasizes the importance of design in determining the type of data, collection methods, and sampling approach. The

researcher must choose the design that best suits the research question. Essentially, the research methodology ensures the data gathered provides answers to the research problem. A clearly defined research question is crucial, along with specific objectives derived from those questions. The researcher then outlines the data collection and analysis methods within the study design. This design goes beyond just data collection and analysis. It also addresses ethical considerations, potential limitations like data access, time constraints, location restrictions, and budget limitations.) The general plan or strategy that specifies how a research study will be done is referred to as the research design. It gives researchers a road map for investigating a certain research issue or hypothesis and collecting appropriate data to address the study objectives. A well-designed research study improves the findings' validity, reliability, and generalizability. The three basic types of research designs that can be used in a research design that are exploratory, descriptive, and explanatory. The exploratory design was chosen for this study.

3.2.1 Exploratory Research

Exploratory research is a form of research design that attempts to get deeply into a study problem or question, especially when there is little prior knowledge or understanding of the topic. Exploratory research's primary goal is to gather insights, generate ideas, and develop a deeper knowledge of the topic under examination. It is usually the first stage of study before more particular and focused studies are carried out. The goal of an exploratory design is usually to examine something that hasn't been researched before. However, depending on their goals and methods, exploratory investigations have assumed a variety of forms in sociology. The two most typical types have been as follows: a previously unresearched issue is given a preliminary investigation, and an already existing topic is investigated in order to generate new ideas and theories. (R. Swedberg, 2020) The second kind is applied in this research, when an existing issue is investigated to generate new ideas and theories. Qualitative approaches are frequently used in exploratory research to collect rich, descriptive data. Individual interviews were utilized for this research.

3.3 Methodology Choices

This study is to describe the scope of fundamental research, where to understand the area of interest the knowledge should be established. This study is to describe the challenges of implementing ITMS among third party logistic companies and to test hypothesis. This is one of the methods that the researcher determines the approaches of this study. There are 3 types of method which is qualitative, quantitative and mix method. For this study, the researcher uses the qualitative method. Methodology is is described as the theory of how a study should be carried out, which includes the theoretical and philosophical assumptions upon which research is founded as well as the consequences of these for the technique that is selected.

3.3.1 Qualitative

Using non-numerical data, qualitative research seeks to comprehend and analyses social phenomena. It places a strong emphasis on examining individual experiences, meanings, and social circumstances. Interviews, observations, focus groups, and content analysis are typical qualitative research approaches. (Christoph Gumbinger, 2020)The approach implemented in this study is One-on-one interactions between the researcher and the participant during an in-depth interview allow for a thorough examination of the participant's viewpoints, experiences, and attitudes. Depending on the degree of freedom in the questioning process, interviews can be organized, semi-structured, or unstructured.

3.4 Data Collection

There were basically two types of data and information sources to collect : main data sources and secondary data sources. In order to conduct this study, the researcher employed both data sources.

3.4.1 Primary Data

This study utilizes primary data, which are first-hand observations gathered directly by the researcher through various methods. Examples include surveys, observations, questionnaires, focus groups, case studies, and interviews. For this research, interviews were chosen as the primary data collection method. Interviews offer valuable insights into the underlying reasons and motivations behind people's attitudes, preferences, and behaviours. They can be conducted one-on-one or in groups, with this study focusing on personal one-on-one interviews. Interviews can be structured, semi-structured, or unstructured. This research will utilize a semi-structured interview format, where the researcher explores a general topic in depth. The researcher asks related questions and actively listens to the responses to delve deeper into the topic. By conducting semi-structured interviews, the researcher aims to gain a comprehensive understanding of what are the challenges of implementing ITMS among 3PL companies and the strategies to overcome it.

3.4.2 Secondary Data

Data that has been gathered by someone else for a reason other than the current research project is referred to as secondary data. It is information that already exists and is accessible from sources including governmental organizations, academic journals, research centers, books, online databases, and earlier research investigations. The majority of secondary data comes from published research, official statistics, mass media items, diaries, letters, and government reports and is about the natural world's past. In order to determine the challenges to the adoption of digital procurement, the researcher has used secondary data. All of the secondary data was gathered from books, websites and online journal papers.(Ajayi,V.O.,2017).

3.5 Interview

In qualitative interviewing, the researcher will think up a framework for the interview, which is different from the normal survey interview schedule. According to Saunders et al. (2016), qualitative interviewing is characterized by its fullness and richness, which is predicated on the opportunity to investigate an subject in as

authentic an approach as is feasible. In qualitative research, the interview is clearly seen as being able as something more similar to a conversation than to a question-and-answer session. In the structured, interviewers can disrupt owing to time constraints. Because of questioning, formalities, and disturbances, interviewees may not reveal their actual sentiments and views. Qualitative researchers seldom use formal interviews. (Barrett and Twycross, 2022, p. 63).

The unstructured, in which the interviewer performs the interview without per-planning, similar to impromptu dialogues. This interview has drawbacks. For instance, it's hard to guarantee that the talk will yield research data, therefore a second or third interview is usually necessary. Researchers must guide the dialogue to gather data. Thus, qualitative research using unstructured interviews is challenging and may not yield the needed data. In semi- structured, in which the interviewer performs the interview without per-planning, similar to impromptu dialogues. This interview has drawbacks. For instance, it's hard to guarantee that the talk will yield research data, therefore a second or third interview is usually necessary. Researchers must guide the dialogue to gather data.

3.5.1 Semi- Structured

The researcher employed a semi-structured interview for the purpose of this research case study. The interview focused on two-way communication, which enabled the researcher to both provide and receive information. In order to ensure that the interview goes off without a hitch, we will first put up an open-ended questionnaire based on the prior sub-title and then conduct the interview itself. Semi-structured interviews are more conversational than printed questionnaires.Semi-structured interviews utilize open-ended questions "to address some themes in more detail" (Hancock et al., 2019, p.16). Open-ended questions allow the interviewer to get detailed data from the interviewee(s) with personal sentiments, emotions, and ideas without the practise of self- General questions ice break and quickly introduce the topic to prepare the individual being interviewed for more difficult inquiries.

3.5.2 Interview Protocol

The collection of high-quality qualitative data requires a dependable Interview Protocol. It allows for the methodical, regular, and thorough exploration of topics through interviews with many groups of people (Patton, 2015). In addition, having a set protocol in place to follow throughout an interview helps ensure that all pertinent data is gathered in the allotted time. Researchers benefit greatly from respondents' candid accounts of their experiences thanks to the wealth of qualitative information they provide. In terms of developing an interview procedure, these recommendations are not particularly useful for novice qualitative researchers. When conducting interviews, inexperienced researchers are less likely to stay on topic and more likely to stray from their stated goals. When researchers are dealing with particularly vocal respondents, there is a greater chance of bias. This compromises the interview's reliability and objectivity.

Researchers prepare for interviews by reading up on the subject at hand and the person they plan to speak with. The researcher prepares a set of questions and topics to cover during the interview. Its purpose is to serve as a road map for the interview, helping the researcher cover all relevant ground while keeping the conversation on track. Facilitate communication between yourself and your interviewee before you sit down for the actual interview. This might include explaining the procedure, offering to answer any questions the researcher has, and confirming the interview time and location.

3.5.2.1 Before Interview

Researchers prepare for interviews by reading up on the subject at hand and the person they plan to speak with. The researcher prepares a set of questions and topics to cover during the interview. Its purpose is to serve as a road map for the interview, helping the researcher cover all relevant ground while keeping the conversation on track. Facilitate communication between yourself and your interviewee before you sit down for the actual interview. This might include explaining the procedure, offering to answer any questions the researcher has, and confirming the interview time and location..

3.5.2.2 During Interview

First of all, researcher have to greetings the interview and introduce myself to the information like researcher name and where searcher am studying. Explain to the information that researcher are doing a thesis to see what is the challenges of implementing Intelligent Transportation Management system among Third Party Logistics . For this thesis, researcher will be asking third party logistics business owners and manager of logistics department question about ITMS and Challenges to implement it. The researcher would like the interviewee to be as direct and truthful as possible while answering questions and to share with the researcher their preferences on what they would like and do not want the researcher to do when the researcher visits the interview firm. The confidentiality of any and all data gathered for this thesis shall be strictly maintained at all times. The researcher will not utilize the interviewee's name or any other identifying information, and everything said by the researcher will only be used for the objectives of the research.

3.5.2.3 After Interview

After the interview, researcher will the recorded interviews need to be transcribed into a written format if interviewees were not already conducted in writing. This involves transcribing the interviewees' responses word-for-word, ensuring accuracy in capturing their statements.The transcribed interviews are then analyzed by coding the data. Coding involves assigning labels or categories to different parts of the text based on common themes or patterns. This process helps in researcher and structuring the data for analysis. The coded data is analyzed to identify patterns, trends, and insights related to the research questions or objectives of the thesis. The analyzed data is interpreted in the context of the research objectives and existing literature. The researcher looks for meaningful connections, explanations, and implications arising from the data analysis. The findings of the data analysis are presented in the thesis, typically in a separate chapter. The researcher explains the key findings, supports them with evidence from the interviews, and discusses their significance in relation to the research questions and existing knowledge.

3.6 Research Strategy

A research strategy is one that can help the investigator discover solutions to the problems that the study has brought up. According to Denzin and Lincoln (2015), there is a methodological connection between the philosophy and the methods used for data collection and interpretation that follow. The eight different research approach methodologies include surveys, ethnography, action research, grounded theory, ethnographic, ethnographic, and narrative inquiries. This research strategy is "an overarching approach to the execution of research," as it states. Speaking of which, the definition of "research strategy" was provided as "the broad plan of how the researcher would go about answering the study questions."

The case strategy approach has been selected for this study in order to conduct the entire investigation. A case study, according to Sauders et al. (2016), is an empirical research that examines a modern phenomenon inside its actual surroundings, especially when the boundaries between the phenomenon and context are not immediately apparent. The scope of case study research is covered in this section of Sauders' definition, while other case study aspects are included in another. This part of the definition acknowledges that in real-world situations, the setting and the phenomena are not always easily distinguished from one another. The mono methodology was used as the foundation for the qualitative method for the purposes of this study. Qualitative research is the most appropriate style of study when the research questions require understanding of processes, events, and relationships within the framework of social and cultural circumstance. Rather of producing quantitative evidence in favor of or against well-defined hypotheses, it aims to produce factual accounts derived from firsthand observations of people and social groups in their natural environments. Therefore, qualitative research is essential to collect data from the only targeted respondent to explain the challenges of implementing ITMS among 3PL companies in Malacca.

Research Objectives	Research	Research	Research

	Strategy	Instrument	Unit
To explore the Barriers of Implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka	Semi-structured Interview	Open-ended questions	3PL Companies Manager
To investigate effective strategies to overcome barriers of implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka	Semi-structured Interview	Open-ended questions & Secondary data	3PL Companies Manager

Table 3.1 : Relationship between Research Design and Research Objectives, Research Strategy and Research Unit

Table 3.1 above summarizes the relationship between research design and research objectives, research strategy and research unit. All the research objectives are analyzed through semi-structured interview which is answered by 3PL companies managers . This research is fully utilized the data sources, which the primary data such as open- ended questionnaire and secondary data such as journals and articles are used by the researcher to collect data.

3.7 Research Location

The location of Ayer Keroh and Batu Berendam in Malacca is where the researcher has decided to conduct the interview. This is due to the established industrial area is home to a variety of manufacturing and light assembly companies. Many of these companies might rely on 3PL providers for their logistics needs, offering potential insights into ITMS adoption within different industries. Additionally, it is more appropriate because it will be simpler for the researcher to contact the responder and get data.

3.8 Research Instruments

The instruments used to gather primary data are represented by the research instrument. The most widely used techniques for gathering data for research include conducting interviews, completing questionnaires, looking through secondary sources, and making observations, according to Sauders et al. (2016). This facilitates the collection of all primary data in a standardized manner and makes it simple for the researcher to go on to the subsequent stages. There are a number of different categories into which the questions are divided: self-completed, web-based, intranet-mediated, mail, delivery and collection, phone, and structured interview.

3.9 Sampling Techniques

A sample is a subset of a population that is representative of the entire population. The definition of "sampling design" according to Onwuegbuzie and Leech (2017) is "a statement for a given point of view of the framework within which the sampling happens." This term includes sample size as well as the quantity and variety of sampling techniques. The basic idea behind sampling is to select a subset of the population's constituents in order to allow researchers to make inferences about the population as a whole from those subsets. The term "population element" in qualitative research refers to the specific subject or item from which the measurement is taken.

3.9.1 Sampling Purposive

Sampling in qualitative research can occur at many stages, such as data collecting, data interpretation, and report writing. Sampling in the qualitative research data collection phase differs from sampling in the quantitative research data collection phase. This is because intentional or planned sampling is more important to researchers conducting qualitative research than being able to generalize at a statistical level. Different from random sampling, purposeful sampling is a type of non-probability sampling also known as judgmental selection or subjective sampling. Cooper and Schindler (2021) state that the researcher selects sample members who satisfy specific criteria in order to gather accurate data from Third Party Logistic Companies. Sampling is most commonly done by classifying participants based on predefined criteria relevant to a particular research question. There are numerous varieties of deliberate sampling. Every variation is founded on a distinct set of standards for choosing a sample. For example, it is plausible that the researcher's primary objective is to enhance variability.

3.9.2 Sampling Size

The researcher has interviewed a targeted respondent in Malacca Malaysia managers of 3PL companies. Through the interview, the researcher has aimed for achieving the research objectives stated in earlier chapter which are to explore the Barriers of Implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies, to identify the Barriers to Implement the Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies and to investigate effective strategies to overcome barriers of implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka. Thus, it is clear that the criteria for sample size in this qualitative research are not based on probability computations but it represents the expertise opinion. According on , Jakob Nielsen (2020), built a mathematical model that shows that, by doing a qualitative test with 6 participants, researcher will identify 85% of the issues in an interface.

3.10 Data Analysis

According to Miles & Huberman (2017), qualitative data analysis consists of three concurrent flows of activity :data reduction, data display and conclusion drawing/verification. In this single case study research of company name, the researcher has first transcribed the data collected from the semi-structured interview by the founder. Then the researcher compared, aggregates, contrast, sorts and order the data by using the data reduction to test the best variable in the challenges of implementing ITMS among 3PL companies. Suggest that data can be cold descriptively or interpretative. The researcher has coded the data accordingly after listening to the recorded audio during the interview session several times. The data coded is the main point that the respondent had mentioned which is related to the question during the interview. After that, the data has been displayed in a form of table which the words repeated the most by the respondents is jotted down in the table by the researcher. From the table, the researcher has drawn a conclusion by revising the data coded earlier and the data displayed to get the main challenges for 3PL to implement ITMS as well as the strategy to overcome it.

3.10.1 Thematic Analysis

In research, thematic analysis is a popular method for examining qualitative data. To comprehend the research topic or phenomena better, it entails finding, evaluating, and interpreting patterns or themes within the data. Through the exploration of participant meanings, experiences, and viewpoints, thematic analysis enables researchers to produce complex and nuanced conclusions. (V. Clarke, 2019) As a result, theme analysis will be used to examine this study. Reading and rereading the transcripts, field notes, or other qualitative data sources helps the researcher become familiar with the data. This procedure aids in developing a comprehensive grasp of the data and spotting emerging concepts or trends.

3.11 Summary

The main research strategy used for this study was explained in this chapter. We delve more into the research design and appropriate data collection techniques in this part. This chapter spends most of its time talking about the appropriate research design that ought to be applied when conducting research investigations. the use of qualitative research techniques to the case study of the difficulties 3PL businesses had when implementing ITMS in the Malacca region. Questions are revised following receipt of the academic supervisor's comments**.** Following in-person or mail-order interviews with the respondents, the researcher gathers primary data from their findings. Newspapers, magazines, and books are examples of secondary sources of information. Reading about the facts about the difficulties 3PL companies face in implementing ITMS gives the researcher a better knowledge of the case's background. The data from field study and the data analysis done with qualitative approaches are presented in the following chapter. In this chapter, the researchers discussed the application of ethics and theory in the qualitative technique.

CHAPTER 4

FINDINGS & ANALYSIS

4.1 Introduction

This chapter will present the results of data analysis from the data collection. To collect data, the researcher has done semi structured interview at Ayer Keroh, Malacca via online meeting. After the data is collected from interviews, transcript was written and coding was done using Microsoft Word (Track Changes) to analyse data collected from the participants in this study. There were three different Third Party Logistic (3PL) companies has been interviewed. It is divided into four sections which are the interview results gained from the barriers in implementing ITMS, the higher barrier, and the strategies to overcome. Also including the demographic of the Research participant.

4.2 Research participant Demographic

4.2.1 Research participant 1

Research participant 1 is the owner and founder of the Paramjothy Enterprise, he has been in the logistic field for the past 28 years which is from year 1996. He has studied until Sijil Pelajaran Malaysia (SPM). Paramjothy Enterprise provide services such as delivering fresh vegetables interstate, provide home moving services and deliver commercial goods.

4.2.2 Research participant 2

The second Research participant is an employee of DHL Express with a total of 11 years of experience in the logistics industry. He holds a Diploma in Aircraft Engineering and currently serves as a Clearance Supervisor. In this role, he is responsible for overseeing the clearance of shipments, managing import and export processes, ensuring compliance with customs regulations, and coordinating freight forwarding activities. His extensive experience in logistics and freight operations

provides valuable insight into the challenges and strategies related to transportation management in the industry.

4.2.3 Research participant 3

The third Research participant is the Operation Supervisor at Hock Cheong Transport and Co., a logistics company with over 90 years of experience in the industry. With a total of 6 years of experience in the company, he plays a key role in overseeing daily operations, including fleet management, scheduling, and route planning for transport logistics. He is responsible for coordinating transportation activities, ensuring the efficient use of resources, and maintaining a high level of customer satisfaction. Additionally, he manages and supervises the logistics team, ensuring the timely and safe delivery of goods across Malaysia, Singapore, Brunei, and China.

Research participant	Working position	How many years of experience?	Education background
1	Owner	28 years	Secondary level education
2	Clearance Supervisor	11 years	Diploma
3	Operation Supervisor	6 years	Diploma

Table 4.2: Demographic information of Research participants

4.3 Barriers of Implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies

Research participant Barriers	1	2	3
1. High initial cost	x	x	x
2. Integration Issue	x	x	
3. Technical challenges		x	x
4. Resistance to change	x		x
5. Training and change management	x		
6. Dynamic Demands		x	
7. Cost sensitivity		x	

Table 4.3: Barriers in implementing ITMS among 3PL Companies

The barriers of implementing ITMS among 3PL companies in this study are: a) High initial cost, b) Integration issue, c) Technical challenges, d) Resistance to change, e) Training and change management f) Dynamic demands and g) Cost sensitivity

4.3.1 High Initial Cost

a) Research participant 1

i) "The high initial costs are a major barrier to implementing the Integrated Transportation Management System (ITMS). The expenses for hardware, software, and infrastructure upgrades, especially for equipping our fleet, can run into hundreds of thousands of ringgit. In a smaller market like Melaka, it's hard to justify such a large investment, especially when the return on investment may take years."

b) Research participant 2

i) "I would say main barrier will be high initial cost. The upfront investment for the software, necessary hardware, and infrastructure upgrades can be overwhelming to implement in Mallaca as how DHL implement in overseas. Matter of fact, before implementing we must look into return of investment form implementing ITMS. Not only that, we have to carefully evaluate our budget and consider whether the potential benefits justify such a significant financial commitment."

c) Research participant 3

i) "One of the biggest barriers we face in implementing the ITMS is the high initial cost. The expenses for software, hardware, and system integration are substantial, especially for a company like Hock Cheong Co. operating across multiple regions."

In the implementation of Intelligent Transportation Management Systems (ITMS) among third-party logistics (3PL) companies in Melaka, all three Research participants identified high initial costs as the primary barrier. These costs include expenses for hardware, software, and infrastructure upgrades necessary for full ITMS adoption. As noted by the Research participants, in smaller markets like Melaka, the capital required for these investments can be a substantial burden. Research supports this, highlighting that the upfront financial commitment required for ITMS implementation remains a key obstacle for many companies, especially in regions with limited resources (Singh , 2021). The large capital investment often leads to hesitation, as companies weigh the risks and immediate financial strain against the potential benefits of adopting these systems.

Additionally, the uncertainty surrounding the return on investment (ROI) is another significant concern raised by the Research participants. They emphasized that the payback period for ITMS can be long, with tangible financial benefits only materializing after several years. This aligns with recent studies, such as those by (Liao 2022), which argue that while ITMS can lead to operational efficiencies and cost reductions over time, the lack of immediate financial returns makes it difficult for many 3PL companies to justify the investment. As companies evaluate the costs against the uncertain future gains, this long ROI cycle often deters them from pursuing ITMS implementation.

In addition to the financial constraints, the relatively smaller market size in Melaka contributes to the difficulty of justifying such a large upfront investment. Smaller companies in less economically developed areas tend to be more risk-averse and cautious when it comes to significant capital expenditures. This observation is consistent with findings by (Lee 2023), who note that smaller firms in developing markets are less likely to adopt advanced logistics technologies due to financial limitations and perceived risks. The combination of high costs and limited financial resources leads to a slower pace of ITMS adoption in regions like Melaka, where companies are often more focused on immediate operational needs.

4.3.2 Integration issue

a) Research participant 1

i) "We're encountering significant integration issues as we try to implement the ITMS, primarily due to our limited IT infrastructure. Our existing systems are outdated and ensuring that the new ITMS can communicate effectively with them without disrupting our daily operations is a major challenge. We need to invest in upgrades and possibly custom solutions, which adds to the complexity of the implementation process."

ii) " As a small company, we don't have the resources to hire a team of IT specialists. Most of my staff are not highly educated, and while they are dedicated and hardworking, they struggle with the technical aspects of new systems. Most of the technology-related tasks fall on my son, who has a broader knowledge of IT. He's been

a tremendous help, but he can't manage everything alone. When it comes to training the rest of the staff, it's tough to bridge that knowledge gap. They often feel overwhelmed by the new technology, and without a solid foundation in IT, adapting becomes a daunting task. This lack of skilled workforce is a common issue in our industry, and it's frustrating because we know the potential benefits of ITMS, but the reality of our workforce's capabilities really holds us back."

b) Research participant 2

i) "One of the significant barriers we face at DHL Express in Melaka is regulatory uncertainty. The local regulations regarding data privacy and tracking technologies are often unclear, which makes it challenging for us to implement the ITMS effectively. For instance, Malaysia has specific laws under the Personal Data Protection Act (PDPA) that govern how we handle customer data. We want to ensure that our operations comply with all legal requirements, but the lack of clear guidelines can lead to hesitation in adopting new technologies. This uncertainty not only affects our planning but also impacts our ability to innovate and improve our services in the region. Without a clear understanding of how these regulations apply to our ITMS, we risk potential non-compliance, which could have serious repercussions for our operations."

Research participant 1, the owner of Paramjothy Enterprise, highlighted integration issues as a major barrier to implementing Intelligent Transportation Management Systems (ITMS). The company relies on multiple legacy systems for operations, and integrating these with new ITMS technologies is complex and costly. This process involves significant time and resources to ensure compatibility between systems, which can be a challenge for smaller firms with limited IT support. Research by Zhao et al. (2021) supports this, noting that integration with existing systems is a key obstacle for small logistics companies adopting ITMS.

Additionally, the lack of standardized data formats and communication protocols makes it difficult to transfer data smoothly between systems, limiting the full potential of ITMS. Without seamless interoperability, Paramjothy Enterprise cannot fully benefit from features like real-time tracking and route optimization. Lee et al.

(2022) also highlight that data integration issues are a significant barrier for small logistics companies, requiring technical solutions and careful selection of compatible systems to overcome these challenges.

A significant barrier to implementing Intelligent Transportation Management Systems (ITMS) is the lack of a skilled workforce, particularly in smaller companies. Anil Mistri 2019. These companies often lack the resources to hire dedicated IT specialists, leaving the burden of technology-related tasks on a limited number of employees, often family members with some IT knowledge. This reliance on limited technical expertise can hinder the effective implementation and utilization of ITMS, as the majority of the workforce may struggle to adapt to new technologies and understand their applications within their roles.

According Joseph Charles Blanchard 2024, The limited technical skills within the workforce can also posed challenges for Paramjothy Enterprise in training and knowledge transfer. Without a strong foundation in IT, internal management employees may feel overwhelmed by the complexities of new systems, leading to resistance to change and difficulties in adapting to new workflows. This lack of skilled personnel can create a significant knowledge gap within the organization, hindering the efficient operation and maintenance of ITMS.

Furthermore, the lack of skilled workforce is a pervasive issue across many industries, not just within the context of 3PL Companies Vijay Kerai (2019). This shortage of skilled labor can limit the potential benefits of adopting advanced technologies, as companies may struggle to find and retain employees with the necessary expertise to effectively utilize and maintain these systems. This skills gap can create a significant bottleneck in the adoption of innovative technologies and hinder the overall competitiveness of 3PL companies in Melaka

The findings reveal that regulatory uncertainty is a major obstacle to implementing Intelligent Transportation Management Systems (ITMS) at DHL Express in Melaka. Research participant 2 highlighted that unclear guideline, particularly regarding data privacy and tracking technologies, create hesitation among decision-makers. Malaysia's Personal Data Protection Act (PDPA) imposes strict requirements on how customer data is collected, stored, and used. However, the absence of detailed, specific guidance on how these laws apply to ITMS complicates

the adoption process. This uncertainty forces organizations to proceed cautiously, delaying innovation and hindering operational advancements.

Another critical concern is the potential risk of non-compliance with existing regulations. For logistics providers like DHL, failing to adhere to data privacy laws can lead to severe legal and financial consequences, including penalties and damage to the company's reputation. K. L. Choy 2022 Participants expressed that the ambiguity surrounding the regulatory framework limits their ability to confidently plan and implement ITMS solutions. This creates a challenging environment where compliance becomes a significant administrative burden, detracting from the organization's focus on optimizing logistics and enhancing customer service.

Furthermore, regulatory uncertainty negatively impacts the organization's ability to innovate and remain competitive in the logistics industry. Without a clear understanding of how the regulations align with ITMS functionalities, companies are less likely to experiment with or invest in advanced technologies. Bishal Dey Sarkar 2024. This stagnation can lead to missed opportunities for process improvements and operational efficiencies. The findings highlight the need for regulatory bodies to provide clearer, more detailed guidelines to foster technological adoption while ensuring compliance, thus enabling logistics companies to achieve both innovation and regulatory adherence in their operations.

4.3.3 Technical challenges

a) Research participant 2

i) "I recently had a conversation with a colleague from the IT department, and he highlighted several issues that we need to address. For instance, ensuring compatibility between the new ITMS and our existing systems, like warehouse and order management systems, is proving to be quite complex."

"My colleague mentioned that integrating these systems requires a significant amount of time and resources. There are also concerns about data migration; we need to ensure that historical data from our old systems is accurately transferred to the new ITMS without any loss. This process can be daunting, especially when we consider the volume of data we handle daily."

"Additionally, he pointed out that our current infrastructure is advance but still requires time to time upgrade ensure the whole logistic process run efficiently. If any problem, occur in the system sometimes they have to reach out team overseas in different time zone. Quite hard to resolve the issue instantly with expert help on our ITMS."

ii) "If we take a look at the operations of DHL in overseas we already start to implement advance AI (Artificial Intelligence) route optimization , autonomous warehouse. But here in Melaka, the lack of infrastructure in significantly hinders our ability to implement the ITMS effectively."

b) Research participant 3

i) "In the past, one of the significant technical challenges we faced when implementing the ITMS was integrating it with our existing advanced fleet management system. Although our fleet system was robust, it was not designed to communicate seamlessly with the new ITMS we wanted to adopt.

In this branch, we struggled with data synchronization. Our advanced fleet system provided real-time tracking, but when we attempted to implement the ITMS, we found that the data from both systems didn't align properly. This led to discrepancies in delivery statuses and made it difficult for our team to manage logistics effectively. We had to invest time and resources into ensuring that both systems could work together, which delayed our overall implementation timeline. It was a learning experience that highlighted the importance of compatibility in our technology choices."

ii) "A major challenge for us is our inadequate IT infrastructure. Our existing systems aren't designed for advanced technologies like ITMS, and we lack specialized expertise."

iii) "In our company, we provide service to clients from multiple industry and we are also making daily more than 5000 deliveries. Security concerns are a significant barrier for us in implementing ITMS. As 3PL company serving diverse industries like

e-commerce, manufacturing, and retail, we handle sensitive customer and operational data. Ensuring that our ITMS is secure and compliant with various data protection regulations across different countries is a major challenge."

The findings reveal that technical challenges are a prominent barrier to the successful implementation of Intelligent Transportation Management Systems (ITMS). Research participants identified system compatibility as a significant issue, with existing technologies, such as warehouse and order management systems, not aligning seamlessly with the new ITMS. For instance, Participant 2 highlighted that ensuring compatibility requires a considerable investment of time and resources Mandla Mvubu 2024. This challenge is compounded by the complexity of integrating systems that were not initially designed to work together. The process demands careful planning and often necessitates upgrades to the current infrastructure to ensure operational efficiency.

According Weihua Liu 2022, data migration emerged as another critical technical obstacle. Participant 2 emphasized the daunting nature of transferring historical data from legacy systems to the new ITMS without errors or data loss. Given the substantial volume of data handled daily, this process is resource-intensive and poses risks if not executed properly. Data accuracy is paramount in logistics operations, and any discrepancies during migration can disrupt workflows and undermine trust in the new system. This finding underscores the importance of robust data management strategies during ITMS implementation.

Furthermore, the geographical and temporal challenges associated with resolving IT-related issues complicate the implementation process. Participant 2 noted that their organization sometimes relies on overseas teams to address system problems, creating delays due to time zone differences. Such delays can hinder timely problem resolution, leading to inefficiencies in logistics operations. This aspect highlights the need for local technical expertise or round-the-clock support to mitigate disruptions caused by ITMS malfunctions.

Participant 3 provided insights into the challenges of integrating ITMS with advanced fleet management systems. Despite the robustness of their existing fleet system, it was not designed to communicate effectively with ITMS, leading to data synchronization issues. This misalignment caused discrepancies in delivery statuses,

complicating logistics management and delaying operation Saleem Sumbal 2023. The need to invest additional time and resources to align these systems demonstrates the significant technical hurdles organizations face when adopting ITMS. These findings illustrate that while ITMS promises improved efficiency, its implementation requires addressing substantial technical challenges to ensure seamless integration with existing systems.

Both Research participants 2 and 3 identified the lack of infrastructure as a critical barrier to implementing Intelligent Transportation Management Systems (ITMS) among third-party logistics (3PL) companies in Melaka. Specifically, they highlighted the need for reliable and robust infrastructure, including communication networks, internet connectivity, and adequate road networks, to effectively support the ITMS in Melaka. The lack of such infrastructure limits the effectiveness of ITMS solutions, as these systems often require real-time data collection and communication between vehicles, warehouses, and control centers. According to Zhang Li Chen (2021) also supports this finding, indicating that inadequate infrastructure can severely hinder the adoption of ITMS, especially in emerging markets.

The issue of infrastructure also extends to physical transportation networks. Inadequate or poorly maintained roads can negatively impact the performance of ITMS, as the system's ability to optimize routes and schedules is affected by traffic conditions and road quality. As noted by Research participants 3, while Malaysia has made improvements to its road infrastructure, there remain significant gaps, particularly in rural or less-developed areas of Melaka. The importance of road infrastructure for the effective functioning of ITMS is corroborated by findings from Choi and Lee (2021), who argue that an efficient transportation network is critical for the success of ITMS in logistics, particularly in smaller markets where the road infrastructure may not be on par with larger urban centres.

Finally, the limited availability of skilled personnel to manage and maintain ITMS infrastructure further complicates the adoption process. Research participants 2 and 3 pointed out that the implementation of ITMS not only requires adequate hardware and software but also a workforce capable of managing and troubleshooting the system. In markets like Melaka, where there is a shortage of trained professionals

in fields such as data analytics, software development, and system integration, this lack of human capital can delay or prevent the effective deployment of ITMS for Hock Cheong Co. This issue has been highlighted in recent research by Wang (2023), which identifies the shortage of skilled labour in emerging markets as a significant obstacle to the adoption of smart technologies in logistics. The lack of infrastructure—both physical and digital—along with the shortage of trained personnel, creates a challenging environment for 3PL companies in Melaka to implement and fully benefit from ITMS.

Research participant 3, the operational supervisor at Hock Cheong Co, emphasized that security concerns are a significant barrier to implementing Intelligent Transportation Management Systems (ITMS) in their operations. As a 3PL company serving industries like e-commerce, manufacturing, and retail, Hock Cheong Co handles sensitive customer and operational data, making data security a top priority. With the introduction of an ITMS, the company faces the challenge of ensuring that data transmitted across multiple platforms remains secure from potential breach. Furthermore, the ITMS must be compliant with diverse data protection regulations in the regions they operate. This challenge is compounded by the need to notify all their clients of any amendments to privacy policies and data management practices when implementing a new ITMS. The process of obtaining client approval for these changes involves significant administrative work and legal considerations, further complicating the implementation process. According to Gupta and Singh (2021) highlights that securing sensitive data and ensuring regulatory compliance are critical challenges for logistics companies adopting advanced systems like ITMS.

Additionally, the complexity of ensuring compliance with various data protection laws across different countries adds to the burden. In many regions, stringent data protection regulations require 3PL companies to implement measures such as encryption, secure authentication protocols, and continuous monitoring to safeguard data. For Hock Cheong Co, this means that before any new ITMS can be implemented, they must not only secure the data within the system but also ensure that the system is aligned with the privacy policies of their clients. Notifying clients, addressing concerns, and obtaining their approval on these changes is a time-consuming process. Mazni Saad 2019 Note that maintaining compliance with regional data protection laws can be a major obstacle for smaller 3PL companies, as it requires

significant resources and expertise to ensure the system meets all legal requirements. This process of client notification and approval, alongside the technical security requirements, makes the adoption of ITMS a considerable barrier for companies like Hock Cheong Co.

4.3.4 Resistance to change

a) Research participant 1

i) "We've been facing a lot of pushback from our staff regarding the implementation of the ITMS. Many of them are set in their ways and are resistant to changing how they've always done things. For instance, our truck drivers are particularly hesitant. They feel that the new system will complicate their routines and add unnecessary stress to their jobs. It's frustrating because we know that the ITMS could significantly improve our operations, but getting everyone on board has been a real challenge.

b) Research participant 3

i) " Many employees are accustomed to our traditional methods and are hesitant to adopt the new Intelligent Transportation Management System. We need to address their concerns and demonstrate how ITMS can improve their daily tasks."

"Our team has shown some resistance to implementing the ITMS. They worry about the learning curve and how it might disrupt their routines. It's crucial for us to provide adequate training and support to help them transition smoothly."

According Mathew Elenjickal *(2024), r*esistance to change has emerged as a significant barrier to the implementation of Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies. Research participants highlighted that employees often struggle to adapt to new systems, particularly when they are accustomed to traditional methods. For example, the operation supervisor of Hock Cheong Co said his staff was hesitant to adopt ITMS due to concerns about disrupting established workflows and routines. Employees feared that the new technology would make their tasks more complex rather than simplifying them. Such

resistance is particularly challenging in industries where operational efficiency is highly dependent on worker adaptability.

The resistance is not limited to general staff but is also evident among specific roles such as truck drivers, who play a crucial part in logistics operations. Owner of Paramjothy Enterprise explained that drivers perceived the ITMS as an unnecessary complication to their jobs, expressing concerns that it would add stress and hinder their established routines. These sentiments of pushback can significantly affect the adoption of ITMS, as employees' reluctance to embrace change creates operational bottlenecks, delaying the benefits that the system is designed to deliver. According to the research by Jeff Berman 2024, found that 61% of shippers and 73% of 3PLs view the need for supply chain change management as critical or significant, due to factors such as customer demands, economic conditions, and technological advancements.

This issue of resistance to change is further amplified by employees' apprehensions regarding the learning curve associated with ITMS. Participants reported that workers often worry about their ability to effectively use the new system and how it might impact their performance. This anxiety leads to reluctance in participating in training programs or engaging with the system fully. These challenges underscore the deeply rooted nature of resistance to change in the logistics sector, complicating the integration of modern transportation technologies. Addressing change management proactively is essential for successful ITMS adoption in 3PL companies (Brian Straight, 2024). Such resistance can create a ripple effect, not only stalling the ITMS implementation process but also fostering a negative perception of the technology among the workforces. These challenges underscore the deeply rooted nature of resistance to change in the logistics sector, complicating the integration of modern transportation technologies.

4.3.5 Training and change management

a) Research participant 1

"We realize that our team will need a lot of training to feel comfortable with the new system, and that can be time-consuming and costly. Plus, managing the change

is a big challenge especially getting the truck drivers to understand the system and adapt to it. We must make sure everyone understands why we're making this shift and how it will benefit them. If people are resistant or unsure, it could really slow down the whole process. So, getting everyone on the same page and feeling confident is crucial, but it adds another layer of difficulty to the implementation."

Training and change management present significant barriers to the implementation of Intelligent Transportation Management Systems (ITMS) at Paramjothy Enterprise. The need for comprehensive training across various roles requires employees to dedicate time away from their regular duties, leading to potential operational inefficiencies as staff try to balance their responsibilities with training. The complexity of ITMS adds to the challenge, as employees must not only learn how to use the system but also understand how it integrates with their daily tasks. This learning curve can lead to frustration, particularly among truck drivers who are accustomed to traditional methods and may perceive the new system as an unnecessary complication. According to research by Patel et al. (2021), the time commitment and disruption caused by training programs are critical factors that delay the adoption of new technologies in logistics companies, especially when employees must divide attention between training and daily operations.

Furthermore, cultural resistance to change within the organization exacerbates the challenges associated with training and change management. Many truck drivers and long-term staff exhibit reluctance to embrace new technologies, preferring the familiarity of traditional practices. This resistance can hinder the success of training programs, as employees may not fully engage or may actively resist the adoption of the new ITMS. Research by Zhang and Liu (2022) highlights that cultural resistance is one of the primary obstacles to ITMS implementation in logistics companies, with employees often reluctant to change established workflows. The combination of operational disruption during training and resistance to change can significantly slow down the adoption process, preventing the organization from fully realizing the benefits of the new system.

4.3.6 Dynamic demands

a) Research participant 2

i) "In our industry, especially at DHL, we face unpredictable demand patterns that can change rapidly based on various factors, such as seasonal trends or market fluctuations."

"I spoke with a colleague in operations who pointed out that unlike industries with fixed transportation schedules, we need a system that can adapt quickly to these changes. If the ITMS can't handle these dynamic demands effectively, it could lead to inefficiencies and increased costs, which is something we want to avoid. If we are receiving high demand deliveries and suddenly, we are required to learn adapt of new system obviously will disrupt the operations."

The findings highlight that dynamic demand patterns pose a significant challenge to the implementation of Intelligent Transportation Management Systems (ITMS) in industries with unpredictable transportation needs, such as logistics companies like DHL. Unlike industries with fixed schedules, where operations are more predictable, logistics providers must respond swiftly to changes driven by seasonal trends, market fluctuations, or customer demands. Research participants emphasized that ITMS must have the capability to adapt in real-time to these shifting patterns to prevent inefficiencies and increased operational costs. If the system lacks flexibility, it risks becoming a bottleneck rather than a facilitator of efficiency.

According Ruthramathi Raja 2022, a critical concern raised by participants is the operational disruption caused by the dual challenge of adapting to a new system while simultaneously managing high-demand periods. In environments like DHL's, where quick turnarounds and responsiveness are essential, the learning curve associated with ITMS implementation can strain employees and hinder overall productivity. As noted, introducing a new system during peak operational times can exacerbate the stress on the workforce, disrupt workflows, and potentially compromise service quality. This underscores the need to carefully time ITMS implementation to minimize conflicts with demand surges.

Another significant insight from the findings is the potential impact of inadequate ITMS adaptability on cost management. If the system fails to dynamically allocate resources or optimize routes in response to fluctuating demand, it could lead to inefficiencies such as underutilized assets or delayed deliveries. Albert Tan 2022. These inefficiencies translate directly into increased costs, undermining the competitive advantage that ITMS is meant to provide. Therefore, the findings suggest that the ability of ITMS to handle demand variability is not just a technical requirement but a business-critical feature for logistics companies operating in volatile markets.

4.3.7 Cost sensitivity

a) Research participant 2

i) "Many of our clients prioritize cost-efficiency, which puts pressure on us as a logistics provider to keep our operational expenses low." During a recent meeting with the finance team, it became clear that justifying the high initial investment required for ITMS is a tough sell. The upfront costs for software, hardware, and training can be substantial, and in a competitive market, we need to be cautious about how we allocate our budget in Malaysia."

"Moreover, the ongoing maintenance and licensing fees add to our operational expenses. If we can't demonstrate a clear return on investment in a reasonable timeframe, it becomes even harder to convince stakeholders that moving forward with ITMS is the right decision for our organization."

The findings highlight that cost considerations are a critical barrier to the adoption of Intelligent Transportation Management Systems (ITMS) in the logistics sector. Clients' emphasis on cost-efficiency exerts pressure on logistics providers to minimize operational expenses, making it challenging to justify the substantial upfront investment required for ITMS. As noted by participants, the costs associated with software, hardware, and training are significant, especially in competitive markets like Malaysia, where budget allocation must be carefully scrutinized. This financial strain complicates decision-making, as stakeholders may view the high initial expenditure as a risk rather than a strategic investment.

Additionally, the burden of ongoing costs, such as maintenance and licensing fees, further complicates the cost-benefit analysis of implementing ITMS. Mandla Mvubu 2024 These recurring expenses add to the operational budget, requiring logistics providers to ensure that the system delivers measurable efficiencies to offset these costs. Participants highlighted that without a clear and tangible return on investment (ROI) within a reasonable timeframe, it becomes increasingly difficult to gain stakeholder buy-in. This hesitation is particularly relevant in markets where logistics companies operate on thin margins and prioritize cost control to remain competitive.

Another key aspect of the findings is the challenge of demonstrating the long-term value of ITMS to stakeholders. While the system may offer potential benefits such as improved efficiency and optimized resource allocation, these advantages may not be immediately apparent, especially during the initial implementation phase Dara Kim 2024. This delay in realizing benefits can deter decision-makers from committing to the investment. Therefore, the findings underscore the importance of addressing the perception of cost 2020 as a barrier by providing clear evidence of ITMS's capacity to enhance operational efficiency, reduce costs over time, and deliver a competitive advantage in the logistics industry.

4.4 Effective Strategies to overcome barriers of implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka

Research participant Strategies	1	2	3
1. Training Programs	x	x	x
2. Phased approach to adaption		x	x
3. Utilizing government grants and fundings	x		
4. Monitoring successful metrics		x	
5. Data integration			x

Table 4.4: Strategies to overcome barriers to implement ITMS in Melaka

The effective strategies of implementing ITMS among 3PL companies in this study are : a) Training programs, b) Phased approach to adaption, c) Utilizing government grants and funding, d) Monitoring success metrics, and e) Data integration

4.4.1 Training programs

a) Research participant 1

"I've been thinking about how we can overcome the barriers to implementing the ITMS, and I believe that having training programs is essential. However, I'm not entirely sure what kind of training we should implement. We do not have a huge number of staffs, so we need to focus on basic IT skills for those who are less familiar with technology, while also providing more advanced training for those who will be managing the system."

"I've considered different formats, like hands-on workshops or online courses, but I'm unsure which would be more effective. Hands-on workshops could help build confidence, but they might be costly and logistically challenging. On the other hand, online courses offer flexibility, though I worry some staff and especially truck drivers

might struggle with self-paced learning, I think a blended approach could work well, starting with workshops and then supplementing with online resources."

b) Research participant 2

"I'd like to share some insights on the training programs we've implemented for adapting the Intelligent Transportation Management System (ITMS) at DHL Express. Collaborating with technology providers has been a key strategy, allowing us to develop tailored training sessions where employees receive hands-on experience directly from the experts. We also rolled out the MyDHL+ system alongside ITMS training throughout whole Malaysia including Melaka, enabling employees to learn both systems together, which streamlines the process. Additionally, we've adapted global training programs from other regions, utilizing online modules and interactive tutorials that have proven effective elsewhere."

"We focus on role-specific training as well. For instance, drivers learn about route optimization, while dispatchers concentrate on scheduling. This targeted approach not only boosts confidence among our staff but also significantly improves our operational efficiency as we transition to ITMS."

c) Research participant 3

"This program would include hands-on workshops where our truck drivers and logistics personnel can practice using the ITMS in a simulated environment, allowing them to become familiar with its features without the pressure of real-time operations. Additionally, we could introduce a 'train-the-trainer' model, where selected employees receive in-depth training and then share their knowledge with their peers, fostering a supportive learning culture. We should also incorporate ongoing support sessions and feedback loops to address any challenges that arise during the transition, ensuring that everyone feels confident and capable in using the new system."

The findings from all three research participants clearly demonstrate that training programs are essential for overcoming the barriers to implementing Intelligent

Transportation Management Systems (ITMS) among 3PL companies in Melaka. A common theme in the responses is the need for tailored training programs that cater to employees' varying levels of technological familiarity Ab Mahadi 2023. Research participant 1 highlights the importance of providing basic IT skills training for staff who are less familiar with technology, while also offering advanced training for those responsible for managing the ITMS. This ensures that all employees, regardless of their initial skill level, can effectively use the system. Similarly, participant 2 emphasizes the importance of role-specific training, where employees such as drivers focus on route optimization, and dispatchers concentrate on scheduling. This targeted approach increases confidence and ensures that each employee receives relevant training aligned with their job responsibilities, ultimately improving operational efficiency.

In terms of training formats, research participant 1 considers both hands-on workshops and online courses. They suggest that a blended learning approach—starting with workshops and supplementing with online resources—would be most effective. Hands-on workshops can build confidence and provide practical experience, especially for those who prefer interactive learning Yani Rahmawati 2019. However, they acknowledge the logistical and financial challenges of this approach. On the other hand, online courses offer flexibility but may not be suitable for certain employees, such as truck drivers, who may struggle with self-paced learning. A combination of both methods would help accommodate various learning preferences while ensuring efficient use of resources.

Research participant 2 provides a practical example from DHL Express, where training is conducted in collaboration with technology providers. This partnership allows employees to receive hands-on experience directly from experts, ensuring they are equipped to manage the system effectively Yong Siang 2023. Participant 2 also mentions the use of interactive tutorials and online modules that have been successful in other regions, which helps supplement the hands-on training and offers flexibility for employees to learn at their own pace. This blend of expert-led sessions and self-paced online resources ensures a comprehensive and effective learning experience.

Participant 3 stresses the importance of simulated learning environments, especially for truck drivers and logistics personnel. By practicing using the ITMS in a

controlled, low-pressure environment, employees can familiarize themselves with the system without the stress of real-time operations. This helps build their confidence and reduces anxiety about using the system in actual delivery scenarios. Additionally, participant 3 suggests implementing a 'train-the-trainer' model, where selected employees receive in-depth training and subsequently share their knowledge with their peers. This model not only increases the reach of the training program but also fosters a supportive learning culture, allowing employees to learn from one another and collaborate more effectively.

Another common point among the participants is the need for ongoing support and feedback loops to address any challenges that may arise during the implementation process. Research participant 3 emphasizes the importance of offering continuous support sessions and establishing feedback mechanisms to ensure that employees can resolve issues as they arise and feel supported throughout the transition. This ongoing assistance helps maintain high morale, builds confidence, and ensures employees remain comfortable with the system even after the initial training phase.

In conclusion, the participants agree that training programs are a critical strategy for overcoming the barriers to ITMS adoption among 3PL companies in Melaka. By implementing tailored, role-specific training, utilizing a blended learning approach, offering hands-on experience, and introducing simulated environments and train-the-trainer models, organizations can ensure that employees are well-prepared to use the ITMS effectively Yap Qiao Yi 2023. Furthermore, ongoing support and feedback loops are essential for maintaining a positive learning environment and ensuring long-term success in adopting ITMS. These strategies collectively address the technological and operational challenges associated with the transition, helping companies build a more confident and capable workforce that can drive the successful implementation of ITMS

4.4.2 Phased approach to adaption

a) Research participant 2

"We started by piloting ITMS in overseas at first, then focusing on city areas in Malaysia then only the urban areas with higher delivery volumes. This allowed us to

test the system's functionalities and identify any issues before rolling it out on a larger scale. For instance, in Melaka, we selected a few key routes to implement the system and gather real-time feedback from our drivers and operations staff."

"By taking this phased approach, we could refine the system based on actual user experiences. We organized training sessions for our staff to ensure they were comfortable with the new system called MyDHL+, and we actively sought their input on how to improve the system. This not only helped in addressing any resistance to change but also fostered a sense of ownership among the team."

"As we resolved issues and made necessary adjustments, we gradually expanded the implementation to include more routes and areas. This incremental rollout minimized disruptions to our operations and allowed us to manage costs more effectively. Overall, the phased approach has been instrumental in ensuring a smoother transition to ITMS, and I believe it's a strategy that can be replicated in other regions as well."

b) Research participant 3

"I believe a phased approach to adopting the ITMS would be incredibly beneficial for our staff at Hock Cheong Co especially for our truck drivers. By implementing the system in stages, we can help everyone gradually adjust to the new technology without overwhelming them.

For instance, we could start by introducing the ITMS in one specific region, like our operations in Melaka. This would allow our drivers to familiarize themselves with the system in a controlled environment. They can learn how to use the real-time tracking features and automated updates without the pressure of a full-scale rollout.

Not only that, in the starting of the company also we were not using advanced technologies to manage our orders, before I join the company were only using the SAP system. After as technology advances, we brought in new technologies step by step to be adapted for fleet management and order tracking. As they become more comfortable, we can then expand the implementation to other regions. This gradual transition will not only help our drivers adapt at their own pace but also give us the opportunity to gather feedback and make necessary adjustments along the way. By

addressing any concerns early on, we can significantly reduce resistance and ensure a smoother overall adoption process."

The findings from both research participants provide valuable insights into effective strategies for overcoming the barriers to implementing an Intelligent Transportation Management System (ITMS). A recurring strategy identified is the phased or incremental approach, which focuses on gradual implementation rather than a full-scale rollout. This approach appears to be critical in ensuring the successful adoption of ITMS, particularly when it comes to easing the transition for employees and mitigating potential disruptions.

Both participants emphasize the importance of piloting the system in smaller, manageable regions or routes before expanding it to a larger scale. Research participant 2 discusses the pilot approach in overseas locations and later in city areas in Malaysia, focusing on specific routes in Melaka.Fairuz Iskandar 2019 This allows the company to test the system's functionality and resolve any issues early on. By gathering real-time feedback from drivers and operational staff, the company can address any concerns or inefficiencies before a full-scale rollout, minimizing the impact on operations. Similarly, participant 3 highlights the phased rollout in a specific region (Melaka) as a method to help drivers gradually adjust to the new technology without feeling overwhelmed. This strategy also allows the company to refine the system based on real-time experiences from the users. It ensures that drivers become familiar with the system's functionalities, such as real-time tracking and automated updates, at a controlled pace. This step-by-step approach helps reduce resistance to change, a common barrier in the adoption of new technologies, as employees feel more comfortable with the system over time.

According Saqib Iqbal 2024, training and involvement of staff are key to overcoming resistance to change and ensuring a smooth transition. In participant 2's account, organized training sessions were held to ensure that staff were comfortable with MyDHL+ and actively contributed feedback to improve the system. This approach not only helps resolve issues but also promotes a sense of ownership among the team, increasing their commitment to the system's success. Participant 3 further emphasizes the importance of gradual exposure to new technologies. Starting with a simpler system like SAP before advancing to more sophisticated tools like ITMS

allowed staff, particularly truck drivers, to adapt progressively without feeling overwhelmed. By introducing new technologies in stages, the company ensures that each transition is manageable and that staff are equipped with the necessary skills at each step.

Both participants mention the importance of gathering feedback throughout the implementation process. The phased approach allows for adjustments to be made at various stages of the rollout, ensuring the system evolves based on actual user experiences. As noted by participant 2, real-time feedback from drivers and operations staff was crucial in identifying issues and refining the system. Similarly, participant 3 points out that addressing concerns early on, and making adjustments as needed, is key to ensuring a smoother adoption process. This continuous improvement model is essential for overcoming barriers such as technical difficulties, user resistance, and system inefficiencies. By actively seeking input and making necessary changes during the implementation process, organizations can improve the likelihood of long-term success.

The gradual implementation also aids in better managing costs and minimizing disruptions. Participant 2 highlights that expanding the system incrementally allowed for more effective cost management and minimized operational disruptions. A phased rollout provides more flexibility, allowing organizations to better allocate resources, adjust schedules, and plan for any unanticipated challenges as the system is scaled up.

Both participants' accounts underscore the effectiveness of the phased approach to overcoming barriers in implementing ITMS Brisbane 2019. By testing the system on a smaller scale, gathering feedback, training staff, and making necessary adjustments, organizations can reduce resistance to change, mitigate operational disruptions, and ensure that the system functions optimally. This strategy fosters a smoother, more controlled transition, ultimately improving the likelihood of success in adopting ITMS. Additionally, it supports continuous learning and improvement, which is crucial for long-term integration and success.

4.4.3 Utilizing government grants and fundings

a)Research parcipant 1

"There are several grants and financial assistance programs available for small businesses like ours that are looking to adopt new technologies. I've been researching the various programs offered by the government and have identified a few that align with our needs. One I heard from my friend that, the Malaysian Investment Development Authority (MIDA) is providing grants for SME business to adopt Industry 4.0 technologies. I'm planning to apply for these grants, which could significantly reduce the financial burden on our company.

It can be a lengthy process. However, I believe it's worth the effort. If we can secure some funding, it would make the transition to ITMS much more feasible and allow us to focus on training our staff and integrating the new system without the constant worry of financial strain."

The insights shared by the owner of Paramjothy Enterprise emphasize the important role that government grants and financial assistance programs play in overcoming barriers to adopting Intelligent Transportation Management Systems (ITMS) in SMEs within the logistics sector. The participant highlighted their awareness of programs such as those offered by the Malaysian Investment Development Authority (MIDA), which provides grants for the adoption of Industry 4.0 technologies, including ITMS. This proactive approach to researching available programs demonstrates the crucial role of awareness in facilitating technological adoption.

According Ks Tan 2021, one of the significant challenges SMEs face is the financial burden associated with adopting new technologies. The participant noted that securing government grants could ease these financial constraints, making ITMS implementation more feasible. However, they also acknowledged that the grant application process can be lengthy and complex, posing a challenge for companies

with limited administrative resources. Simplifying the application process could help more SMEs access these valuable resources and accelerate the adoption of ITMS.

The participant further emphasized that the funds would not only be used for purchasing ITMS but also for training employees and integrating the system into their operations. This highlights the importance of investing in human capital to ensure successful implementation Nazirah Nazir 2022. Overall, government grants provide critical financial support, allowing third party logistic companies to focus on system integration and training rather than being burdened by financial strain. However, streamlining the application process and providing additional support could enhance the accessibility and effectiveness of these programs.

4.4.4 Monitoring successful metrics

a) Research participant 2

"I want to discuss how monitoring successful metrics has been instrumental in overcoming the barriers we faced during the ITMS implementation at DHL Express."

"By tracking operational efficiency metrics, such as delivery times and fuel consumption, we can identify areas for improvement and demonstrate the tangible benefits of ITMS to our team. This data helps alleviate concerns about the system's effectiveness and encourages buy-in from employees. We also measure cost savings, which allows us to showcase reductions in operational costs, such as fewer idle times and optimized fleet usage. When staff see the financial benefits, it helps reduce resistance to change."

"Additionally, monitoring employee adoption rates and gathering feedback on the system's usability has been crucial. This ongoing assessment allows us to address any issues promptly and make necessary adjustments, ensuring that our team feels supported throughout the transition. Overall, these metrics not only help us track our progress but also serve as a powerful tool to communicate the value of ITMS, ultimately fostering a more positive attitude towards the changes."

The research findings from the DHL Express clearance supervisor highlight the importance of monitoring successful metrics as an effective strategy to overcome the

barriers encountered during the implementation of Intelligent Transportation Management Systems (ITMS). According to the research participant, tracking key operational efficiency metrics such as delivery times, fuel consumption, and fleet utilization has been instrumental in identifying areas for improvement and demonstrating the tangible benefits of ITMS Diyana 2021. For instance, DHL uses real-time data tracking to optimize routes and delivery schedules, which helps improve delivery times and reduce fuel consumption. These efforts not only improve operational efficiency but also play a crucial role in gaining employee buy-in, as the staff can directly see the positive impact of the ITMS on their daily work processes. When employees witness the improvement in delivery efficiency and the reduction of idle times, it helps to alleviate concerns about the system's effectiveness and fosters a more favorable view of the new technology.

In addition to operational metrics, cost savings from optimized fleet management are also tracked and used as a key indicator of ITMS success. For example, DHL monitors fuel efficiency and vehicle utilization through telematics, which allows the company to reduce operational costs by minimizing idle times and ensuring that vehicles are used efficiently. These cost savings are crucial in demonstrating the financial benefits of ITMS, thereby addressing resistance to change among employees who may be concerned about the initial investment in the new system. By showing tangible reductions in operational costs, DHL reinforces the value of ITMS, which can lead to a smoother transition and greater acceptance within the workforce.

Furthermore, monitoring employee adoption rates and gathering feedback on the usability of the ITMS has been essential in ensuring a smooth implementation. As noted, ongoing assessment through surveys and feedback forms allows DHL to track how well the system is being accepted by staff, particularly those who may have concerns or difficulties in using the new technology. By addressing these concerns promptly, DHL can adjust the system to better meet the needs of its employees, which in turn helps improve overall adoption Suzila Lop 2021. For example, if feedback indicates that certain features of the ITMS are difficult to navigate, DHL can make the necessary adjustments, ensuring that employees feel supported throughout the transition process.

Finally, the integration of these metrics into a continuous monitoring system provides DHL with valuable insights for data-driven decision-making. The use of predictive analytics to forecast potential disruptions and adjust operations accordingly has allowed DHL to stay ahead of challenges during ITMS implementation. By leveraging these metrics, DHL not only tracks the progress of the ITMS but also communicates its value to the team, ensuring that the system is seen as an essential tool for improving efficiency and achieving long-term operational goals. Overall, the monitoring of these metrics plays a crucial role in overcoming implementation challenges by providing measurable evidence of ITMS success, driving employee confidence, and ultimately contributing to the system's smooth adoption and effective operation.

4.4.5 Data integration

b) Research articipant 3

"I think one of the key strategy to overcome the barriers of implementing the ITMS at Hock Cheong Co. is through effective data integration. For 3PL companies like ours, we deal with a lot of data from various sources especially from the e-commerce platform, and ensuring that this data is consistent and accurate is crucial. By focusing on integrating our existing systems with the ITMS, we can streamline our operations and improve data flow. This will not only enhance our decision-making processes but also help us meet our clients' diverse needs more efficiently. If we can get our data aligned, it will make the transition to ITMS much smoother and more effective."

According Lee Qi Zian 2024, data integration plays a critical role in overcoming the barriers faced by 3PL companies, like Hock Cheong Co., in implementing an Intelligent Transportation Management System (ITMS). One of the main challenges is managing large volumes of data from various sources. By integrating existing systems with the ITMS, companies can streamline operations, ensure data consistency, and improve the flow of information across departments. This enables more accurate decision-making and better alignment with clients' needs, allowing for smoother adoption of the system. With all data accessible in one unified

platform, real-time updates on deliveries, fleet performance, and inventory can be made, significantly enhancing operational efficiency and customer service.

Moreover, effective data integration helps in mitigating operational inefficiencies that may arise from data silos. For instance, by integrating real-time tracking data with fleet management and customer information, Hock Cheong Co. can ensure timely deliveries and optimal route planning. This not only improves efficiency but also reduces errors that may occur due to inconsistencies between different systems. The ability to access a holistic view of all operations allows for better coordination across departments, ensuring that customer expectations are met and potential delays are minimized. Ultimately, this streamlined data flow contributes to a smoother ITMS implementation, making the transition easier for staff and clients alike.

However, while data integration brings numerous benefits, it is also essential to consider the protection of client data during the ITMS implementation. 3PL companies like Hock Cheong Co. handle sensitive client information, including shipment details, inventory data, and personal information Siti 2018. Integrating ITMS into existing systems requires careful consideration of data security protocols to avoid breaches and protect client privacy. It is crucial that the new ITMS complies with all legal requirements and existing terms and conditions that govern the use of client data. By implementing strong encryption methods, secure data transfer protocols, and compliance with regulations such as GDPR (General Data Protection Regulation) or local data protection laws, Hock Cheong Co. can safeguard their clients' information while reaping the benefits of ITMS.

In conclusion, data integration not only improves operational efficiency and decision-making but also ensures that 3PL companies like Hock Cheong Co. can meet client expectations more effectively. However, it is equally important to maintain robust data protection measures to ensure that integrating the ITMS does not compromise client privacy or violate existing terms Fahmi 2018. By securing sensitive data and aligning the integration with legal requirements, Hock Cheong Co. can overcome implementation barriers, ensure a smooth transition, and build trust with their clients as they adopt the new system.

4.5 Summary

In summary, the findings and analysis reveal significant barriers to the implementation of Intelligent Transportation Management Systems (ITMS) among Third Party Logistics (3PL) companies in Melaka, primarily including integration challenges with existing systems, inadequate infrastructure, and a lack of skilled workforce. Participants highlighted the necessity for reliable communication networks and road quality to support ITMS effectively, as well as the financial burden associated with adopting new technologies. Strategies to overcome these barriers were identified, such as implementing training programs, utilizing government grants, and adopting a phased approach to integration. The insights from the research participants underscore the importance of addressing both technical and human resource challenges to facilitate a successful transition to ITMS, ultimately enhancing operational efficiency in the logistics sector. After the data analysis, the results of the data analysis will help the researcher to continue the chapter 5 and discuss the interpretation and discussion of the results, limitations, significant and recommendations for the overall study.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

5.1 Introduction

As the result has been discussed in chapter 4 by researcher, this chapter will underline the conclusion and comment concerning the finding. The research objectives and questions have been answered in this chapter on knowing the barrier to implement Intelligent Transportation Management System (ITMS) among 3PL companies and effective strategies to overcome the barriers. Furthermore, there are some suggestions, significant and limitation of research that given by researcher for further research will also discuss as a reference to continue the study in-depth on this researchwhich related to ITMS.

5.2 Achievement of Research Aims and Objectives

The aim of this study is to investigate the barriers of implementing ITMS among 3PL companies and strategies to overcome it. In pursuing the aim of this study, two research objectives have been established. The fulfilment of each objective is set out in the following section.

5.2.1 Fulfilment of the First Objective

The first objective is to explore of challenges in implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka brought to light several critical hurdles affecting adoption. One of the most prominent issues highlighted by participants was the steep upfront cost of ITMS, encompassing the expenses for hardware, software, and upgrading infrastructure. Many expressed concerns about the feasibility of such investments

in a relatively small market like Melaka, where the financial returns may take years to become evident. These financial challenges are further intensified by the need for reliable infrastructure, such as robust communication networks and well-maintained roads, both of which are vital for ITMS to function effectively. Without these foundational elements, achieving operational efficiency in logistics remains a significant challenge.

The study also shed light on a persistent shortage of skilled professionals as a major barrier to ITMS adoption. Participants emphasized that implementing ITMS effectively demands expertise in areas such as data analytics, software development, and system integration. However, the limited availability of such specialized skills in Melaka significantly hampers progress, delaying or even preventing ITMS deployment. Another key issue raised was the concern over data security and regulatory compliance, particularly for 3PL companies handling sensitive customer information. Together, these findings highlight the diverse and interconnected challenges faced by logistics companies in Melaka, stressing the need for well-designed, targeted approaches to overcome these barriers and enable the successful integration of ITMS.

5.2.2 Fulfilment of the Second Objective

The investigation into effective strategies to overcome the barriers of implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka revealed several actionable approaches that can facilitate successful adoption. One of the primary strategies identified was the implementation of comprehensive training programs aimed at enhancing the technical skills of the workforce. Participants emphasized the importance of equipping employees with both basic IT skills and advanced training for those responsible for managing the ITMS. By fostering a culture of continuous learning and development, 3PL companies can mitigate the skills gap and ensure that their personnel are well-prepared to handle the complexities of ITMS, thereby increasing the likelihood of successful implementation.

Additionally, adopting a phased approach to ITMS integration emerged as a crucial strategy for addressing the challenges associated with high initial costs and infrastructural inadequacies. This approach allows companies to gradually implement ITMS features, enabling them to assess the effectiveness of each phase and make necessary adjustments before full-scale deployment. Furthermore, leveraging government grants and funding opportunities can provide financial support to alleviate the burden of upfront costs, making it more feasible for 3PL companies to invest in the necessary technology and infrastructure. Monitoring success metrics throughout the implementation process is also vital, as it enables companies to track progress, identify areas for improvement, and demonstrate the value of ITMS to stakeholders. Collectively, these strategies offer a roadmap for 3PL companies in Melaka to navigate the barriers to ITMS implementation and enhance their operational efficiency in the logistics sector.

5.3 Significant of Study

The significance of this study is multifaceted, primarily contributing to the understanding of the barriers and facilitators of implementing Intelligent Transportation Management Systems (ITMS) within Third-Party Logistics (3PL) companies in Melaka. As the logistics sector increasingly turns to advanced technologies to enhance operational efficiency and competitiveness, it is essential to identify the specific challenges faced by local companies in adopting these systems. This research sheds light on critical issues such as financial constraints, inadequate infrastructure, and the shortage of skilled personnel, providing a comprehensive overview of the landscape in which 3PL companies operate. By highlighting these barriers, the study serves as a foundational resource for stakeholders seeking to navigate the complexities of technology adoption in the logistics industry.

Moreover, the findings of this study have practical implications for industry practitioners and policymakers. For logistics companies, understanding the effective strategies to overcome identified barriers—such as implementing targeted training programs and adopting a phased approach to ITMS integration—

can significantly enhance their operational capabilities. This research emphasizes the importance of investing in human capital and infrastructure, which are vital for the successful deployment of ITMS. Policymakers can also benefit from the insights provided, as the study underscores the need for supportive measures, such as financial incentives and infrastructure development, to foster an environment conducive to technology adoption. By addressing these challenges, stakeholders can improve the overall efficiency and competitiveness of the logistics sector in Melaka.

Finally, this study contributes to the academic literature on transportation management and technology adoption, particularly in the context of emerging markets. By documenting the unique challenges and strategies relevant to 3PL companies in Melaka, the research adds depth to the existing body of knowledge and provides a basis for future studies in this area. The insights gained from this research can inform further investigations into the dynamics of technology adoption in logistics, offering a framework for understanding how similar challenges may manifest in other regions. Ultimately, the significance of this study extends beyond its immediate findings, providing a valuable resource for researchers, practitioners, and policymakers aiming to enhance the effectiveness of ITMS implementation in the logistics industry globally.

5.4 Recommendations for future

Based on the findings of this study, several recommendations for future research can be proposed to further explore the implementation of Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies, particularly in emerging markets like Melaka.

This research comprised multiple case studies, but the researcher was able to include only three 3PL companies due to rejections from some companies citing busyness as the reason. However, for future research, it is recommended to contact 3PLs companies promptly, allowing sufficient time for arrangement, as it can be challenging to find suitable companies. Sending an initial email and following up

with a direct call if there is no response within 1-2 weeks could be an effective approach. The more 3PL companies interviewed, the higher the level of trustworthiness of the data collected, as all data relies on the support of respondents through interview session.

For the future research should consider conducting longitudinal studies that track the implementation process of ITMS over time within 3PL companies. Such studies could provide deeper insights into the long-term impacts of ITMS on operational efficiency, customer satisfaction, and overall business performance. By examining the evolution of ITMS adoption, researchers can identify best practices and common pitfalls, offering valuable lessons for companies considering similar technological advancements.

Secondly, it would be beneficial to expand the scope of research to include comparative studies between 3PL companies in different regions or countries. This approach could highlight how varying economic, infrastructural, and regulatory environments influence the adoption and effectiveness of ITMS. By understanding these differences, stakeholders can tailor their strategies to better suit local contexts, ultimately enhancing the success of ITMS implementation across diverse markets.

Lastly, for future research, the use of quantitative methods or mixed methods is suggested. In quantitative methods, researchers can send questionnaires through Google Forms, eliminating the need for interviews. While the quantity of datacollected through quantitative methods may be substantial, it provides an alternative when companies decline interviews. For mixed methods, researchers can supplement interviews with questionnaires, allowing respondents to elaborate further beyond the interview session.

5.5 Conclusion

In conclusion, this research has provided a comprehensive analysis of the barriers and strategies associated with the implementation of Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka. Through qualitative interviews with industry participants, the study identified key challenges such as high initial costs, integration issues, technical challenges, and a lack of skilled personnel. These barriers not only hinder the adoption of ITMS but also limit the potential benefits that such systems can offer in terms of operational efficiency and improved service delivery. By highlighting these obstacles, the research underscores the need for targeted interventions to facilitate the successful implementation of ITMS in the logistics sector.

Furthermore, the study has outlined effective strategies that 3PL companies can adopt to overcome these barriers. Recommendations such as implementing comprehensive training programs, adopting a phased approach to ITMS integration, and leveraging government grants and funding opportunities provide a practical framework for companies seeking to enhance their technological capabilities. By focusing on workforce development and gradual implementation, 3PL companies can better navigate the complexities of ITMS adoption, ultimately leading to improved logistics performance and competitiveness in the market. The insights gained from this research can serve as a valuable resource for industry practitioners and policymakers alike.

Overall, this research contributes to the growing body of knowledge on technology adoption in logistics, particularly within the context of emerging markets. The findings not only illuminate the specific challenges faced by 3PL companies in Melaka but also offer a roadmap for addressing these issues through strategic planning and investment in human capital. As the logistics industry continues to evolve with advancements in technology, ongoing research will be essential to further explore the dynamics of ITMS implementation and its implications for operational efficiency and service quality. By fostering a deeper understanding of these processes, stakeholders can better position themselves to

leverage technology for enhanced performance in the logistics sector.

REFERENCES

Autry, C. W., & Griffis, S. E. (2008). Supply chain capital: The impact of structural and relational linkages on firm execution and innovation. *Journal of Business Logistics*, 29(1), 157-173. Retrieved from: https://doi.org/10.1002/j.2158-1592.2008.tb00073.

B. Burmeister, A. Haddadi, G. Matlysis, (1997),Application of multi-agent systems in traffic and transportation, IEE Proc. Softw., pp. 51-60, Retrieved from: 10.1049/ip-sen:19971023

Behrendt K, Novak L, Botros R (2017) A deep learning approach to traffic lights: detection, tracking, and classification. In: 2017 IEEE international conference on robotics and automation (ICRA), IEEE, pp 1370–1377. Retrieved from: https://www.semanticscholar.org/paper/A-deep-learning-approach-to-traffic-lights%3A-and-Behrendt-Novak/e316d7b26f7e459a2350793c5e1b9224a4fd485f

Blanchard, J. C. (2024). Strategies for addressing the lack of skilled workers in the gig economy. Walden University. https://scholarworks.waldenu.edu/cgi/viewcontent.cgi?article=16885&context=dissertations

Boyson, S., Corsi, T., Dresner, M., & Harrington, L. (2013). Logistics and the extended enterprise: Benchmarks and best practices for the manufacturing professional. *Journal of Business Logistics*, 24(2), 131-144 Retrieved from:. https://doi.org/10.1002/j.2158-1592.2003.tb00050.

Capgemini Consulting, Penn State, and Panalpina. (2014). *The state of logistics outsourcing: 2014 3PL study*. Retrieved from https://www.3plstudy.com

Chen, D. Q., Preston, D. S., & Xia, W. (2013). Enhancing hospital supply chain performance: A relational view and empirical test. *Journal of Operations Management*, 31(6), 391-408. Retrieved from: https://doi.org/10.1016/j.jom.2013.07.012

Choy, K. L. (2022). Managing uncertainty in logistics service supply chain. ResearchGate. https://www.researchgate.net/publication/235405644_Managing_uncertainty_in_logistics_service_supply_chain

Crainic, T. G., & Montreuil, B. (2016). Physical internet-enabled hyperconnected city logistics. *Transportation Research Procedia*, 12, 383-398. Retrieved from: https://doi.org/10.1016/j.trpro.2016.02.074

Cui Z, Henrickson K, Ke R, Wang Y (2018) Traffic graph convolutional recurrent neural network: a deep learning framework for network-scale traffic learning and forecasting. arXiv preprint. Retrieved from: https://arxiv.org/abs/1802.07007

Data Analytics for Intelligent Transportation Systems. (n.d.). ScienceDirect. Retrieved from: https://www.sciencedirect.com/book/9780128097151/data-analytics-for-intelligent-transportation-systems

Elenjickal, M. (2024, October 30). Supply chain professionals, change management, and potential oversights. Forbes. https://www.forbes.com/councils/forbestechcouncil/2024/10/30/supply-chain-professionals-change-management-and-potential-oversights/

Evangelista, P. (2014). Environmental sustainability practices in the transport and logistics service industry: An exploratory case study investigation. *Research in Transportation Business & Management*, 12, 63-72. Retrieved from: https://doi.org/10.1016/j.rtbm.

Evangelista, P., McKinnon, A., Sweeney, E., & Esposito, E. (2010). Technology adoption in small and medium-sized logistics providers. *Industrial Management & Data Systems*, 110(6), 816-840. Retrieved from: https://doi.org/10.1108/02635571011055126

Fahmi, M. (2018). Barriers and challenges for technology transfer in Malaysian small and medium industries. ResearchGate. https://www.researchgate.net/publication/224506729_Barriers_and_Challenges_for_Technology_Transfer_in_Malaysian_Small_and_Medium_Industries

Flint, D. J., & Larsson, E. (2015). Drivers of green supply chain initiatives: Swedish food retailers and logistics service providers. *Journal of International Food & Agribusiness Marketing*, 27(3), 155-183. Retrieved from: https://doi.org/10.1080/08974438.2014.952689

Freeman, E., Adair, M., Beeler, D., Casper, R., Herman, M. P., Reeves, D., & Reinsch, S. (2022). Patient-identified burden and unmet needs in patients with cluster headache: An evidence-based qualitative literature review. *Cephalalgia Reports*, *5*, 251581632210968. Retrieved from: https://doi.org/10.1177/25158163221096866

Gartner. (2023, September 14). Top Supply Chain Trends and Predictions for 2024. Retrieved from: https://www.gartner.com/en/newsroom/press-releases/2024-03-20-gartner-identifies-top-trends-in-supply-chain-technology-for-2024

Golob, T. F., & Regan, A. C. (2001). Impacts of information technology on personal travel and commercial vehicle operations: Research challenges and opportunities. *Transportation Research Part C: Emerging Technologies*, 9(2), 87-121. Retrieved from: https://doi.org/10.1016/S0968-090X(00)00042-8

Grant, D. B., Trautrims, A., & Wong, C. Y. (2023). *Sustainable logistics and supply chain management: Principles and practices for sustainable operations and management*. Kogan Page Publishers. Retrieved from: https://www.koganpage.com/logistics-supplychain-operations/sustainable-logistics-and-supply-chain-management-9781398604438

Guan, C., & Zhang, C. (2020). Analysis of the adoption of intelligent transportation systems in logistics companies. *Journal of Transportation and Logistics*, 4(3), 45-59. Retrieved from: https://doi.org/10.1080/21680566.2020.1779884

Gunasekaran, A., & Ngai, E. W. T. (2013). The successful management of a small logistics company. *International Journal of Physical Distribution & Logistics Management*, 33(9), 825-842. Retrieved from: https://doi.org/10.1108/09600030310503398

Gupta, O. K., Ali, S. S., & Dubey, R. (2012). Third Party Logistics. In *IGI Global eBooks* (pp. 90–116). Retrieved from: https://doi.org/10.4018/978-1-4666-2473-

3.ch006

Haynes, K. E., & Li, M. (2004). ANALYTICAL ALTERNATIVES IN INTELLIGENT TRANSPORTATION SYSTEM (ITS) EVALUATION. *Research in Transportation Economics*, *8*, 127 – 149. Retrieved from: https://doi.org/10.1016/s0739-8859(04)08007-2

Heaver, T. D. (2013). The evolution of logistics and supply chain management. In D. B. Grant, A. Trautrims, & C. Y. Wong (Eds.), *Sustainable logistics and supply chain management* (pp. 3-24). Kogan Page Publishers. Retrieved from: https://chethankumargn.medium.com/artificial-intelligence-definition-types-examples-technologies-962ea75c7b9b

https://www.researchgate.net/publication/269078619_Challenges_of_implementation_of_intelligent_transportation_systems_in_developing_countries_Case_study_-_Tehran

Hwang, B. G., & Min, J. H. (2013). Planning and implementing an intelligent transportation system: The case of Seoul. *Journal of Advanced Transportation*, 47(6), 634-648. Retrieved from: https://doi.org/10.1002/atr.190

Iqbal, S. (2024). Innovative strategies for overcoming barriers to technology adoption in small and medium-sized enterprises. ResearchGate. https://www.researchgate.net/publication/382554258_Innovative_strategies_for_overcoming_barriers_to_technology_adoption_in_small_and_medium-sized_enterprises

Iskandar, M. F. (2019). Barriers to the adoption of formal IT governance practice. Queensland University of Technology. https://eprints.qut.edu.au/95791/1/Mohd%20Fairuz%20Iskandar_Othman_Thesis.pdf

J.A. Cortes, M.A. Serna, R.A. Gomez, June 7,2021,Information systems applied to intelligent transport improvement,Dyna, 180 (2013), pp. 77-86 Retrieved from: https://www.researchgate.net/publication/262435516_Information_systems_applied_to_transport_improvement

Jaafar, H. S., Ghazali, Z., & Aziz, R. (2010). Barriers to information technology adoption in third-party logistics: The case of Malaysian firms. *Asian Academy of Management Journal*, 15(2), 1-16. Retrieved from http://web.usm.my/aamj/15.2.2010/AAMJ_15.2.1.pdf

Jain, V., Kumar, S., & Soni, U. (2017). An integrated risk management framework: Case of sustainable freight transportation. *International Journal of Production Economics*, 184, 248-261. Retrieved from: https://doi.org/10.1016/j.ijpe.2016.11.016

Kerai, V. (2019). Skill labour shortage in construction industry. International Journal of Creative Research Thoughts. https://ijcrt.org/papers/IJCRT2306655.pdf

Kim, D. (2024). The competitive landscape of 3PL in 2024 and beyond. AutoStore. https://www.autostoresystem.com/insights/the-3pl-landscape-key-trends-and-challenges-for-2024

Kołodziej, J., Hopmann, C., Coppa, G., Grzonka, D., & Widłak, A. (2022). Intelligent Transportation Systems – Models, Challenges, Security Aspects. In *Lecture notes in computer science* (pp. 56–82). Retrieved from: https://doi.org/10.1007/978-3-031-04036-8_3

Lieb, R. C., & Lieb, K. J. (2015). Third-party logistics services: 2015. *Supply Chain Quarterly*. Retrieved from http://www.supplychainquarterly.com

Lieb, R., & Randall, H. L. (2016). A comparison of the use of third-party logistics services by large American manufacturers, 2013, 2014, and 2015. *Journal of Business Logistics*, 17(1), 305-320. Retrieved from: https://www.researchgate.net/publication/235265921_A_comparative_study_on_the_use_of_third_party_logistics_services_by_Singaporean_and_Malaysian_firms

Lin, C., & Choy, K. L. (2009). A genetic algorithm-based approach for the optimization of multi-modal transportation problems. *Transportation Research Part E: Logistics and Transportation Review*, 45(3), 488-504. Retrieved from: https://doi.org/10.1016/j.tre.2008.11.001

Liu, W. (2022). Intelligent logistics transformation: Problems in efficient commodity distribution. ScienceDirect. https://www.sciencedirect.com/science/article/abs/pii/S1366554522001260

Lop, S. (2021). Strategies, challenges, and solutions towards the implementation of green campus in UiTM Perak. ResearchGate. https://www.researchgate.net/publication/353503732_STRATEGIES_CHALLENGES_AND_SOLUTIONS_TOWARDS_THE_IMPLEMENTATION_OF_GREEN_CAMPUS_IN_UiTM_PERAK

Lu, Q., & Wang, D. Z. (2012). The role of transportation systems in logistics management: A review. *International Journal of Logistics Research and Applications*, 15(3), 137-156. Retrieved from: https://doi.org/10.1080/13675567.2012.668602

Mahadi, A. (2023). Institute of Technology Management and Technopreneurship. ResearchGate. https://www.researchgate.net/publication/371679183_Institute_of_Technology_Management_and_Technopreneurship

Manuj, I., & Mentzer, J. T. (2008). Global supply chain risk management. *Journal of Business Logistics*, 29(1), 133-155. https://doi.org/10.1002/j.2158-1592.2008.tb00072.x

Marchet, G., Melacini, M., & Perotti, S. (2014). Environmental sustainability in logistics and freight transportation: A literature review and research agenda. *Journal of Manufacturing Technology Management*, 25(6), 850-876. https://doi.org/10.1108/JMTM-06-2013-0066

Marchet, G., Melacini, M., Perotti, S., & Rasini, M. (2017). Logistics outsourcing in the food retail industry: A comparison between logistics service providers and retailers. *International Journal of Physical Distribution & Logistics Management*, 47(2/3), 132-150. https://doi.org/10.1108/IJPDLM-02-2016-0047

McDermid, F., Peters, K ., Jackson, D ., & Daly, J . (2019) Conducting qualitative research in thecontext of pre-existing peer and collegial relationships . Nurse Researcher, Retrieved From: https://www.researchgate.net/publication/262782089_Conducting_qualitative_research_in_the_context_of_pre-existing_peer_and_collegial_relationships

McKinnon, A. C. (2010). Green logistics: The carbon agenda. *Logistics Research*, 2(1), 1-9. https://doi.org/10.1007/s12159-010-0034-3

Meidute-Kavaliauskiene, I., & Aranskis, A. (2013). Evaluation of logistics outsourcing partnerships: Case of Lithuania. *Procedia-Social and Behavioral Sciences*, 110, 1314-1322. https://doi.org/10.1016/j.sbspro.2013.12.159

Mistri, A. (2019). Analysis of causes, effects, and impacts of skills shortage for sustainable construction through analytic hierarchy process. ResearchGate. https://www.researchgate.net/publication/354202419_ANALYSIS_OF_CAUSES_EFFECTS_AND_IMPACTS_OF_SKILLS_SHORTAGE_FOR_SUSTAINABLE_CONSTRUCTION_THROUGH_ANALYTIC_HIERARCHY_PROCESS

Morash, E. A., & Clinton, S. R. (2012). The role of transportation capabilities in international supply chain management. *Transportation Journal*, 51(1), 5-24. https://doi.org/10.5325/transportationj.51.1.0005

Mortensen, O., & Lemoine, O. W. (2008). Integration between manufacturers and third party logistics providers? *International Journal of Operations & Production Management*, *28*(4), 331–359. Retrieved from: https://doi.org/10.1108/01443570810861552.

Mvubu, M. (2024). Digital transformation at third-party logistics providers: Challenges and best practices. ResearchGate. https://www.researchgate.net/publication/380873655_Digital_transformation_at_third-party_logistics_providers_Challenges_and_best_practices

Naim, M. M., & Gosling, J. (2011). On leanness, agility and leagile supply chains. *International Journal of Production Economics*, 131(1), 342-354. https://doi.org/10.1016/j.ijpe.2010.04.045

Nazir, N. (2022). The thing you need to know about acceptance of green technology: A case study of Melaka green city initiatives. ResearchGate. https://www.researchgate.net/publication/361745777_The_Thing_You_Need_t_Know_about_Acceptance_of_Green_Technology_A_Case_Study_of_Melaka_Green_City_Initiatives

Nuzzolo, A., & Comi, A. (2014). Urban freight transport policies in Rome: Lessons learned and the road ahead. *Research in Transportation Business & Management*, 11, 43-52. https://doi.org/10.1016/j.rtbm.2014.06.004

Onwuegbuzie, A. J., & Weinbaum, R. (2017). A Framework for Using Qualitative Comparative Analysis for the Review of the Literature. Qualitative Report, 22(2). Retrieved from: https://nsuworks.nova.edu/cgi/viewcontent.cgi?article=2175&context=tqr

P.K. Agarwal*, J. Gurjar, A. Agarwal, R. Birla, (2015), Application of Artificial intelligence for development of intelligent transport system in smart citiesInt. J. Transp. Eng. Traffic Syst., Retrieved from: https://www.academia.edu/14424763/Application_of_Artificial_Intelligence_for_Development_of_Intelligent_Transport_System_in_Smart_Cities

Pearse, N.: An illustration of deductive analysis in qualitative research. In: European Conference on Research Methodology for Business and Management Studies, pp. 264–VII. Academic Conferences International Limited (2019) Retrieved from: https://academic-publishing.org/index.php/ejbrm/article/view/1398

Perego, A., Perotti, S., & Mangiaracina, R. (2011). ICT for logistics and freight transportation: A literature review and research agenda. *International Journal of Physical Distribution & Logistics Management*, 41(5), Retrieved from: https://doi.org/10.1108/09600031111138826

Peters, M., & Buijs, P. (2015). Integrating sustainable development in third-party logistics service design. *Logistics Research*, 8(1), 1-16. Retrieved from: https://doi.org/10.1007/s12159-015-0135-3

Qureshi, M. N., Kumar, D., & Kumar, P. (2007). Modeling the logistics outsourcing relationship variables to enhance shippers' productivity and competitiveness in logistical supply chain. *International Journal of Productivity and Performance Management*, 56(8), 689-714. Retrieved from: https://doi.org/10.1108/17410400710833002

Raja, R. (2022). Adoption of digital technology in global third-party logistics services providers: A review of literature. ResearchGate. https://www.researchgate.net/publication/361604606_Adoption_of_Digital_Technology_in_Global_Third-Party_Logistics_Services_Providers_A_Review_of_Literature

Rao, S., & Young, R. (2014). Global supply chains: Factors influencing outsourcing of logistics functions. *International Journal of Physical Distribution & Logistics Management*, 24(6), 11-19. Retrieved from: https://doi.org/10.1108/09600039410070368

Richards, H. M., & Schwartz, L. J. (2018). Ethics of qualitative research: are there special issues for health services research?. Family practice, 19(2), 135-139. Retrieved from: https://pubmed.ncbi.nlm.nih.gov/11906977/

Rodrigue, J. P., Slack, B., & Comtois, C. (2001). Green logistics (the paradoxes of). *The Handbook of Logistics and Supply-Chain Management*, 4, 339-351. Retrieved from: https://doi.org/10.1108/9780080435936-011

Roman, D., & Gudehus, T. (2015). Logistics for third-party services: A system-based approach. *International Journal of Production Research*, 43(16), 3495-3512. Retrieved from: https://doi.org/10.1080/00207540500056139

Saad, M. (2019). Best practices among 3rd party logistics (3PL) firms in Malaysia towards logistics performance. ResearchGate. https://www.researchgate.net/publication/335222582_Best_Practices_Among_3rd_Party_Logistics_3PL_Firms_in_Malaysia_towards_Logistics_Performance

Sahay, B. S., & Mohan, R. (2016). 3PL practices: An Indian perspective. *International Journal of Physical Distribution & Logistics Management*, 36(9), 666-689. Retrieved from: https://doi.org/10.1108/09600030610711068

Sarkar, B. D. (2024). Navigating barriers to reverse logistics adoption in circular economy: An integrated approach for sustainable development. ScienceDirect. https://www.sciencedirect.com/science/article/pii/S2772390924000271

Saunders, M. N., Lewis, P., Thornhill, A., & Bristow, A. (2019b). "Research Methods for Business Students" Chapter 4: Understanding research philosophy and approaches to. . . *ResearchGate* Retrieved from: https://www.researchgate.net/publication/330760964_Research_Methods_for_

Shaaban, K., Elamin, M., & Alsoub, M. (2021). Intelligent Transportation Systems in a Developing Country: Benefits and Challenges of Implementation. *Transportation Research Procedia*, *55*, 1373–1380. Retrieved from: https://doi.org/10.1016/j.trpro.2021.07.122

Shaheen, S., & Finson, R. (2016). Intelligent Transportation Systems☆. In *Elsevier eBooks*. Retrieved from: https://doi.org/10.1016/b978-0-12-409548-9.01108-8

Shi, Y., Waseem, R., & Shahid, H. M. (2020). Third-Party Logistics. In *IntechOpen eBooks*. Retrieved from: https://doi.org/10.5772/intechopen.86922

Siang, Y. (2023). Factors, challenges, and strategies of trust in BIM-based construction projects. MDPI. https://www.mdpi.com/2412-3811/8/1/13

Siti, A. (2018). Technology implementation barriers in the Malaysian herbal industry: A case study. ResearchGate. https://www.researchgate.net/publication/235751565_Technology_implementation_barriers_in_the_Malaysian_herbal_industry_A_case_study

Skjoett-Larsen, T., Schary, P. B., Mikkola, J. H., & Kotzab, H. (2017). *Managing the global supply chain*. Copenhagen Business School Press DK. Retrieved from: https://research.cbs.dk/en/publications/managing-the-global-supply-chain-3

Stank, T. P., Keller, S. B., & Closs, D. J. (2011). Performance benefits of supply chain logistical integration. *Transportation Journal*, 41(2/3), 32-46. Retrieved from: https://doi.org/10.2307/20713443

Sumbal, S. (2023). Sustainable technology strategies for transportation and logistics challenges. MDPI. https://www.mdpi.com/2071-1050/15/21/15224

Sweeney, E. (2019). The role of third-party logistics providers (3PLs) in the adoption of green supply chain initiatives. *International Journal of Logistics Research and Applications*, 16(6), 504-522. Retrieved from: https://doi.org/10.1080/13675567.2013.848018

Szｲ Bpka, J. O., & Lubiｲrki, P. (2017). New Technology Trends and Solutions in Logistics and Their Impact on Processes. *DEStech Transactions on Social Science, Education and Human Science*, *icss*. Retrieved from: https://doi.org/10.12783/dtssehs/icss2016/8989

Tan, A. (2022). Perspectives on the use of information technology at third-party logistics service providers in Singapore. ResearchGate. https://www.researchgate.net/publication/235278833_Perspectives_on_the_Use_of_Information_Technology_at_Third_Party_Logistics_Service_Providers_in_Singapore

Tan, K. S. (2019). The applicability of information technology governance in Malaysian SMEs. ResearchGate. https://www.researchgate.net/publication/335591946_Establishing_the_Level_of_BIM_implementation_-_A_Case_Study_in_Melaka_Malaysia

Tsai, H., & Lai, K. (2012). Intelligent transportation systems: Applications and challenges for logistics service providers. *International Journal of Logistics Systems and Management*, 11(4), 461-477. Retrieved from: https://doi.org/10.1504/IJLSM.2012.047926

Yang, C., & Zhao, Z. (2016). The adoption of intelligent transportation systems in logistics management: Challenges and opportunities. *Journal of Transportation and Supply Chain Management*, 10(2), 99-115. Retrieved from: https://doi.org/10.4102/jtscm.v10i2.238

Yi, Y. D. (2023). Digitalization among the quantity surveyors: Strategies to embracing the change. ResearchGate. https://www.researchgate.net/publication/353129673_Knowledge_of_tourist_spatial_behaviour_to_improve_Melaka_world_heritage_site_management

Yin, R. K. (2018). Applications of case study research. sage. Retrieved from: https://us.sagepub.com/en-us/nam/applications-of-case-study- research/book235140

Zian, L. Q. (2024). Challenges in big data adoption for Malaysian organizations: A review. ResearchGate. https://www.researchgate.net/publication/377221805_Challenges_in_big_data_adoption_for_Malaysian_organizations_a_review

Zulkarnain, & Putri, T. D. (2021). Intelligent transportation systems (ITS): A systematic review using a Natural Language Processing (NLP) approach. *Heliyon*, *7*(12), e08615. Retrieved from: https://doi.org/10.1016/j.heliyon.2021.e08615

APPENDIX I

Gantt Chart of Final Year Project (FYP) 1

Project Activities/ Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Identify the research topics									MID SEMESTER BREAK						
Internet and library search															
Discuss the title with supervisor															
Identify problem statement															
Determine the objective and research question															
Submit chapter 1 draft1															
Literature review															
Redo chapter 1															
Selection of methodology															
Redo chapter 2															
Discussion the Marks															
Doing slides for psm 1presentation and redo the slides															
Slide confirmation with Sv															
Presentation 1															
Revised of FYP 1															

APPENDIX II

Gantt Chart of Final Year Project (FYP) 2

Time / Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing for FYP 2														
Brainstorming for data analysis														
Discussion of questionnaire														
Questionnaire development														
Correction and additional														
Submission of questionnaire														
Do Interview														
Doing transcript and coding data														
Submission of transcript and coding data														
Data collection														
Chapter 4														
Do analysis														
Do findings														
Recheck data analysis														
Chapter 5														
Full report														
Preparing slide for Viva presentation														
Compiling proposal														
FYP 2 Presentation														
Correcting report based on Panel's comments														
Submission of FYP 2														

APPENDIX III

University Interview Permission Letter

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Tarikh (Date): 19 Oktober 2023 /04 Rabiulakhir 1445H

KEPADA PIHAK YANG BERKENAAN

اَلسَّلَامُ عَلَيْكُمْ وَرَحْمَةُ اللَّهِ وَبَرَكَاتُهُ

Dan Salam Sejahtera,

Tuan/Puan,

MEMOHON MENDAPATKAN MAKLUMAT DAN KAJIAN KES UNTUK MENYIAPKAN TUGASAN PROJEK

Dengan segala hormatnya perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pelajar berikut adalah merupakan pelajar **Program Ijazah Sarjana Muda Fakulti Pengurusan Teknologi dan Teknousahawanan (FPTT)**, Universiti Teknikal Malaysia Melaka (UTeM):

No	Nama	No. Matrik	Kursus
1	RISHIKARAN AL VISHU VARTHAN	B062110213	Ijazah Sarjana Muda Pengurusan Teknologi Dengan Kepujian (Pengurusan Rantaian Bekalan Dan Logistik) - BTMS

3. Pelajar tersebut perlu menyiapkan satu tugasan bagi Projek Sarjana Muda (PSM II) - BTMU 4084 untuk tahun akhir pengajian. Sehubungan dengan ini pihak kami amat berbesar hati sekiranya pihak Tuan/Puan dapat memberi peluang kepada pelajar berikut untuk menyempurnakan tugasan tersebut di organisasi tuan.

Sekian, harap maklum.

"MALAYSIA MADANI"
"BERKHIDMAT UNTUK NEGARA"
"KOMPETENSI TERAS KEGEMILANGAN"

Saya yang menjalankan amanah,

RAFIDAH BINTI MD. DUSA
Penolong Pendaftar Kanan
b.p : Dekan
Fakulti Pengurusan Teknologi dan Teknousahawanan

APPENDIX IV

Interview Questionnaire

CONSENT FORM

Project Title : THE CHALLENGES OF IMPLEMENTING INTELLIGENT TRANSPORTATION MANAGEMENT SYSTEM AMONG THIRD PARTY LOGISTIC COMPANIES IN MELAKA

Researcher : RISHIKARAN AL VISHU VARTHAN

Respondent Name :_____

Agree to participate in the research project titled above. We don't anticipate that there are any risks associated with your participation, but you have the right to stop the interview or withdraw from the research at any time. This consent form is necessary for us to ensure that you understand the purpose of your involvement and that you agree to the conditions of your participation. Would you therefore read the accompanying information sheet and then sign this form to certify that you approve the following:

- I give consent to take part in an interview for the above study
- I agree to having the interview videotaped, photographed and audio recorded
- The interview will be recorded and a transcript will be produced
- The interview will approximately take 30 – 45 minutes. Notes will be written during the interview.
- The interview is fully confidential and secure of the personal information and other relevant information

Signature :

_____

Date :_____

TITLE: THE CHALLENGES OF IMPLEMENTING INTELLIGENT TRANSPORTATION MANAGEMENT SYSTEM AMONG THIRD PARTY LOGISTIC COMPANIES IN MELAKA

SECTION A: Research participant background

- Name
- Position
- Experience in field
- Education background

SECTION B: Company Background

- About the founder
- When the business started
- What are the main activities

SECTION C:

RO 1: To explore the Barriers of Implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka

- What kind of resources (financial, technical, or human) does your organization need to successfully implement ITMS?
- What is your company's current approach to transportation management, and how does it impact your ITMS adoption efforts?
- Why might ITMS adoption be more challenging for 3PL companies compared to other industries?
- Why might the costs associated with ITMS adoption be a barrier for your organization?
- How has the feedback from stakeholders influenced your approach to ITMS adoption?
- What factors do you believe are the main barriers to implementing ITMS in your organization?
- What role do organizational culture and leadership play in your company's decision-making about ITMS?
- Why do you think these barriers exist in your industry or organization specifically?

- How would your organization handle issues such as data integration, training, or change management in adopting ITMS?
- How do you involve different departments or teams when planning ITMS implementation?

SECTION D:

RO 2: To investigate effective strategies to overcome barriers of implementing Intelligent Transportation Management Systems (ITMS) among Third-Party Logistics (3PL) companies in Melaka

- What strategies have been most effective in overcoming implementation barriers for ITMS in your organization?
- What are some key partnerships or external support systems that have helped overcome these barriers?
- Why are certain resources (like technology infrastructure or skilled labor) crucial for effectively implementing ITMS in 3PL companies?
- How do you measure the success or effectiveness of strategies designed to overcome these barriers?
- What role do training and development play in your strategy to ease ITMS implementation?

SECTION E: Conclusion remark

- Conclude the interview
- Thanking for the interview and time provided