SMART LOGISTIC ADOPTION TOWARDS LOGISTIC PERFORMANCE IN DHL MALAYSIA (SOUTHERN AREA).

WONG SOAN HANK

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

I hereby acknowledge that this project paper has been accepted as part of fulfilment for the degree of Bachelor of Technology Management (Supply Chain Management and Logistics)

SIGNATURE :
NAME OF SUPERVISOR : MISS ATIKAH SAADAH BINTI SELAMAT
DATE : 03/02/2023

SIGNATURE :
NAME OF PANEL : DR ATIRAH BINTI SUFIAN
DATE : 3/2/2023

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WONG SOAN HANK

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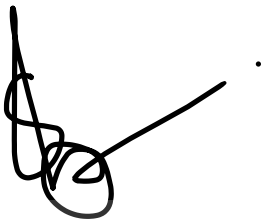
DECLARATION OF ORIGINAL WORK

I hereby declare that all the work of this thesis entitled “SMART LOGISTIC ADOPTION TOWARDS LOGISTIC PERFORMANCE IN DHL MALAYSIA (SOUTHERN AREA).” is original done by myself and no portion of the work encompassed in this research project proposal has been submitted in support of any application for any other degree or qualification of this or any other institute or university of learning.

SIGNATURE : 

NAME : WONG SOAN HANK

DATE : 20/06/2022

DEDICATION

I would like to thank the dedication of my sincerely family members who teaches me and encourage me to study until this education level. Besides that, I also express a deep sense of gratitude to my lecturer whom also my supervisor for my final year project, Miss Atikah Saadah Binti Selamat and my fellow friends. They gave me different kind of support and advice throughout this research. Without their support and motivation, this research is hard to complete within a short period of time.

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ABSTRACT

In this research, there are three aspect of smart logistic adoption that influence logistic performance in DHL Malaysia (Southern Area). The aspects are accessibility, reliability, and interoperability of smart logistic system. Technology Acceptance Model (TAM) was used as a framework to assist researcher in explain and forecasts the Technology users' behavior. A questionnaire survey was conducted to 111 respondents who works in DHL Malaysia (Southern area). The result of survey was recorded through Google form and the research sampling design was convenience sampling due to employee such as delivery men are not fixed to work at one location. After that, data analysis was conducted to ensure the data are reliable by using pilot test. The data was interpreted in descriptive analysis to visualize the information. Methods such as descriptive analysis, Cronbach's Alpha reliability analysis, Pearson Correlation analysis, multiple regression analysis are used to analyse data in this research. In the end of research, researcher obtain the result of relationship between aspect of smart logistic adoption and logistic performance. Researcher also provide research implication to help other in future study which related to this research.

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Keyword: ***Smart logistic, Logistic Performance, Accessibility, Reliability, Interoperability***

ABSTRAK

Dalam penyelidikan ini, terdapat tiga aspek penggunaan logistik pintar yang mempengaruhi prestasi logistik di DHL Malaysia (Kawasan Selatan). Aspek tersebut ialah kebolehcapaian, kebolehpercayaan, dan kebolehoperasian sistem logistik pintar. Model Penerimaan Teknologi (TAM) digunakan sebagai rangka kerja untuk membantu penyelidik menerangkan dan meramalkan tingkah laku pengguna Teknologi. Tinjauan soal selidik telah dijalankan kepada 111 responden yang bekerja di DHL Malaysia (kawasan Selatan). Hasil tinjauan telah direkodkan melalui borang Google dan reka bentuk persampelan kajian adalah persampelan mudah kerana pekerja seperti orang penghantar tidak tetap bekerja di satu lokasi. Selepas itu, analisis data dijalankan untuk memastikan data boleh dipercayai dengan menggunakan ujian rintis. Data telah ditafsirkan dalam analisis deskriptif untuk menggambarkan maklumat. Kaedah seperti analisis deskriptif, analisis kebolehpercayaan Alpha Cronbach, analisis Korelasi Pearson, analisis regresi berganda digunakan untuk menganalisis data dalam penyelidikan ini. Di akhir kajian, pengkaji memperoleh hasil hubungan antara aspek penerimaan logistik pintar dan prestasi logistik. Penyelidik juga memberikan implikasi kajian untuk membantu pihak lain dalam kajian masa depan yang berkaitan dengan penyelidikan ini.

Kata kunci: logistik pintar, prestasi logistic, kebolehcapaian, kebolehpercayaan, kebolehoperasian

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In this chapter, it will discuss about our research topic “Aspect of smart logistics adoption for DHL company in Southern Area of Malaysia”. It includes the background of study, problem statement, research question, research objectives, scope and limitation of study, significant of study, and summary of this chapter.

1.2 Background of Study

According to JWD (2021), logistic management firstly began from British Army, they use it to transport and keep their military needs such as troops and weapons during first world war. In 1964, U.S. public starts to implement logistic management in their business and practice it until now.

Evolution of logistic is continuously grows as the demand towards logistic is increase. Previously, most of our shipment can only deliver local and inefficiency. Logistic service providers and customers also difficult to track their shipments. For example, customer want to cancel or modify order but company difficult to track and contact with the transporters. This causes waste of time and money due to miscommunication and poor technology in logistic. According to Flock Freight (2022), a survey found that industry’s traditional shipping methods such as partial truck load (PTL), truck load (TL), and less-than-truckload (LTL) cause shipping fee increases and delay of shipment.

In 2020, the demand towards logistic service increase gradually and it had stimulated the evolution of logistic. According to Kaur G. (2021), Tasco Berhad, a logistic solution company reported their annual profit in year 2021 had hit all new time which is RM41.27mil during pandemic of COVID-19. This is because efficient logistic service to fulfil order become one of the competitive advantages in e-commerce activity during COVID-19 outbreak as people forced to stay home. Due to increase of consumer demand, the importance of information flows in supply chain become significant. However, every country had forced to lockdown during

COVID-19 outbreak peak period to prevent the infection of the virus so this action had brings huge impact to logistic industry. The number of shipments to a certain country had limited and many restrictions are set by inbound and outbound country government. The activities of logistic become less and its significant affect the production of manufacturing industry. For example, the production of semi-conductor shortage due to lack of material as they cannot reach the manufacturing factory on time. The interconnecting of logistic system had proven its significant as customers or any parties within the supply chain can check the availability of goods or service through a tracking system.

Today, logistic plays a significant role in most of the industry. It is significant to a business or manufacturer as it can optimize the production and profitability. According to ExpressIt Delivery (2021), better logistic performance can also offer lower costs, higher customer satisfaction, better supplier relationship, and greater industry reputation. Hence, "Smart logistic" become a solution for most of the logistic service provides such as DHL. The concept of smart logistic is combining the Internet of Things (IoT) and other technology with logistic service to optimize the logistic operation and visualize the information from the supply chain. For example, customer of food delivery company can put their orders in apps and immediately merchant and rider receive the order details. According to Bo F. & Qiwen Y. (2021), smart logistic is a suitable alternative to handle high complexity and volume of logistic operations.

DHL company is global logistic service provider company. In March 2022, it has almost 512,536 employees working in DHL company around the world. There are 5 main entities in DHL to provide logistic solution for their customers. They are DHL Express, DHL Global Forwarding, DHL Freight, DHL Supply Chain, and DHL eCommerce Solutions. Each entity has different responsibilities towards logistic solution, but they still need to work together and ensure the effectiveness and efficiency of supply chain. Hence, smart logistic in DHL company such as adoption of Internet of Things (IoT) in their logistic system can link every entity together. The information flows in their logistic system become visible and tracking information is approximate to real time.

1.3 Problem Statement

The problem to be addressed by this study is the adoption of smart logistic and the corresponding logistics performance among DHL company in Melaka, Malaysia. Nowadays, logistics service is overwhelming around the world as the rapid growth of e-commerce. Customers desire to have a lower cost, shorter delivery time, and safety logistics service. The adoption of technology in logistics such as smart logistics may help to improve their performance and increase competitive advantage in the market. In 2018, logistic performance index (LPI) of Malaysia is 3.22/5.0 which placed 41 in LPI global ranking. Hence, smart logistics is expected to improve logistics performance among Malaysia LSP company.

Logistic company without the assist of technology may suffer in low productivity and low efficiency operations. For example, DHL has met some challenges from the customers in their logistic services. From DHL Summary of "Customer Challenges", they stated that they need to find their logistic solutions for quality of resource and service management, cost reduction, local logistic operations and distribution network design, and supply chain resilience and flexibility. They required a good system or a modal such as smart logistic to assist them for finding their solutions.

According to Shapiro (2021, December 9), improved technology can benefits logistics industry with trucking transportation, international transportation, supply chain management, and shipment tracking. These advantages allow LSP to improve their logistics performance and increase customers satisfaction level. Joydeep Misra from Bridgera (2020, November 17) stated that smart logistics powered by Internet of Things (IoT) provide Amazon a solution for customers to receive their shipment in same day. This service also known as same-day shipping.

Referring to Suaz Canal blockage issues happened in 2021, Ever Green, a vessel which has a gross tonnage of 220,940 blocked the waterway at Suaz Canal. Suaz Canal is located at Egypt where offers the shortest path for vessel to travel between Asia and Europe. The blockage issues cause a heavy maritime traffic and affects all the transit time of vessel that planned to pass through Suaz Canal. The issue not only affecting the transit time of vessel, yet it also affects the operation of manufactory industry as the parts or materials needed were stuck on vessel at the Suaz Canal. Organizations that suffer in this tragedy struggled to respond as they cannot make decision with uncertainties. The uncertainties were come from the lack of real time visibility which required digitalization and assist of Iot.

Maritime logistic service provider companies always need to offer short lead time service due to consumer demand so they are forced to respond immediately for unexpected event happens. Hence, LSP companies require to improve their capabilities to capture approximate real time data that helps them to reduce damage from unexpected disruption and its consequence such as shipment delay.

Besides that, the outbreak of pandemic COVID-19 also causes a supply disruption which brings a big negative impact for poor logistic management. In conventional logistic management, the lack of technology causes higher risk to meet an inventory shortage problem. The quantity and supply of inventory is not enough to capture the consumer demand and causes the shortage happens. This is because the data of inventory has low visibility and poor real time tracking system. An example of toilet roll shortage in 2020, it happens when the COVID-19 starts to outbreak, consumer has high demand to keep large quantities of toilet roll as their daily necessities. However, the supply is unable to catch up the demand as manufacturing industry do not has enough material to produce. Hence, the importance of smart logistics adoption to visualize the information along supply chain had been shown in these previous issues. Smart logistic is expected not only to increase logistic performance, yet it also expected to enhance customer satisfaction and loyalty.

In other hand, emerging technology such as smart logistic may also not applicable for everyone since both DHL employees and customers have different background and education level. Low accessibility technology may not bring positive effect to the performance, yet it may bring negative user experiences. The application of technology is aimed to be user-friendly and optimize its function. For example, update and check of goods availability information can only worked by using computer. This is not user-friendly as deliveryman is impossible to always bring a computer along its travel and update the information of goods. Hence, accessibility of smart logistic adoption can be significantly affecting the logistic performance as low accessibility need longer time to use it and lead time will increase.

Last but no least, reliability of a technology may also affects the performance of an operation. The consistency occurs of error in the system may increase the cost of operation and low productivity. For example, the errors in recording the inventory quantity may cause wrong ordering of low turnover rate goods and surplus occurs. Company may face high inventory cost and other negative consequences from the mistake. The consistent occurs of errors may also increase the lead time as amends are needed to cover the errors.

1.4 **Research Question**

There are three research questions to be determined in this study:

i. What are the aspects of smart logistic that affect logistic performance?
ii. Which is the most significant aspect between smart logistic and logistic performance?

1.5 Research Objective

In this study, the researcher had identified three research objectives:

i. To determine the relationship between aspect of smart logistic and logistic performance.
ii. To determine the most significant aspect between smart logistic and logistic performance.

1.6 Scope and Limitation of the Study

The scope of this research paper is to focus on aspect of smart logistic adoption towards logistic performance in DHL company. The respondent of this research will be conducted from employee in DHL company Malaysia (Southern area). It will be picked randomly among employee in DHL company Malaysia (Southern area). The research result will be obtained from questionnaire which given to the selected respondents.

The limitation of this research is huge population of target company, DHL. DHL company is known as one of the most employee company in the world so it is difficult to reach that much of people for a satisfy research outcome. Besides that, due to high population of target company, it also requires to consume more time to collect the research questionnaire. However, the time given to complete this study is short so it is a challenge to collect enough data in this short period of time.

1.7 Significant of Study

The outcome of this study is to benefit logistic solution companies. They will understand the important aspects of smart logistic adoption for their company development. They also can understand the aspects of smart logistic adoption which can affect the most in level of logistic performance. Besides that, the research outcomes also can provide a reference for comparison between the three aspects of research used. This research might further study to investigate with other aspects in smart logistic adoption.

1.8 Summary

As a conclusion, the overview of this study is comprised in this chapter. The chapter is starts with discussing the background of study and coming up with problem statement of this study. After that, the researcher had dedicated three research question and research objective for this study. The researcher also highlighted the scope and limitation in this study. Finally, the significant to conduct this study also be discussed in this chapter. In the next chapter, the study will continue with literature review of this research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The definitions of smart logistic and logistic performance will be discussed in this chapter. The factors of smart logistic adoption which are the independent variable such as accessibility, reliability, and interoperability of smart logistic, will also be discussed in this chapter.

2.2 Smart Logistic

According to I. Dembińska (2018), the direct meaning of word "smart" is wise or clever. However, it is not suitable to use it with logistic as the meaning is more to express people. The word also has another definition which is "intelligent" and it is more suitable to describe a high technology product or service.

According to W. Kenton (2022), the definition of "logistic" is the combination of process to acquire, stored, and moved the goods to their destination. According to H. Bhasin. (2021), the main activity of logistic includes order processing, materials handling, warehousing, inventory control, transportation, and packaging. According to W.P. Wong & C.F. Tang (2018), logistics is a way of transporting commodities from producers to consumers, it is the backbone of trade. Hence, logistic plays important role in every business.

According to Y. Song et.al (2021), the concept of smart logistic is based on the modern advanced information and communication technology (ICT). It can intelligently develop a contemporary integrated logistics system by processing and analysing information from all parts of logistics in real time. According to Y. Ding (2020), there are some types of smart logistic in recent such as autonomous logistic, smart freight, intelligent transportation system, and customer-oriented intelligent logistic.

2.2.1 Smart Logistic in DHL company

According to DHL (2020), we bring robotics and automation to our smart warehouse. Businesses are exploiting the potential of micro-fulfillment. It uses small warehouses in urban areas for immediate and short-term delivery to more people. The time and efficiency gains afforded by smart warehousing solutions make this model increasingly viable for enterprises. According to M. Kruysen (2020), automated processes are bringing greater resilience to logistics infrastructure as the pandemic has highlighted the importance of supply chain resilience.

According to DHL (2023), there are five ways to implement 5G in their logistic. First is digitalized logistic. It can offer faster speeds, lower latency, greater coverage, and relatively lower power consumption, smart devices can communicate with each other faster even closer to real-time speeds. This will catalyze the use of time-sensitive Internet of Things (IoT) device applications and open the door to new use cases in logistics and beyond. Second is reduce risk of supply chain to minimum. Portable Internet-connected tracking devices that track the location and status of goods in real time throughout the supply chain can eliminate information blind spot. Third is autonomous transport. With ultra-low latency, 5G is significant for self-driving trucks on public roads, where every millisecond counts. Indeed, 5G data can be transmitted with a latency of only 1 millisecond, 50 times faster than 4G so the self driving system can take less time to do a decision and offer safer and more reliable operation. Forth is higher efficiency operation at port. To build an intelligent traffic system, sensors, cameras, and devices are networked to form an integrated communication system. Intelligent autonomous transport load and unload, transmit cargo inventory information and provide access to controlled areas. Lastly is implementation of Augmented Reality (AR). Reduced lag time and instant updates to cargo movement improve the user experience of AR applications that can visually display the latest changes. This reduces the potential for error and increases the efficiency of staff managing warehouse operations.

2.3 Logistic performance

According to Brumbrach (1988), performance implies behaviour and results. The act comes from the performer and translates the performance from abstraction to action. According to UKEssay (2018), performance might be simply described as the achievement of quantifiable goals. However, it is not just about what individuals achieve, but also about how they do it.

The aspects used to measure logistic performance are shipping time, order accuracy, picking accuracy, delivery time, picking and packaging time, equipment utilization rate, transportation cost, warehousing costs, picking, and packaging costs, use of packaging material, number of shipments, inventory accuracy, inventory turnover, and inventory to sales ratio.

Besides that, Logistics Performance Index also normally in evaluate logistic performance. According to The World Bank (2018), it is an outstanding benchmarking tool designed to assist nations in identifying the difficulties and opportunities in their trade logistics performance, as well as what they can do to improve it.

According to G. Chow et.al (1994), logistic performance in meeting agreed delivery dates, fill rate on baseline/in-stock items, advance notice of shipping delays, manufacturer's accuracy in predicting and dedicating to predicted shipping dates on contract/project orders, manufacturer's compliance to special delivery instructions, accuracy in filling orders

2.3.1 Lead time

According to Brightpearl (2022), the definition of lead time is the time from start of a procedure until it is completely done. Lead time also can know as the combination of shipping time and delivery time which can use to evaluate the logistic performance. According to Mecalux (2019), it can be calculated by using formula below:

Lead time = Delivery date – Order date

According to W.S. Chang (2019), in the case of global outsourcing. companies face greater uncertainty in the shipping process because of longer delivery times. It demonstrates that growing supply chain complexity, whether through horizontal or vertical collaboration, may increase the chance of disruptions in lead time. The spread and multiplication of risks is a problem that requires prompt attention and resolution for lead time.

2.4 Aspect of Smart Logistic

2.4.1 Accessibility of smart logistic

According to M. Soegaard (2021), the idea of accessibility refers to whether a product or service is available to everyone. According to Peatworks (2022), "accessible technology" is technology that persons with a wide variety of functional abilities can employ successfully. When technology is high accessibility, users may interact with the most efficient ways for themselves.

According to G.M. Greco (2018), the initial call for accessibility in contemporary thinking and society may be traced back to the same ferocious argument about human dignity, equality, autonomy, and participation that raged in the opening decades of the twentieth century, between the conclusion of World War 1 and the start of World War 2. Nowadays, accessibility also can be used in technology or online. According to M. Campoverde-Molina et.al (2020), when we talk about online accessibility, it is about web design and development that makes it possible for individuals to see, comprehend, navigate, and engage with the Internet.

Mobile phone become an essential tool in our life. A mobile apps may help to increase accessibility of a technology or system. According to 6 River Systems (2021), technology such as mobile apps making logistic feasible to real time track both fixed and mobile assets indoors with greater accuracy, and when paired with digital maps, providing visual access to this data in the context of a map.

Conclusion, it can be explained "accessibility of smart logistic" is the ability for any individual to understand and access the high intelligent logistic system.

2.4.2 Reliability of smart logistic

According to A.M. Gillespie (2015), the definition of reliability is the chance that a component or system will perform its intended function without error for a certain amount of time under specified operating circumstances.

According to M. Tatum (2022), delivery reliability (DR) is a measurement that determines the number of shipments suffer in any type of errors where the shipment starts deliver from origin to its destination in a particular time. According to Y. Li & H. Yi (2014),

reliability is the main aspect of logistics service quality that a logistics client perceives, and it has a direct impact on the core service benefit of a logistics organisation.

In other hands, A. Golnas (2013) states that reliability of a system is used to describe the chance of a system to complete a designed or intended task within a given time and particular environment. System reliability basically has three arrangements which series system, parallel system, and combined system. According to J. Menčík (2016), series system states that a failure of any part in the system can cause the failure of the entire system. While parallel system states that a failure of any part in the system will not affect the operation of the entire system. Combined system is the combination of series system and parallel system. Reliability of a series system can be calculated by the formula below:

$$R_S = R_1 \times R_2 \times \ldots \times R_n$$

Reliability of a parallel system can be calculated by the formula below:

$$R_S = 1 - \prod (1 - R_i)$$
$$= 1 - (1 - R_1) \times (1 - R_2) \times \ldots (1 - R_n)$$

Hence, reliability in smart logistic can be explained as the probability that error occurs while using high intelligent logistic system.

2.4.3 Interoperability of smart logistic

According to S. Pan et.al (2021), the definition of interoperability is the capacity of separate logistics and supply networks to conduct operations and business with one another in order to utilise the capability of other networks or to execute activities for others. According to S.B. Santiago et.al (2019), interoperability also can show an organization's ability to act in an interoperable for both internal and external manner with significant competitive advantage, as it can cut costs, improve response time, and allow for a broader scope of operations. It is typically desired in the field of information systems, but its principles have been observed to be applicable to logistics.

According to Hofmann and Rüsch (2017), logistic and supply chain management proposed a strong emphasis on improving digital interoperability. The main factor is the shift of trends towards logistic system digitalization and data-driven transformation. According to S. Pan et.al (2021), logistic involves a series of companies and logistic service providers, so interoperability is important to show how these parties can communicate with each other efficiency and effectively.

According to S.B. Santiago et.al (2019), interoperability creates an interconnection links between processes, information flows, equipment, and systems from different organizations. It is considered accomplished if efficient cooperation is carried out at least in the levels of business technologies, knowledge, information, and communication technologies, as well as considering the semantic factors that supplement the preceding three. For example, (Yang et al., 2017) while dealing with problems, inventory system which is distributed and interconnected has ability to decrease 35% of total logistic costs. These logistic costs include shipping, inventory cost, and shortage.

According to S.B. Santiago et.al (2019), to optimize its full potential, logistics interoperability should focus on four basic areas: command and control, information management, transport systems, equipment, and logistics support services. Because it provides a centralised command structure, an interoperable system can increase efficiency by reducing logistical expenditure on processes that do not need it such as multi-modal solutions.

2.5 TAM model

Technology Acceptance Model (TAM) is the theory used to conduct this research. It is selected as the theory because smart logistic is a set of technology system that implement to optimize logistic performance. Hence, TAM model is suitable to understand users' acceptance for smart logistic adoption.

According to P.C. Lai (2017), TAM model was initially introduced by Davis in 1986, the model was used in research for explaining and forecasting the behavior of Technology users. The following figure is the example of Technology Acceptance Model (Davis, 1986):

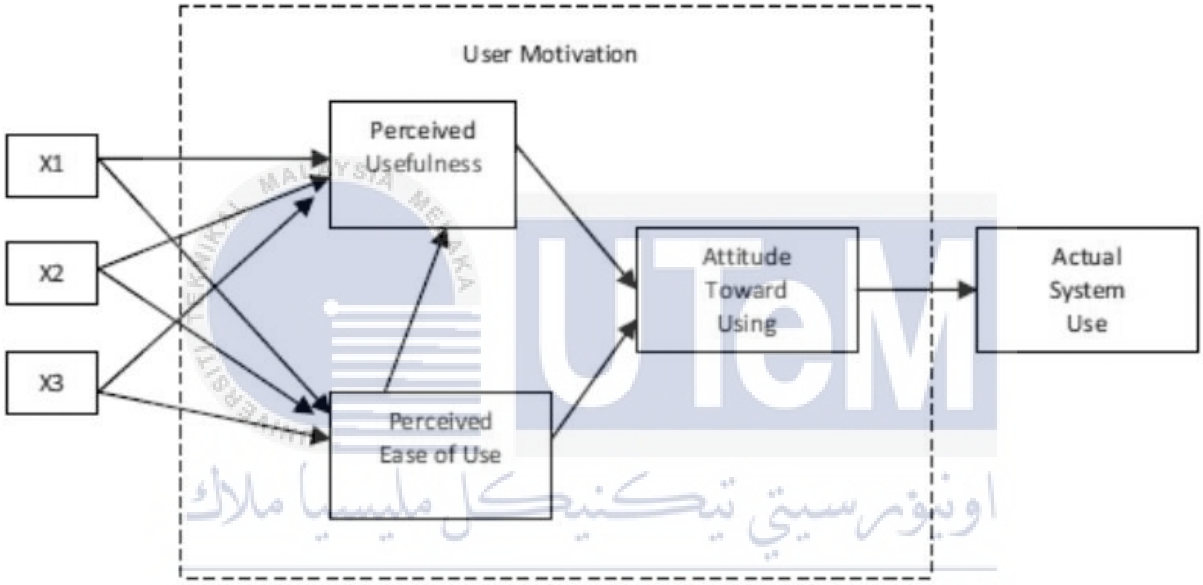

Figure 2.1: Technology Acceptance Model (Davis, 1986)

2.6 Conceptual Framework

In this research, theoretical background of study is used to identify the aspect of smart logistic adoption. However, the research framework is conceptual since this research framework is totally new for smart logistic adoption towards logistic performance. The three independent variables which are accessibility, reliability, and interoperability of smart logistic is selected. While dependent variable is logistic performance. The dependent variable was measured in term of lead time. The research framework is illustrated as below:

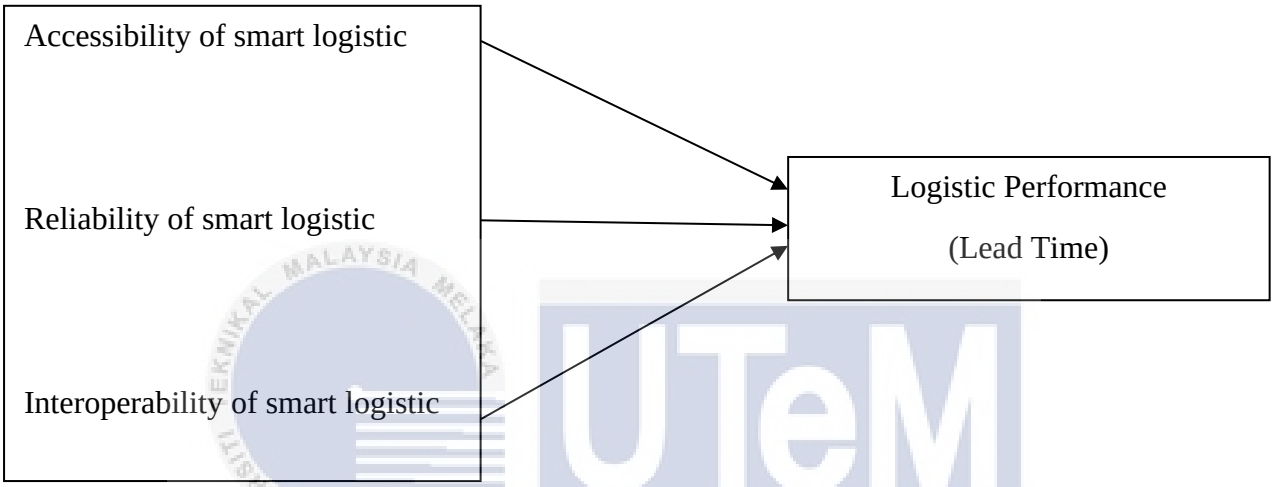

Figure 2.2: Research Framework

2.7 Hypothesis Testing

There are 3 hypotheses can be determined based on research framework of this study. The following statement are the hypothesis:

i. Accessibility

H_0 = There is no significant positive relationship between accessibility of smart logistic and logistic performance.

H_1 = There is significant positive relationship between accessibility of smart logistic and logistic performance.

ii. Reliability

H_0 = There is no significant positive relationship between reliability of smart logistic and logistic performance.

H_1 = There is significant positive relationship between reliability of smart logistic and logistic performance.

iii. Interoperability

H_0 = There is no significant positive relationship between interoperability of smart logistic and logistic performance.

H_1 = There is significant positive relationship between interoperability of smart logistic and logistic performance.

2.8 Summary

As a conclusion, the researcher had discussed on smart logistic adoption, logistic performance, and various factor of smart logistic adoption. The research framework that links independent variables and dependent variable also had been proposed in this chapter. Last but not least, the chapter end up with the hypothesis testing of this research. The next chapter is going to discuss about the research methodology.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the researcher will discuss about the methodologies used to collect the data and information for this research. This chapter starts with discuss the relationship between independent variables and dependent variable in research design. The methodological choice of this research is quantitative method. Primary and secondary data will be used as the research data sources. Research location, research strategy, time horizon, reliability and validity, and data analysis method will also be discussed in this chapter.

3.2 Research Design

In this research, the research design used is explanatory research. According to Samia et.al (2019), explanatory research is a research design that more on explaining the details of study. It used to help researcher solve problem that was not study in-depth previously. Explanatory research is not necessary to conclude with an answer, but it helps to increase understanding towards the study. The new data and theory added to the existing study topic can create a variety level of understanding in the research.

According to Samia et.al (2019)**, t**here are a few benefits to choose explanatory research as research design of study. First is enhance the understanding of certain topic in the research. Second is flexibility of source as primary and secondary data are widely accepted in this kind of research design. Third is create more valuable conclusions because more new statistical data and theory are added into the research.

3.3 Methodological Choices

In general, there are three type of research methodologies which are quantitative, qualitative, and mixed methods. These methods are used to collect data and to address issues that arise during the data collection process. Only based on the preliminary data collection

process and the secondary data collection process can the researcher present his findings in the form of quantitative or qualitative or mixed methods research.

In this case of study, the researcher uses the quantitative method in determining the relationship between logistic performance and aspect of smart logistic. Researcher will identify how the aspect of smart logistic adoption affects logistic performance via using three independent variable which are accessibility, reliability, and interoperability of smart logistic. A reliable questionnaire was conducted in collecting data to prove that this study is completely quantitative.

3.4 Primary and Secondary Data Sources

3.4.1 Primary Data

Primary data can be defined as the information collected by researcher for a certain purpose of study. The information is fresh as it is the first-hand source of the information collected. The most common ways to collect primary data are surveys, interview, and experiments.

In this research, questionnaire is conducted to collect primary data. The gathered data is used in determining the aspect of smart logistic and logistic performance. It is important as researcher can attain the goal as well as the objective of research. The questionnaire will be distributed to the management in DHL Malacca. Respondents are required to answer the questions given that used to measure the independent variables of research. Likert-type scales are used to evaluate the variables in the research.

Table 3.1: 5-point Likert-Scale Survey

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	2	3	4	5

3.4.2 Secondary Data

The researcher also gathers the secondary data for research purpose. According to F. Solt (2020), secondary data can be defined as the data that is already gathered and is readily to use. Secondary data is commonly data used in previous literature. It is important to utilize in supporting the primary data to achieve the objective of research.

The researcher obtained the information of research topic from news, articles, books, and government publication on Internet. Secondary data is good for initial a discussion or study on background and historical information of a topic as it can offer different points of view, interpretations and conclusions from researcher on a same topic.

3.5 Research Location

Southern area of Malaysia is chosen as the research location because there are three states in this area which able to provide sufficient respondents sample size to the research. The diversity of employee category such as age, education level and jobs position can help the research to avoid bias result.

Figure 3.1: Locations of survey

3.6 Research Strategy

3.6.1 Questionnaire Design

A questionnaire is conducted for this research to obtain the primary data needed. The questionnaire is divided into three sections. Section A is the demographic data for research respondent. Respondents are required to answer the question regarding to age, education level, and job position. Section B is used to measure the aspect of smart logistic adoption. Section C is used to measure the logistic performance after the adoption of smart logistic. The questionnaire is designed based on 5-point Likert scale. For 5-point Likert scale, the scale displays, 1: “Strongly disagree”, 2: “Disagree”, 3: “Neutral”, 4: “Agree”, 5: “Strongly agree”. 5-point Likert scale is used in Section B to measure the aspect of smart logistic adoption and Section C to measure the logistic performance after smart logistic adoption.

3.6.2 Sampling Design

Non-probability sampling has been chosen as the sampling design for this research. There are four type of non-probability sampling methods which are convenience sampling, judgemental or purposive sampling, snowball sampling, and quota sampling. In this research, the most suitable sampling method is convenience sampling. Convenience sampling is selected as the sampling design because DHL company is a courier service provider company. My respondent includes DHL deliveryman, but they are not working at a fixed workplace due to their job characteristic. Hence, it is more suitable to use convenience sampling to collect my data.

3.6.3 Pilot Test

A pilot test is mostly used in guiding the plan of big scale analysis. The purpose of pilot test is mostly emphasized in research, the progress assumed in development of an upcoming extensive test, venture, or the development. this test facilitates to making the decision and therefore it serves as the small-scale test, or the observations set adopted to decide how and whether the dispatch a whole project. The quiz within the pilot frame may enhance the comprehension of the queries in that the uncertainty of the clarifications in the study agreement would be averted. Pilot test may show the errors as well as the weakness of the questionnaires

used. It can be used in modifying the questionnaires to ensure that the questionnaires are effective afore being spread to the respondents. A minimum of 12 respondents are selected because there is a limitation to reach the population.

3.7 Time Horizons

Time horizon is the time duration which the study can take. There have been two approaches that can be used in appropriating the time horizon: cross-sectional and longitudinal. Longitudinal is the well-known when it comes to group studies and health test. Besides that, longitudinal research also is the study whereby the research participants' outcomes and probably exposures or even the treatment is collected dissimilar times. This research is categorized basing on the kind of data collected and the hypothesis to be tested. While cross-sectional research can be defined as the study of identified situation in a specified period. More importantly, there are several studies done for the academic purpose. Cross-sectional research is entirely dissimilar with longitudinal due to their observation in one time and longitudinal on the other end the individual or the studies done by a team is valuated more than a single period. Cross-sectional study was selected for the case of this research. The researcher did the research from the year 2022 March to the year 2023 January. Questionnaire will be distributed from the year 2022 July to the year 2022 October. The study would be conducted in the year 2022 December and ready to be presented in the year 2023 January.

3.8 Reliability and Validity

Cronbach's Alpha is used to measure the average correlation of each item with all other items that make up that variable. If the Cronbach's Alpha reliability coefficient in the range between 0.6 - 0.7, it is acceptable. If it is greater than 0.7, the reliability is considered good.

Table 3.2: Cronbach's Alpha Coefficient Range

Cronbach's Alpha Coefficient Range	Strength of Association
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

3.9 Data Analysis Method

3.9.1 Descriptive Analysis

Descriptive analysis is used to describe the huge amount of data that have been collected into numeral values. Descriptive statistics of a set of data such as mean, median, mode, standard deviation, and variance score are determined using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics will simply a large amount of data in a sensible way and summarize or describe a set of quantitative data.

3.9.2 Pearson's Correlation Analysis

Pearson's correlation coefficient is used to quantify the strength of the linear relationship between two numerical variables. The sample correlation coefficient, ρ can indicate a number from -1 to 1. The larger the variation in the data to the best fit line，if the closer the value of ρ is to zero. The smaller the variation in the data and the best fit line, the closer the value of ρ is to +1 or -1.

Figure 3.2: Pearson's Correlations Coefficient

3.9.3 Multiple Regression Analysis

Multiple Regression Analysis is an extension of simple linear regression. It is used to predict the value of a variable based on the value of two or more other variables by using ANOVA. The variable used to predict are called the dependent. The variables are used to predict the value of the dependent variable is called the independent variables. The multiple regression equation of this study shows below:

Equation: $Y = a + bX_1 + cX_2 + dX_3 + eX_4$

3.10 Summary

In this chapter, researcher had explained the research design used which is convenience sampling. The methodology choice of this research is quantitative method and questionnaire will be conducted to collect data. The data collected is then further study in next chapter. Primary and secondary data are the data sources of this research. Malacca DHL stations is selected as research location and minimum of 12 employee are required to fulfil this research. The data analysis methods used are descriptive analysis, Pearson's correlation analysis, and multiple regression analysis. SPSS is used to present the descriptive analysis.

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter will present the results of data analysis from the data collection. To collect data, questionnaires are distributed to employee who work in DHL Melaka via Google Forms. After the data is collected from questionnaires, Statistical Package for Social Science (SPSS) software version 29.0 is used to analyze data collected from the target respondents in this study. This chapter will include descriptive statistics, reliability, and normality tests. To determine the relationship between the dependent variable and independent variables, Pearson's correlation coefficient (parametric test) will be used when the data is normally distributed, Spearman rank-order correlation will be used when the data is unevenly distributed, as well as using multiple regression analysis.

4.2 Pilot test

Pilot testing was conducted before the data collection process and distribution of the questionnaire to target respondents. The objective of conducting a pilot test is to evaluate the validity of the questionnaire and the data's reliability (Hamilton, 2022). To create a better questionnaire design and reduce issues for respondents answering the questionnaire and data screening issues, it is necessary to conduct pilot tests to ensure that the research can be carried out smoothly (Saunders et al., 2019). Hence, 12 respondents who work at DHL Malaysia (Southern area) were chosen to conduct the pilot test.

Reliability Statistics

Cronbach's Alpha	N of Items
.930	22

Table 4.1: Reliability Statistics (Pilot Test)

Source: SPSS output

The questionnaire included a total of 22 items, and none of the 12 respondents had missing data. The research data only consider reliable when Cronbach's Alpha value is greater than 0.7. (Saunders et al., 2019). Based on table 4.1 above, the value of Cronbach's Alpha for all the items in this research is 0.93, which is higher than 0.7, thus the data obtained is reliable with excellent internal consistency.

4.3 Descriptive Statistics on Demographic Background

Descriptive statistics is one of the methods to evaluate, define, display, and interpret collected data using tables, graphs, and overview calculations (Saunders et al., 2019). In this research, the researcher used descriptive statistics to analyze the demographic data of respondents collected from questionnaires. Based on the table, there are three categories of the demographic profile of respondents which included age, education level, and job position. The questionnaires were distributed through Google Forms to target respondents and there has a total of 111 respondents after the data collection.

4.3.1 Age

Age / Umur :

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 20	10	9.0	9.0	9.0
	20 - 29	58	52.3	52.3	61.3
	30 - 39	33	29.7	29.7	91.0
	40 - 49	8	7.2	7.2	98.2
	50 and above	2	1.8	1.8	100.0
	Total	111	100.0	100.0	

Table 4.2: Age of Respondents

Source: SPSS Output

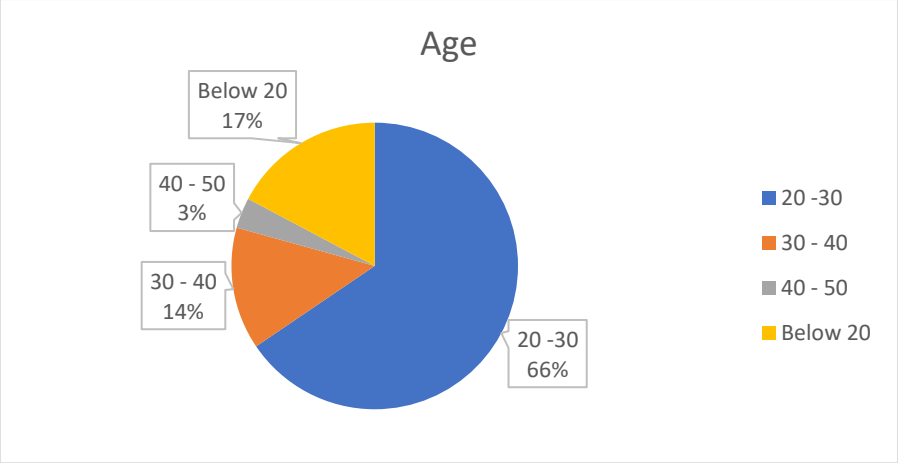

Figure 4.1: Age Pie Chart

Table 4.2 presents the frequency distribution of respondents' age in this research and the age range of respondents is divided into 5 categories which are below 20 years old, 20-29 years old, 30-39 years old, 40-49 years old, and 50 years old & above. From the table above, there are 58 respondents (52.3%) who aged between 20 to 29 and 10 respondents (9.0%) aged below 20 among the total 111 respondents. While 33 respondents (29.7%) aged 30-39 years old involved in this survey. There are 8 respondents (7.2%) who aged 40-49 years old and only 2 respondents (1.8%) are aged 50 years old and above. Therefore, the majority respondents to this survey were between the ages of 20-29 while the age range that represents the least number of respondents is 50 years old and above.

4.3.2 Education level

Education Level / Tahap Pendidikan

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SPM	5	4.5	4.5	4.5
	STPM	2	1.8	1.8	6.3
	Diploma	23	20.7	20.7	27.0
	Degree	79	71.2	71.2	98.2
	Master	2	1.8	1.8	100.0
	Total	111	100.0	100.0	

Table 4.3: Education level of respondents

Source: SPSS Output

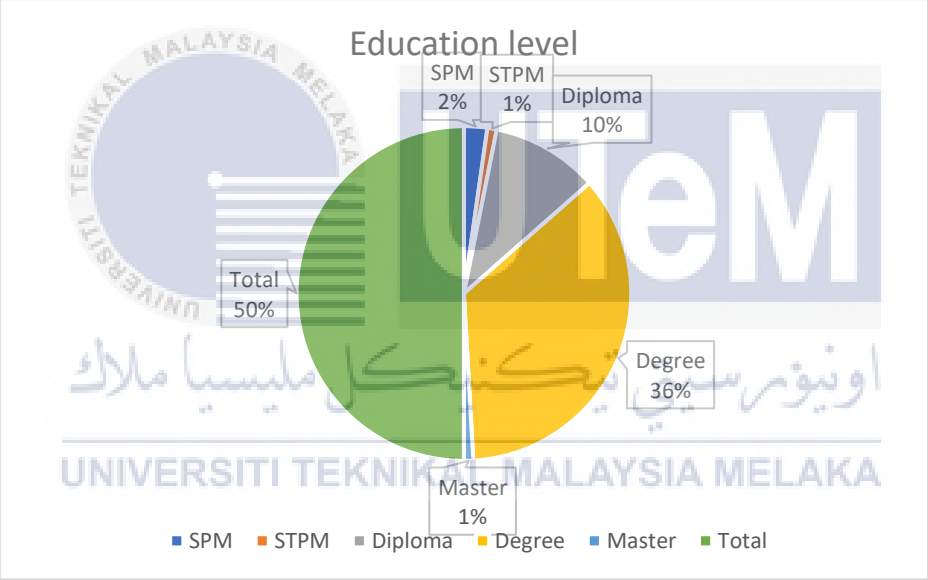

Figure 4.2: Education Level Pie Chart

In this research, the education level of respondents has been separated into seven different groups including SPM, STPM, Diploma, Degree, Master, PHD and others. There are 5 respondents (4.5%) with SPM, 2 respondent (1.8%) with STPM, 23 respondents (20.7%) with Diploma, 79 respondents (71.2%) with Degree, and 2 respondent (1.8%) with Master. None of the respondents are PHD holder. Hence, the most education level of the respondents is Degree, while the least number of respondents in education level is PHD.

4.3.3 Job Position

Job Position / Jawatan Kerja

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Floor Staff	84	75.7	75.7	75.7
	Supervisor/Head of Department	20	18.0	18.0	93.7
	Manager	7	6.3	6.3	100.0
	Total	111	100.0	100.0	

Table 4.4: Job position of respondents

Source: SPSS Output

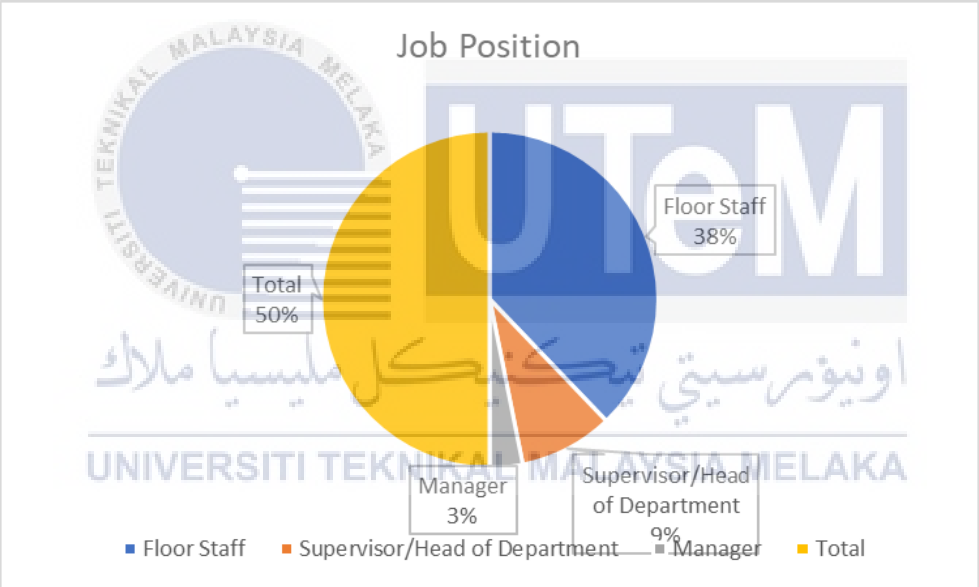

Figure 4.3: Job Position Pie Chart

The job position of respondents is classified into four groups, which are floor staff, supervisor/head of department, manager and other. According to the table 4.4, there are 84 respondents (75.7%) working as floor staff, 20 respondents (18.0%) working as supervisor/ head of department, and 7 respondents (6.3%) working as manager. While there is no respondent working in other position from the selections. Therefore, the highest number of respondents is 84 persons who works as floor staff, and the least number is 7 persons who works as manager.

4.4 Descriptive Statistics on Independent Variables and Dependent Variable

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ASL	111	1.00	5.00	3.9712	.69326
RSL	111	1.00	5.00	4.0721	.81432
ISL	111	1.00	5.00	4.1351	.69605
LPA	111	1.00	5.00	4.1667	.75328
Valid N (listwise)	111				

Table 4.5: Descriptive Statistics of Independent Variables and Dependent Variable

Source: SPSS Output

In this research, table 4.5 above indicates the descriptive statistics of three independent variables including accessibility of smart logistic adoption (ASL), reliability of smart logistic adoption (RSL), and interoperability of smart logistic adoption (ISL), and the dependent variable which is logistic performance after smart logistic adoption (LPA). Among the independent variables, the mean value of accessibility, reliability, and interoperability are 3.9712, 4.0721, and 4.1351 respectively. Since their mean value is close to 4, it means that most of the respondent opinions are sided to agree on accessibility, reliability, and interoperability as the aspect influencing smart logistic adoption towards logistics performance. In other hand, the mean value of dependent variable (logistic performance) is 4.1667. Since the mean value is close to 4, it shows that respondents are sided to agree better logistic performance after smart logistic adoption. Furthermore, the logistic performance after smart logistic adoption (LPA) variable has the highest mean value while the accessibility of smart logistic has the lowest mean value among the variables.

Besides that, the highest standard deviation of the variable is the reliability, at 0.81432, followed by logistic performance after smart logistic adoption (LPA), interoperability, and accessibility. Therefore, the data in the reliability variable is the most spread out from the mean compared to other variables. While the accessibility variable has the lowest standard deviation value which is 0.69326, thus its data are the most concentrated around the mean among the variables. Lastly, the minimum and maximum values of independent variables (accessibility, reliability, interoperability) and dependent variable (logistic performance) are 1.00 and 5.00 respectively.

4.4.1 **Descriptive Statistics on Accessibility**

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ASL1: It is easy for me to understand the smart logistic system.	111	1	5	3.76	.855
ASL2: It is easy for me to learn the smart logistic system.	111	1	5	4.05	.918
ASL3: It is easy for me to access by using mobile device.	111	1	5	4.06	.907
ASL4: It is convenient to use the system to complete a task.	111	1	5	4.20	.851
ASL5: Uses of smart logistic system does not require high mental effort.	111	1	5	3.78	1.004
Valid N (listwise)	111				

Table 4.6: Descriptive Statistics of Independent Variable (Accessibility)

Source: SPSS Output

In this research, table 4.6 above indicates the descriptive statistics of independent variables which is accessibility of smart logistic adoption (ASL). It had divided into five different statements to measure the accessibility of smart logistic adoption towards logistic performance. In first statement (ASL1: It is easy for me to understand the smart logistic system.), the mean value is 3.76 and its standard deviation is 0.855. In second statement (ASL2: It is easy for me to learn the smart logistic system.), the mean value is 4.05 and its standard deviation is 0.918. In third statement (ASL3: It is easy for me to access by using mobile device.), the mean value is 4.06 and its standard deviation is 0.907. In forth statement (ASL4: It is convenient to use the system to complete a task.), the mean value is 4.20 and its standard deviation is 0.851. In fifth statement (ASL5: Uses of smart logistic system does not require high mental effort.), the mean value is 3.78 and its standard deviation is 1.004. These results show that ASL4 had the highest mean value and ASL1 had the lowest mean value among statements in accessibility. While the standard deviation of ASL4 had the lowest value and ASL5 had the highest value. The minimum and maximum values of accessibility of smart logistic adoption are 1.00 and 5.00 respectively.

4.4.2 Descriptive Statistics on Reliability

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
RSL1: Smart logistic system can show the reliability of your supply chain performance.	111	1	5	4.05	1.090
RSL2: It can help the task to complete within agreed time.	111	1	5	4.07	1.015
RSL3: It can help the task to complete with agreed quantities.	111	1	5	3.92	1.046
RSL4: It reduces error occurs compared to conventional logistic system.	111	1	5	4.12	.839
RSL5: It offers stability and consistency of operation performance over time.	111	1	5	4.21	.955
Valid N (listwise)	111				

Table 4.7: Descriptive Statistics of Independent Variable (Reliability)

Source: SPSS Output

In this research, table 4.7 above indicates the descriptive statistics of independent variables which is reliability of smart logistic adoption (RSL). It had divided into five different statements to measure the reliability of smart logistic adoption towards logistic performance. In first statement (RSL1: Smart logistic system can show the reliability of your supply chain performance.), the mean value is 4.05 and its standard deviation is 1.090. In second statement (RSL2: It can help the task to complete within agreed time.), the mean value is 4.07 and its standard deviation is 1.015. In third statement (RSL3: It can help the task to complete with agreed quantities.), the mean value is 3.92 and its standard deviation is 1.046. In forth statement (RSL4: It reduces error occurs compared to conventional logistic system.), the mean value is 4.12 and its standard deviation is 0.839. In fifth statement (RSL5: It offers stability and consistency of operation performance over time.), the mean value is 4.21 and its standard deviation is 0.955. These results show that RSL5 had the highest mean value and RSL3 had the lowest mean value among statements in reliability. While the standard deviation of RSL4 had the lowest value and RSL1 had the highest value. The minimum and maximum values of accessibility of smart logistic adoption are 1.00 and 5.00 respectively.

4.4.3 Descriptive Statistics on Interoperability

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ISL1: Digital interoperability can help interconnect logistics and supply networks as well as the operational solutions for sustainable development.	111	1	5	3.95	.878
ISL2: Smart logistic has ability to connect the independent logistics and supply networks to mutually conduct operations and business with one another.	111	1	5	4.21	.810
ISL3: Smart logistic provide an efficiency and effectively channel for multi-level communication with each other.	111	1	5	4.15	.844
ISL4: Smart logistics system allow quick, reliable, secure, and seamless sharing of data or information among different systems, among companies, or among networks.	111	1	5	4.19	.869
ISL5: It enhances the ability to track and trace sharing of data.	111	1	5	4.22	.928
Valid N (listwise)	111				

Table 4.8: Descriptive Statistics of Independent Variable (Interoperability)

Source: SPSS Output

In this research, table 4.8 above indicates the descriptive statistics of independent variables which is interoperability of smart logistic adoption (ISL). It had divided into five different statements to measure the interoperability of smart logistic adoption towards logistic performance. In first statement (ISL1: Digital interoperability can help interconnect logistics and supply networks as well as the operational solutions for sustainable development.), the mean value is 3.95 and its standard deviation is 0.878. In second statement (ISL2: Smart logistic has ability to connect the independent logistics and supply networks to mutually conduct operations and business with one another.), the mean value is 4.21 and its standard deviation is 0.810. In third statement (ISL3: Smart logistic provide an efficiency and effectively

channel for multi-level communication with each other.), the mean value is 4.21 and its standard deviation is 0.810. In forth statement (ISL4: Smart logistics system allow quick, reliable, secure, and seamless sharing of data or information among different systems, among companies, or among networks.), the mean value is 4.19 and its standard deviation is 0.869. In fifth statement (ISL5: It enhances the ability to track and trace sharing of data.), the mean value is 4.22 and its standard deviation is 0.928. These results show that ISL5 had the highest mean value and ISL1 had the lowest mean value among statements in interoperability. While the standard deviation of ISL2 had the lowest value and ISL5 had the highest value. The minimum and maximum values of accessibility of smart logistic adoption are 1.00 and 5.00 respectively.

4.4.4 Descriptive Statistics on Logistic Performance

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
LPA1: Delivery from origin to destination on time.	111	1	5	4.08	.811
LPA2: Delivery from origin to sorting center on time.	111	1	5	4.24	.974
LPA3: Delivery from sorting center to delivery hub on time.	111	1	5	4.08	.764
LPA4: Delivery from delivery hub to destination on time.	111	1	5	4.28	.926
Valid N (listwise)	111				

Table 4.9: Descriptive Statistics of Dependent Variable (Logistic Performance)

Source: SPSS Output

In this research, table 4.9 above indicates the descriptive statistics of dependent variables which is logistic performance after smart logistic adoption (LPA). It had divided into four different situations to measure the logistic performance. In first situation (LPA1: Delivery from origin to destination on time.), the mean value is 4.08 and its standard deviation is 0.811. In second situation (LPA2: Delivery from origin to sorting center on time.), the mean value is 4.24 and its standard deviation is 0.974. In third situation (LPA3: Delivery from sorting center to delivery hub on time), the mean value is 4.08 and its standard deviation is 0.764. In forth

situation (LPA4: Delivery from delivery hub to destination on time.), the mean value is 4.28 and its standard deviation is 0.926. These results show that LPA4 had the highest mean value while LPA1 and LPA3 had the lowest mean value among situations in logistic performance. While the standard deviation of LPA3 had the lowest value and LPA2 had the highest value. The minimum and maximum values of accessibility of smart logistic adoption are 1.00 and 5.00 respectively.

4.5 Reliability Analysis

The reliability analysis will be used to determine the accuracy and consistency of sample data in the questionnaire by performing reliability test and determine the result of Cronbach's Alpha. To test the reliability of this research, Cronbach's Alpha will be the indicator for this research.

Case Processing Summary

		N	%
Cases	Valid	111	100.0
	Excluded[a]	0	.0
	Total	111	100.0

a. Listwise deletion based on all variables in the procedure.

Table 4.10: Case Processing Summary

Source: SPSS Output

Reliability Statistics

Cronbach's Alpha	N of Items
.931	22

Table 4.11: Reliability Test

Source: SPSS Output

In the questionnaire, there are total of 22 items including 3 demographic questions, 15 independent variable questions, and 4 dependent variable questions. The total number of sample data collected is 111 samples and there is no missing data. Since the research data only consider reliable when Cronbach's Alpha value is greater than 0.7. (Saunders et al., 2019). According to table 4.11, the value of Cronbach's Alpha for all items in this study is 0.931, which is greater than 0.7, indicating that the data gathered from the samples is reliable and has excellent internal consistency. Since all the items in the survey has very high reliability due to the Cronbach's Alpha is above 0.9. All the variables in this analysis are reliable.

4.6 **Normality Test**

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ASL	.194	111	<.001	.844	111	<.001
RSL	.184	111	<.001	.846	111	<.001
ISL	.182	111	<.001	.861	111	<.001
LPA	.238	111	<.001	.779	111	<.001

a. Lilliefors Significance Correction

Table 4.12: Normality Test

Source: SPSS Output

Normality test is used to determine whether the sample data is normally distributed from its population. The Shapiro-Wilk test is one of the examples of normality test and checks how well the sample data fits a normal distribution. When the significant value of Shapiro-Wilk test is more than 0.05, therefore conclude the data follows a normal distribution and use parametric test to make assumptions or data analysis more accurately. In contrast, non-parametric is more suitable for hypothesis or data analysis when the data does not follow a normal distribution. According to table above, the significance value of the Shapiro-Wilk test is less than 0.05, indicating that the data is not normally distributed, and non-parametric tests are more suitable for further data analysis such as correlation tests.

4.7 Pearson's Correlation Coefficients Analysis

Correlations

		ASL	RSL	ISL	LPA
ASL	Pearson Correlation	1	.669**	.656**	.705**
	Sig. (2-tailed)		<.001	<.001	<.001
	N	111	111	111	111
RSL	Pearson Correlation	.669**	1	.726**	.640**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	111	111	111	111
ISL	Pearson Correlation	.656**	.726**	1	.687**
	Sig. (2-tailed)	<.001	<.001		<.001
	N	111	111	111	111
LPA	Pearson Correlation	.705**	.640**	.687**	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	111	111	111	111

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.13: Pearson's Correlation Coefficients Analysis

Source: SPSS Output

Remarks:

IV1: Accessibility **(ASL)**, **IV2**: Reliability **(RSL)**, **IV3**: Interoperability **(ISL)**, **DV**: Logistic Performance After Smart Logistic Adoption **(LPA)**

Table 4.13 shows the correlation values between all independent variables (Accessibility, Reliability, Interoperability) and the dependent variable (Logistic Performance). Significant values above or equal to 0.5 means that the relationship between the variable is clear and significant. Low correlation between the variables is indicated by correlation coefficients with significant value sizes between 0.3 and 0.5.

The correlation value between accessibility of smart logistic and logistic performance after smart logistic adoption is r = 0.705*, Sig. value (2-tailed) = 0.000, indicating a strong positive correlation with the dependent variable. In addition, the correlation coefficient between reliability of smart logistic and logistic performance after smart logistic adoption were r = 0.640, Sig. value (2-tailed) = 0.000, indicating that there is also a weak positive correlation between the independent variable and the dependent variable as r value is between 0.3 to 0.7. Besides that, for the correlation between interoperability of smart logistic and logistic performance after smart logistic adoption, contributing r = 0.687, Sig. value (2-tailed) = 0.000, there is a weak positive correlation between independent and dependent variables as r value is between 0.3 to 0.7.

Independent Variables	Pearson's Correlation	Association Strength
Accessibility	0.705	**Strong Positive**
Reliability	0.640	**Weak Positive**
Interoperability	0.687	**Weak Positive**

Table 4.14: Strength of Pearson's Correlation Coefficient

4.8 Spearman Rank Correlation Analysis

The Spearman's rank correlation is a non-parametric test to determine the strength and direction of the relationship between independent and dependent variables. It essentially provides a measure of the linear constraints of the relationship between two variables by showing how well the relationship between two variables can be described by a linear function (Gupta, 2022). Since the sample data is not normally distributed in the research, the Spearman's rank correlation will be used to determine the association between the variables.

An association is considered significant if the significance value is less than 0.05. Additionally, the correlation coefficient (r) assesses the strength of the linear link between two variables. Correlation coefficients range from +1 to -1. The closer the value is to 1, the stronger the association between the two variables. On the contrary, the closer the value is to 0, it means that there is a weaker link between the two variables.

Correlations

			ASL	RSL	ISL	LPA
Spearman's rho	ASL	Correlation Coefficient	1.000	.487**	.436**	.542**
		Sig. (2-tailed)	.	<.001	<.001	<.001
		N	111	111	111	111
	RSL	Correlation Coefficient	.487**	1.000	.665**	.478**
		Sig. (2-tailed)	<.001	.	<.001	<.001
		N	111	111	111	111
	ISL	Correlation Coefficient	.436**	.665**	1.000	.497**
		Sig. (2-tailed)	<.001	<.001	.	<.001
		N	111	111	111	111
	LPA	Correlation Coefficient	.542**	.478**	.497**	1.000
		Sig. (2-tailed)	<.001	<.001	<.001	.
		N	111	111	111	111

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4.15: Spearman Rank Correlation Test

Source: SPSS Output

Table 4.15 shows the correlations between the independent and dependent variables. The independent variables in this research are accessibility, reliability, and interoperability while the dependent variable is logistic performance after smart logistic adoption (LPA).

According to the table above, the correlation coefficient for the accessibility is 0.542. It indicates that there is a strong positive relationship between accessibility and logistic performance after smart logistic adoption. The correlation is significant at the 0.01 level (2 tailed) and proving an efficiency of $p < 0.001$ for all two perceptions. Therefore, when accessibility increases, logistic performance after smart logistic adoption will increase.

Next, the correlation coefficient for the reliability is 0.478. It indicates that there is a moderate positive relationship between reliability and logistic performance after smart logistic adoption. The correlation is significant at the 0.01 level (2 tailed) and proving an efficiency of $p < 0.001$ for all two perceptions. As a result, as reliability increases, logistic performance after smart logistic adoption will increase.

Lastly, the correlation coefficient for the interoperability is 0.497. It indicates that there is a moderate positive relationship between interoperability and logistic performance after smart logistic adoption. The correlation is significant at the 0.01 level (2 tailed) and proving an efficiency of $p < 0.001$ for all two perceptions. Therefore, when interoperability increases, the logistic performance after smart logistic adoption will increase.

4.9 Multiple regression analysis

Multiple regression analysis is a statistical method used to evaluate the strength of a cause-and-effect relationship between independent and dependent variables (Saunders et al., 2019). As a result, the objective of conducting multiple regression analysis in this study is to determine the significant relation between the independent variables (accessibility, reliability, interoperability) and the dependent variable (logistic performance after smart logistic adoption).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.770[a]	.593	.581	.48077

a. Predictors: (Constant), ISL, ASL, RSL

Table 4.16: Model Summary Multiple Regression Analysis

Source: SPSS Output

R-square is a method for calculating the percentage of variation of a dependent variable is explained by the independent variables in a regression model. Based on the table above, the correlation coefficient (R) is 0.770 which indicated there is a moderate relationship between those variables. Furthermore, the coefficient of determinant (R square) is 0.593, indicating that the variation of logistic performance after smart logistic adoption is 59.3% influenced by the three independent variables (accessibility, reliability, and interoperability), while 40.7% is explained by other factors that are not considered in this research.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.015	3	12.005	51.938	<.001[b]
	Residual	24.732	107	.231		
	Total	60.748	110			

a. Dependent Variable: LPA

b. Predictors: (Constant), ISL, ASL, RSL

Table 4.17: ANOVA

Source: SPSS Output

According to table 4.17 above, the result of F-test value is 172.131 with a significant level at 0.000 which is lower than 0.05. Therefore, the result shows that the multiple regression model is fit and there is a significant relationship between accessibility, reliability, interoperability, and logistic performance after smart logistic adoption. Moreover, the null hypothesis would be rejected because the significant level of regression model is less than 0.05.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.464	.303		1.532	.128
	ASL	.438	.096	.401	4.557	<.001
	RSL	.124	.089	.135	1.400	.164
	ISL	.353	.103	.326	3.422	<.001

a. Dependent Variable: LPA

Table 4.18: Coefficients of Multiple Regression Analysis

Source: SPSS Output

According to table 4.18, there are three independent variables including accessibility, reliability, and interoperability. Each of the independent variables provides a contribution which is used to determine dependent variable logistic performance. First, the strongest aspect is accessibility, β =0.438, t (111) = 4.557, p < 0.001 (<0.05). This result shows unstandardized beta, β of accessibility has the highest influence of positive relationship with the logistic performance.

Then, the second strongest predictor is interoperability, β = 0.353, t (111) = 3.422, p < 0.001 (<0.05). This result shows unstandardized beta, β of interoperability is the second highest positive value compared to other independent variables and it also is the second highest influence of positive relationship with the logistic performance.

Last but not least, the lowest predictor is the reliability, β = 0.124, t (111) = 1.400, p = 0.164 (>0.05). This result shows unstandardized beta, β of reliability is the lowest positive

value compared to other independent variables. The significance value of reliability (RSL) is 0.164 which is more than 0.05, so it is considered that there is not a significant relationship between reliability and logistic performance.

According to the findings, each independent variable makes a different contribution and offers significant predictions for the logistic performance, despite having a varied influence value and influence level on the dependent variable. The relationship between the dependent variable and the three independent variables can be established using the multiple regression equation shown below. This study's multiple regression is as follows:

$$Y = a + bX_1 + cX_2 + dX_3$$

$$\mathbf{Y = 0.153 + 0.468X_1 + 0.286X_2 + 0.223X_3}$$

a	Constant/Other influences
b	Influence of X_1 (Accessibility)
c	Influence of X_2 (Reliability)
d	Influence of X_3 (Interoperability)
Y	Dependent Variable (Logistic Performance)
X_1, X_2, X_3,	Independent Variables

Table 4.19: Equation of Multiple Regression Analysis

Source: (Saunders, Lewis & Thornhill, 2016)

In short, Logistic Performance = 0.153 + 0.468 (Accessibility) + 0.286 (Reliability) + 0.223 (Interoperability) is the regression equation developed to analyses logistic performance. In order to demonstrate how the variables are related to one another, The regression equation is established is for purpose to demonstrate how the variables are related to one another.

4.10 Hypothesis Testing

i. Accessibility

H_0 = There is no significant positive relationship between accessibility of smart logistic and logistic performance.
H_1 = There is significant positive relationship between accessibility of smart logistic and logistic performance.

Based on the result of correlation test and regression analysis for accessibility (independent variable) and logistic performance (dependent variable). The significant value of independent variable towards the dependent variable is less than 0.05, which is indicating that there is a significant positive relationship between them. Hence, the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted in this research.

ii. Reliability

H_0 = There is no significant positive relationship between reliability of smart logistic and logistic performance.
H_2 = There is significant positive relationship between reliability of smart logistic and logistic performance.

Based on the result of correlation test and regression analysis for reliability (independent variable) and logistic performance (dependent variable). The significant value of independent variable towards the dependent variable is more than 0.05, which is indicating that there is a significant positive relationship between them. Hence, the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted in this research.

iii. Interoperability

H_0 = There is no significant positive relationship between interoperability of smart logistic and logistic performance.
H_3 = There is significant positive relationship between interoperability of smart logistic and logistic performance.

Based on the result of correlation test and regression analysis for interoperability (independent variable) and logistic performance (dependent variable). The significant value of independent variable towards the dependent variable is less than 0.05, which is indicating that there is a significant positive relationship between them. Hence, the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted in this research.

4.10.1 Hypothesis Testing Overall Result

Hypothesis	p-value	Result
H_1 = There is significant positive relationship between accessibility of smart logistic and logistic performance.	**< 0.001**	**Accepted**
H_2 = There is significant positive relationship between reliability of smart logistic and logistic performance.	**0.164**	**Rejected**
H_3 = There is significant positive relationship between interoperability of smart logistic and logistic performance.	**< 0.001**	**Accepted**

Table 4.20: Hypothesis Testing

Source: Developed from research

In conclusion, Table 4.20 above demonstrates among three hypothesis, two hypothesis are accepted and one hypothesis is rejected. This study demonstrates a close relationship between dependent variables (logistic performance) and independent variables (accessibility,

interoperability). This is because these two independent variables' significance values fall below the 0.05 level of significance. However, reliability does not show a close relationship as an aspect of smart logistic adoption towards logistic performance. The result of study shows it has a greater significance value than 0.05. Hence, it can conclude that there is not significant positive relationship between reliability of smart logistic and logistic performance.

4.11 Summary

In summary, the data collected from questionnaires is analyzed by using the SPSS software. The data analysis conducted in this research includes pilot test, descriptive statistics, reliability test, Pearson's Correlation Coefficients Analysis, Spearman rank correlation test, and multiple linear regression analysis. Based on the result of data analysis, it shows that the independent variables (accessibility and interoperability) have a significant relationship with the dependent variable which is logistic performance after smart logistic adoption. However, reliability does not have a significant relationship with the dependent variable. Hence, there is a direct relationship between the accessibility, interoperability, and logistic performance. After the data analysis, the results of the data analysis will help the researcher to continue the subsequent chapters and discuss the interpretation of the results, limitations, and recommendations for the overall study.

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Introduction

In this chapter, researcher is going to discuss the hypothesis testing, discussion of findings, limitations of study, and recommendation for future research. Hypothesis testing can be done by using the result in Chapter 4 which are tested by various tools and measurement. The result of hypothesis testing for independent variable (accessibility, reliability, and interoperability) and dependent variable (logistic performance) are shown in this chapter. Besides that, researcher also outlines the limitations that meet in this study. Recommendation of researcher also given to help other researcher on future study and direction to study deeper.

5.2 Summary of the Study

The aim of this research was determining the relationship between aspect of smart logistic and logistic performance. There were three independent variables, such as accessibility, reliability, and interoperability which contributing towards logistic performance. The things that need to be achieve from the results and findings of the research is the two research objectives.

The research objectives were stated as below:

i. To determine the relationship between aspect of smart logistic and logistic performance.
ii. To determine the most significant aspect between smart logistic and logistic performance.

The hypothesis to analyse the relationship between the dependent variable and independent variables was discussed in Chapter 4. The relationship had been analysed was between accessibility, reliability, interoperability, and logistic performance.

5.3 Discussion of Findings

5.3.1 Discussion on Demographic of Respondents

The most of respondents is 58 which is 52.3% on the age range of 20-29 years old. The least respondents were in the age range of 50 years old and above which is 2 respondents or 1.8% only. While there are 10 (9.0%) respondents who age below 20 years old and 33 (29.7%) respondents are 30 to 39 years old who were answering the research study. Another age group which is 40 to 49 years old contains 8 respondents same as 7.2%. The age around 20 – 29 years old was the most people among the age range as the researcher was sent the survey questionnaire by Google form. According to Statista Research Department (2022), 46% of Malaysia Internet users in 2020 are aged between 20 to 30 years, followed by 21.2% who aged between 30 to 40 years old. The research was conducted by using Google form which is an online survey form, Internet users between aged 20 to 29 years old has the most number so it is more easier to approach with this age group.

Next, most of the respondents which 79 or 71.2% was holding a degree in this research study. The second mostly are diploma education level which was 23 or 20.7%. There are 5 or 4.5% respondents with diploma. However, those with STPM and Master were 2 or 1.8% and none of them have PHD education level. According to Statista Research Department (2023), employed persons with secondary education level has the most which is 8.3 million followed by employed persons with tertiary education level which is 4.9 million. The number of respondents show high in tertiary education as DHL is shifting to digitalized operation. Hence, it is important for them to hire talents with higher education background.

Lastly, there were 84 respondents or 75.7% who was floor staff. Floor staff includes any kind of executives, operator, delivery man, customer support, etc. For the supervisor or head of department, 20 respondents and 18.0% had answered the research survey. While only 7 person (6.3%) manager involved in this research survey. The highest number of job position that participated was floor staff. According to Hattrup (1993), there are 5 to 6 subordinates for each supervisor or head of department in an ideal organization. Hence, subordinates such as floor staff has the highest number in an organization.

5.3.2 Discussion on the Research Objectives

Objective 1: To determine the relationship between aspect of smart logistic and logistic performance.

In the second research objective, the researcher had used SPSS software to prove the results of the explanatory factor. There are three independent variables which were aspects of smart logistic that affect logistic performance. Through the hypothesis testing, there were two smart logistic aspects that affected as they were significant with the logistic performance. However, there were one smart logistic aspect that rejected as it was not significant relationship with the logistic performance. The smart logistic aspects that been accepted were accessibility and interoperability. The smart logistic aspect that been rejected was reliability.

The table below showed that the significant value of accessibility and interoperability <0.001 (<0.05) and <0.001 (<0.05). So, the multiple regression analysis can be assumed that accessibility and interoperability had the significance relationship with the work productivity at workplace. However, the significant value of reliability was 0.164 > 0.05 so the multiple regression analysis can be assumed that had no significant relationship on the logistic performance.

Hypothesis	Sig	Result
H_1 = There is significant positive relationship between accessibility of smart logistic and logistic performance.	**< 0.001**	**Accepted**
H_2 = There is significant positive relationship between reliability of smart logistic and logistic performance.	**0.164**	**Rejected**

H_3 = There is significant positive relationship between interoperability of smart logistic and logistic performance.	**< 0.001**	**Accepted**

Table 5.1: Summary of Hypothesis Testing

Resources: SPSS Output

Accessibility of smart logistic

Hypothesis 1: There is a significant positive relationship between accessibility of smart logistic and logistic performance.

The result showed accessibility was able to affect logistic performance in the hypothesis 1. The p-value of accessibility was <0.001 and it is lower than 0.05 according by the multiple regression analysis result in Chapter 4. From the result showed that accessibility has a significant positive relationship with logistic performance. According to Peatworks (2022), "accessible technology" is technology that persons with a wide variety of functional abilities can employ successfully. When technology is high accessibility, users may interact with the most efficient ways for themselves.

In conclusion, the significant value was less than 0.05 so the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted. There is a significant positive relationship between accessibility of smart logistics and logistic performance.

Reliability of smart logistic

Hypothesis 2: There is a significant positive relationship between reliability of smart logistic and logistic performance.

The result showed that reliability of smart logistic was not able to affect the logistic performance. Based on the multiple regression analysis result in Chapter 4, the p-value of reliability was 0.164, which was more than the p-value of 0.05. There was no significant relationship between reliability and logistic performance.

Based on the previous research, reliability has become smart logistic aspects to affect logistic performance. However, the respondents were not focusing on this factor and think that is no significant relationship with the reliability. Reliability may not necessarily help the logistic performance. According to V. Vojtov (2018), reliability is one of the quality indicators to measure logistic performance. It can use to evaluate the efficiency of supply chains. Hence, reliability is more likely to play as a role in dependent variable compared to independent variable for this study.

In conclusion, the significant value was more than 0.05 so the null hypothesis (H_0) was accepted and the alternative hypothesis (H2) was rejected. There is no significant relationship between reliability of smart logistic and logistic performance.

Interoperability of smart logistic

Hypothesis 3: There is a significant positive relationship between interoperability of smart logistic and logistic performance.

In hypothesis 3, the result showed that interoperability was able to affect the logistic performance. Based on the result of multiple regression analysis in chapter 4, the p-value of interoperability was <0.001 and it was less than the p value of 0.05. Hence, there was a significant relationship between interoperability of smart logistic and logistic performance. interoperability creates an interconnection links between processes, information flows, equipment, and systems from different organizations. It is considered accomplished if efficient cooperation is carried out at least in the levels of business technologies, knowledge,

information, and communication technologies, as well as considering the semantic factors that supplement the preceding three.

In conclusion, the significant value was less than 0.05 so the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted. There is a significant positive relationship between interoperability of smart logistic and logistic performance.

Objective 2: To determine the most significant aspect between smart logistic and logistic performance.

For second research objective, the Multiple Regression Analysis result showed that the most influence smart logistic contributing aspect to affect logistic performance was accessibility. From the result of Standardized Coefficients (Beta) value showed that the highest value which was 0.401. Among the three smart logistic aspects, the respondents more focus on accessibility will affect the logistic performance. They agree that employer need to improve accessibility of smart logistic so it is convenient to use the system to complete a task. Besides that, respondents also agree that smart logistic system should be easy for user to learn and access by using mobile device. Hence, the best suggestion to DHL to improve their technology in logistic system such as smart logistic is accessibility of technology.

5.4 Implications of the Study

5.4.1 Knowledge Implication

The findings of this research are analysed to achieve the research objective that can identify the relationship between aspect of smart logistic and logistic performance in DHL. By using SPSS software to analyse the collected data such as pilot test, Cronbach's Alpha, Descriptive Statistics, Correlations, Multiple Regression Analysis (MRA) and hypothesis testing to analyse the relationship of independent variables and dependent variable. This study had determined the aspect that DHL should focus on and prove that some of them are significant positive relationship between the aspect of smart logistic and logistic performance DHL. While it also shows that aspect of smart logistic such as reliability may not bring significant effect towards logistic performance in their company. This study had explained and proven different relationship between aspects of smart logistic and logistic performance. It

proven that accessibility and interoperability bring a significant positive relationship towards logistic performance. Accessibility can offer a better understanding and user-friendly of technology operation in their logistic system. It is good for technology with a lower barrier of entry so every user can operate it smoothly and effectively. In other hand, interoperability can offer better flows of information within the supply chain. Visibility of logistic information is significant to stakeholders as they can observe the logistic activities of their orders. However, there is one variable does not show significant positive relationship between aspect of smart logistic and logistic performance. Respondents of study believe that reliability may not bring significant positive relationship between aspect of smart logistic and logistic performance. It explained that reliability is important for logistic performance but is in the term of measurement. For example, better accessibility and interoperability of technology adoption may increase the reliability in logistic performance.

Furthermore, this study also determined the most significant positive relationship between aspect of smart logistic and logistic performance. In this study, accessibility shown its importance in technology adoption in logistic system such as smart logistic. It explained that smart logistic was a high complexity system but it will be better if user can understand, learn, and operate it easily. Hence, this study emphasis accessibility of smart logistic to improve logistic performance in DHL. As a conlcusion, this study can provide some insights of employee perspective towards adoption of smart logistic with logistic performance. Industry can put more effort on the right path to multiple the effect of output and avoid to put wrong effort on less effective aspect when develop strategy to adopt technology in their logistic system.

5.4.2 Managerial Implication

The finding shows the aspects of smart logistic that influence logistic performance as well as lead time. The relationship between aspects affecting logistic performance DHL is significant identified. These results may lead the logistic service providers such as 3PL and 4PL, even manufacturing industry to understand the important aspects of technology adoption in their logistic system. Industry also can refer to the study and point of views from different degree of understanding. The significant positive relationship between variables of smart logistic adoption such as accessibility and interoperability emphasis the growth of technology in logistic industry. Technology users may become significant factors that could influences the

most in logistic performance as they cannot easily access to the technology adopted. Technology required to keep improve so they can optimize their facilities for users. Research and development (R&D) in logistic can focus more on creating higher accessibility and interoperability technology as it had demand in DHL to improve their logistic performance. As a conclusion, logistic service industry need to implement a suitable technology in their company so the efficiency and effectiveness of operation can be optimized.

5.4 Limitations of Study

There are some limitations in the conduct of this research, such as time constraints, limited location and honesty of respondent. Firstly, the researcher only has about 3 months to collect the data for this research. The researcher only has the limited time which is from November 2022 to January 2023 to distribute and collect the questionnaires. Furthermore, limited location was one of the limitations to conduct this research. The researcher mainly focused on Southern part of Malaysia for DHL company. However, the survey was conducted through convenience sampling so the data collected may exist bias on respondent area.

Due to the time and location limitations, the researcher only can distribute the survey questionnaire by using Google Form. The questionnaires may not reach researcher expectation as it cannot manipulated the distribution. Some of the respondents may ignore the questionnaire and the distribution of questionnaire may not spread well as the respondents may spread the questionnaire to certain people only. Hence, it cannot reach the research expectation.

Besides that, the honesty of respondents also one of the limitations to conduct the survey about smart logistic contributing aspects and logistic performance. The respondents did not want to spend their time and honesty to answering the questionnaire.

5.5 Recommendations for Future Research

A few advice and solution that may be the researcher recommended to conduct similar research for future researchers. Recommendations can sole the current limitation that had been showed in the previous section. Approach from professional related with the industry were encourage to future researchers. The reason is time constraints for researcher to distribute and collect the questionnaire from the respondents. The industry knowledge and opinion will give

by the professional and this can help researchers saving more time in gathering data and completing the research. For example, the respond of logistic manager is better compared to other as the position can overview the logistic activities and information. Hence, logistic manager can offer a more professional respond which may help to provide more accurate research result.

Digital platform also be encouraged for future researcher to distribute and collect their questionnaire from the respondents. The reason is because the researcher needs to collect the questionnaire from different location in the short time. Future researcher will save time to make more valuable and useful findings for smart logistic adoption towards logistic performance at different location such as East Malaysia and other countries. By using the digital platform, the respondents from different locations can share their point of view on their perspective with difference in demographic background easily.

Future researcher is encouraged to use the empirical research to conduct the research. This is because empirical research is analyzing smart logistic adoption aspects by using the empirical evidence. Researcher can use the evidence to identify the hypothesis testing to evaluate the relationship between aspect of smart logistic and logistic performance. The evidence can be collected by using observation and experience from the respondents.

Lastly, the coefficient of determination (R Square) is 0.593. This discussed that the aspect of smart logistic researcher discussed in this study only 59.3%% influencing logistic performance in DHL at Southern part of Malaysia. The aspects mentioned are accessibility and interoperability, while reliability had been rejected after the discussion of findings had been done. In another words, there are 40.7% was explained by other aspects. Hence, the future researcher can explore more on other aspect of smart logistic adoption that can bring significant positive effect towards logistic performance in DHL.

5.6 Conclusion

As a conclusion, demand of logistic performance is increasing linearly around the worlds nowadays. High logistic performance as well as shorter lead time can bring a lot of benefits to the organization. It can offer better customer satisfaction as the goods and information flows within supply chain are visualize and manipulated. It is important to improve the accessibility of smart logistic for employee to improve logistic performance as it is the most

significant positive relationship aspect in this research study. Through the finding of this research, most of the respondents agree that aspect of smart logistic will affect logistic performance. The employer should enhance their awareness and put more effort on adoption of better logistic technology for their employee. Employer can use the degree of accessibility and interoperability to source better logistic technology for improvement. However, sourcing and improving better logistic technology required cooperation between stakeholders. Hence, it is important to always have a periodic feedback or survey on logistic technology adoption.

5.7 Summary

The two research objectives had achieved by the researcher which are to identify the aspect contribute to smart logistic adoption, the relationship between aspect of smart logistic and logistic performance, and shows the most influencing aspects of smart logistic towards logistic performance. The research implications, limitations, and recommendations of the research to guide future researcher about the similar research had been done in this chapter. The overall result of the study had been discussed in the last part of chapter 5.

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APPENDIX A

Gantt Chart of Final Year Project (FYP) 1

WEEK/ ACTIVITIES	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
FYP talk									MID SEMESTER BREAK							
Search for FYP topic																
Meeting with supervisor																
Topic discussion																
Title confirmation																
RO & RQ Construction																
Submission Chapter 1																
Submission Chapter 2																
Submission Chapter 3																
First draft of FYP 1																
Submission of FYP 1																
Presentation 1																
Revised of FYP 1																

APPENDIX B

Gantt Chart of Final Year Project (FYP) 2

WEEK/ ACTIVITIES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Create Questionnaire	■								MID SEMESTER BREAK							
Distribute Questionnaire		■	■	■	■	■	■									
Collect Questionnaire								■								
Analysis Data										■	■					
Submission Chapter 4												■				
Submission Chapter 5													■			
Proposal Correction														■		
Slide Preparation															■	
Submission of FYP 2																■
Presentation 2																■

APPENDIX C

SURVEY ON ASPECTS INFLUENCING SMART LOGISTIC ADOPTION TOWARDS LOGISTIC PERFORMANCE

Dear DHL employee,

You are invited to participate in my study regarding "Aspect of smart logistic adoption towards logistic performance in DHL Malaysia (Southern Area) ". My name is WONG SOAN HANK, who is a student studying my Bachelor of Technology Management (Supply Chain Management and Logistics) with honours in Technical University of Malaysia, Melaka (UTeM). The purpose of my survey is to understand your perspective in smart logistics adoption to logistic performance. It is an academic study to gain knowledge about how and which aspect of smart logistic adoption influencing logistics performance in DHL Malaysia (Southern Area).

***Note: This survey is only for DHL employee in Malacca and this survey is only for academic purposes** / *Nota: Kaji selidik ini hanya untuk pekerja DHL di Malacca dan kaji selidik ini hanya untuk tujuan akademik.*

I would be appreciated for your cooperation to spend about 5 minutes to finish my survey. This survey consists of Section A, B, and C which require respondent to answer it in the best accordance to your perspective and knowledge. Your survey responses are confidential and only used for academic purposes. I am thankful for your cooperation to complete my survey. Thank you.

For further clarifications or inquiries, please contact:

WONG SOAN HANK

Email:

Supervisor: Miss Atikah Saadah Binti Selamat

Email:

Address: Faculty of Technology Management and Technopreneurship, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100 Durian Tunggal Melaka Malaysia

SECTION A: DEMOGRAPHIC / BAHAGIAN A: DEMOGRAFIK

Instructions: This section intends to get the general information of respondents. Please answer the question to your best accordance. Your answers will remain anonymous. / Arahan: Bahagian ini bertujuan untuk mendapatkan maklumat am bagi setiap responden. Sila jawab soalan mengikut kesesuaian anda. Jawapan anda akan disimpan kekal tanpa nama.

Age / Umur :

Below 20 / Bawah 20	
20 - 29	
30 - 39	
40 - 49	
50 and above / 50 dan ke atas	

Education Level / Tahap Pendidikan

SPM	
STPM	
Diploma	
Degree	
Master	
PHD	

Job Position / *Jawatan Kerja*

Floor staff	
Supervisor / Head of Department	
Manager	

Section B: ASPECT OF SMART LOGISTICS ADOPTION / BAHAGIAN B: ASPEK PENGGUNAAN LOGISTIK PINTAR

Instruction: This section is to collect data in your perspective on aspect of smart logistic adoption. Please read each question below and provide your answer by choosing the appropriate number on the 5-point Likert scale provided below / *Arahan: Bahagian ini adalah untuk mengumpul data terhadap aspek penggunaan logistik pintar dalam pengetahuan anda.* Sila baca setiap soalan dan beri jawapan anda dengan memilih nombor yang sesuai berikut ke skala Likert lima mata yang disediakan di bawah:

(1) Strongly Disagree */ Sangat Tidak Setuju*

(2) Disagree */ Tidak Setuju*

(3) Neutral */ Neutral*

(4) Agree */ Setuju*

(5) Strongly Agree */ Sangat Setuju*

Accessibility of smart logistic (ASL) / *Kebolehcapaian logistik pintar (ASL)*

The questions below are related to the **accessibility of smart logistic** towards logistic performance. / *Soalan di bawah adalah berkaitan dengan* ***kebolehcapaian logistik pintar*** *ke arah prestasi logistik.*

Title	1	2	3	4	5
ASL1: It is easy for me to understand the smart logistic system. *ASL1: Mudah untuk saya memahami sistem logistik pintar.*					
ASL2: It is easy for me to learn the smart logistic system. *ASL2: Mudah untuk saya mempelajari sistem logistik pintar.*					
ASL3: It is easy for me to access by using mobile device. *ASL3: Mudah untuk saya akses dengan menggunakan peranti mudah alih.*					
ASL4: It is convenient to use the system to complete a task. *ASL4: Mudah untuk saya menggunakan sistem ini demi menyelesaikan tugas.*					
ASL5: Uses of smart logistic system does not require high mental effort. *ASL5: Penggunaan sistem logistik pintar tidak memerlukan usaha mental yang tinggi.*					

Reliability of smart logistic (RSL) / Kebolehpercayaan logistik pintar (RSL)

The questions below are related to the **reliability of smart logistic** towards logistic performance. / *Soalan di bawah adalah berkaitan dengan* ***kebolehpercayaan logistik pintar*** *terhadap prestasi logistik.*

Title	1	2	3	4	5
RSL1: Smart logistic system can show the reliability of your supply chain performance. *RSL1: Sistem logistik pintar boleh menunjukkan kebolehpercayaan prestasi rantaian bekalan anda.*					
RSL2: It can help the task to complete within agreed time. *RSL2: Sistem ini membantu tugasan diselesaikan dalam jangka masa yang dipersetujui.*					
RSL3: It can help the task to complete with agreed quantities. *RSL3: Sistem ini membantu tugasan diselesaikan dengan kuantiti yang dipersetujui.*					
RSL4: It reduces error occurs compared to conventional logistic system. *RSL4: Sistem ini mengurangkan ralat berlaku berbanding sistem logistik konvensional.*					
RSL5: It offers stability and consistency of operation performance over time. *RSL5: Ia menawarkan kestabilan dan ketekalan prestasi operasi dari semasa ke semasa.*					

Interoperability of smart logistic (ISL) / Kebolehoperasian logistik pintar (ISL)

The questions below are related to the **interoperability of smart logistic** towards logistic performance. / *Soalan di bawah adalah berkaitan dengan* ***kebolehoperasian logistik pintar*** *terhadap prestasi logistik.*

Interoperability as well as digital operability can be defined as ability of computer system to connect and exchange information with one another. / *Kebolehoperasian seperti yang dikenali sebagai kebolehoperasian digital boleh ditakrifkan sebagai keupayaan sistem komputer untuk menyambung dan bertukar maklumat antara satu sama lain.*

Title	1	2	3	4	5
ISL1: Digital interoperability can help interconnect logistics and supply networks as well as the operational solutions for sustainable development. *ISL1: Kebolehoperasian digital boleh membantu menghubungkan logistik dan rangkaian bekalan serta penyelesaian operasi untuk pembangunan mampan.*					
ISL2: Smart logistic has ability to connect the independent logistics and supply networks to mutually conduct operations and business with one another. *ISL2: Logistik pintar mempunyai keupayaan untuk menghubungkan logistik bebas dan rangkaian bekalan untuk menjalankan operasi dan perniagaan bersama antara satu sama lain.*					
ISL3: Smart logistic provide an efficiency and effectively channel for multi-level communication with each other.					

ISL3: Logistik pintar menyediakan kecekapan dan saluran yang berkesan untuk komunikasi pelbagai peringkat antara satu sama lain.					
ISL4: Smart logistics system allow quick, reliable, secure, and seamless sharing of data or information among different systems, among companies, or among networks. *ISL4: Sistem logistik pintar membolehkan perkongsian data atau maklumat yang cepat, boleh dipercayai, selamat dan lancar antara sistem yang berbeza, antara syarikat atau antara rangkaian..*					
ISL5: It enhances the ability to track and trace sharing of data. *ISL5: Ia meningkatkan keupayaan untuk menjejak dan menjejak perkongsian data.*					

Section C: LOGISTIC PERFORMANCE OF SMART LOGISTIC / BAHAGIAN C: PRESTASI LOGISTIK PINTAR

Instruction: This section is to collect data in your perspective on logistic performance of smart logistic adoption. Please read each question below and provide your answer by

choosing the appropriate number on the 5-point Likert scale provided below / *Arahan: Bahagian ini adalah untuk mengumpul data terhadap prestasi logistik pintar dalam pengetahuan anda.* Sila baca setiap soalan dan beri jawapan anda dengan memilih nombor yang sesuai berikut ke skala Likert lima mata yang disediakan di bawah:

(1) Strongly Disagree */ Sangat Tidak Setuju*

(2) Disagree */ Tidak Setuju*

(3) Neutral */ Neutral*

(4) Agree */ Setuju*

(5) Strongly Agree */ Sangat Setuju*

Logistic performance after smart logistic adoption (LPA) / *Prestasi logistik selepas penerimaan logistik pintar (LPA)*

The questions below are related to the logistic performance after smart logistic adoption. / *Soalan di bawah adalah berkaitan dengan prestasi logistik selepas penggunaan logistik pintar.*

Title	1	2	3	4	5
LPA1: Delivery from origin to destination on time / *LPA1: Penghantaran dari asal ke destinasi dengan tepat*					
LPA2: Delivery from origin to sorting center on time. / *LPA2: Penghantaran dari asal ke pusat pengisihan dengan tepat.*					
LPA3: Delivery from sorting center to delivery hub on time. / *LPA3: Penghantaran dari pusat pengisihan ke hab penghantaran dengan tepat.*					

LPA4: Delivery from delivery hub to destination on time. / *LPA4: Penghantaran dari hab penghantaran ke destinasi dengan tepat.*					