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Perceptual Study on Higher Level Digitilization Among Managers in the Logistics Industry

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Abstract

Purpose: The study attempts to explore the operational performance of the existing Malaysian logistics companies and the extent of their adoption of digitalization. The role of digitalization in enhancing the performance of companies in the logistics industry in Malaysia, for value creation, is the topic of study. **Research design, data and methodology:** A qualitative research method with a semi-structured interview approach was applied and judgmental sampling was used as the sampling technique to collect data. The research has chosen nine companies in the logistics industry in Peninsular Malaysia, with the interviews aimed at eleven members of top and middle-level management. Data analysis was performed using logical system techniques to examine and evaluate data, reorganizing feedback, comparing it with literature, and transforming it into structured, valuable information after interviews. **Results:** The study revealed mixed opinions on digitalization in logistics, despite its potential benefits such as improved operational efficiency, real-time information, and customer service. However, high costs may hinder financial performance and require revisions due to stakeholder involvement. **Conclusions:** The Malaysian logistics industry's adoption of digitalization is gaining traction, with most companies satisfied with their status. However, challenges like cost and inefficiency persist, prompting calls for government support to improve efficiency and reduce costs while ensuring sustainable transportation.

Keywords: Digitalization, logistics, qualitative research, operational efficiency, global supply chain

JEL Classification Code: M150, M160, R41, R42

1. Introduction

Logistics is considered as a crucial function for every business. Efficient transportation, storage of goods and services play a vital role in meeting customers' requirements timely and cost-effectively (Hashemi-Pour & Essex, 2023). To survive in this intense market, companies always strive to achieve cost reduction to offer a competitive price or enhance their operational performance to achieve high efficiency, thereby increasing the level of customer satisfaction. Such goals can be achieved through the utilization of innovative digital technologies such as the Internet of Things (IoT), cloud computing, blockchains, and artificial intelligence (AI). For instance, the adoption of digital technologies enables companies to get information or monitor the market demand in real-time to react to unexpected circumstances in time (DOSM, 2020; Makris et al., 2019) which increase the flexibility of the operations.

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Also, it is expected to reduce the cost by 34.2% and increase the revenue by 33.6% in the logistics industry through the implementation of digitalization (DOSM, 2020). Along with the economic growth, the Malaysian logistics industry has proliferated in these recent years. According to Ministry of Finance in Malaysia, the logistics industry has played a pivotal role in promoting industrialization and increasing competitiveness in international trade (DOSM, 2020), and it has grown rapidly and has also gained global recognition in these recent years.

Port Klang has ranked in 12th place ("One Hundred Container Ports 2020," n.d.); the global Logistics Performance Index (LPI) ranking of Malaysia in the year 2018 was 41st place out of more than 160 countries (Erratum, 2018). The service sector plays a major contributor to the economic activity of Malaysia, which contributed 57.7 % of the total Gross Domestic Product (GDP) in 2020. Among them, transportation and storage have contributed 5.4% of the total contribution of the service sector, which contributed an added value of RM41.89 billion in 2020 (DOSM, 2020).

Nevertheless, the Malaysian logistics industry is facing various challenges. One of the main problems in the Malaysian logistics industry is the low adoption of digitalization (MIDA, 2021). The lack of digital technologies may lead to Malaysia's logistics industry failing to perform well operationally.

Digitalization can immensely benefit companies in various aspects, such as cost savings, efficiencies, and customer satisfaction. Hence, the adoption of digitalization is critical in Malaysia to ensure the growth of the logistics industry. Based on this background, this study attempted to answer the following research questions: *RQ1*: What is the existing performance of the logistics industry in Malaysia? *RQ2*: What is the role of digitalization in enhancing the performance of the logistics industry in Malaysia? *RQ3*: What is the recommendation for higher-level adoption of digitalization in the logistics industry in Malaysia?

2. Literature Review

2.1. Operational Performance

Yu et al. (2021) stated that operational performance indicates a company's capacity to fulfil customers by delivering high-quality products quickly at an affordable cost and with high operational flexibility. According to the World Bank (2018) report, Malaysia's LPI ranking in 2018 was 41st, nine places lower than its 2016 ranking (32nd), which shows a declining trend (Rashidi & Cullinane, 2019). However, Rashidi and Cullinane (2019) identified one of the primary potential issues with the LPI's underlying nature - LPI cannot assist countries in their economic development at the operational level. The reason is due to the lack of operational criteria in LPI assessment. Therefore, this study has put forward the six common dimensions (quality, delivery, cost, speed, customer service, and flexibility) to determine the operational performance logistics in this study, which will provide a new reference for the performance of sustainable operation logistics (Boer & Boer, 2019).

2.1.1. Quality

The International Organization for Standardization (ISO) defines quality as the sum of the features and characteristics of a product, process or service that affect its ability to meet stated or implicit demands (Aggarwal, 2018). Grant and Philipp (2018) believed if firms could bridge the gap between client expectations and perceptions, the firms would be able to offer a better quality of service.

Different people use the word "quality" differently and with different connotations (Aggarwal, 2018). The quality of logistics services is highly uncertain compared to manageable and tangible goods (Park, 2020). Nevertheless, many studies have shown that ensuring service quality is one of the most successful ways to attract clients by lowering perceived risks (Park, 2020). Service quality assurance research covers many subjects, including time guarantees, pricing guarantees, and money-back promises (Park, 2020).

Kabak et al. (2020) showed that a country's global trade performance is strongly influenced by the quality of its logistics network, which is determined by the government's services, investments, and policies. According to Beysenbaev and Dus (2020), inadequate government agency coordination, a general lack of cohesion, and complex regulatory requirements are widely acknowledged to cause time delays and, as a result, increased costs for LSPs and cause major trade bottlenecks.

2.1.2. Delivery

According to Muñoz-Villamizar (2019), freight delivery accounts for just a tiny percentage of overall products' transportation time, but it can account for up to 28% of total transportation expenditures. Logistics delivery is done in an assignment-centralised and artificial manner (Liu et al., 2019). Liu et al. (2019) mentioned that the lack of real-time logistics information and appropriate route optimisation methods would waste loading capacity, make mistakes in loading activities, and lead to low-efficiency logistics delivery. Furthermore, Moroz and Polkowski (2016) stated that a courier delivering 60 items each day is expected to release 300g of CO_2 for every parcel; therefore, finding a cost-effective and environmentally friendly solution has become one of the concerns.

Tang et al. (2021) introduced an internet of things (IoT) based smart parcel locker logistics, a self-service pickup

mechanism in China. The recipient may pick up their goods whenever convenient for them, and the recipient can use the mobile application to manage and track their packages' movements (Huang & Chen, 2016). Furthermore, an autonomous guided vehicle (AGV) example, which can deliver goods without human interaction, is illustrated in the empirical study done by Chen et al. (2021). Customers are alerted of the precise arrival time and instructed to pick up a parcel from a designated locker (Chen et al., 2021). However, implementing autonomous guided vehicles in developing countries is far from settled since there are still many unknowns regarding autonomous truck development, such as benefits, costs, transportation effects, and consumer demand (Aboul-Dahab, 2022).

2.1.3. Cost

Ehmke et al. (2018) mentioned that one of the most critical goals for LSPs is to reduce costs. Beysenbaev and Dus (2020) even stated that the high logistical expenses would erode the international competitiveness of a country.

Chen et al. (2021) illustrated how Global Positioning Systems and Geographic Information Systems (GPS and GIS) technology enhances cost-effectiveness. Adopting a GIS and GPS network information system improves distribution efficiency since it may enhance loading rates and simplify delivery fleets by dynamically optimising routes. Moreover, each line's capacity and mileage can be modified in real-time, hence, lowering logistics costs. Tarudin and Adlan (2020) affirmed the cost-effectiveness of GPS technology since GPS can help to minimise fuel consumption, for example, by lowering truck speed and minimising waiting times during loading since GPS can provide warnings or notifications to the coordinator, who subsequently interacts with the driver.

However, a contradiction toward the concept of "digitalization enhances cost-effectiveness" was made by Wang et al. (2018). Wang et al. (2020) mentioned that many logistics companies fail to achieve greater financial performance by investing in digital logistics technology due to the high cost of modern technology, the difficulty of constructing complex information systems, and the lack of supervision of information technology (IT) specialists. Furthermore, since technologies are a standardised resource, they are easily copied by competitors, making it difficult for companies embracing digital technology to maintain a competitive edge over time (Wang et al., 2020).

2.1.4. Speed

In logistics, speed is one of the elements that will affect operational performance. Also, the speed and efficiency of the delivery process are perceived as global challenges in logistics (PwC, 2020). Wang et al. (2018) have proposed a parcel delivery system based on IoT technology and radio-frequency identification (RFID) technology combining with computer network technology, cloud computing, and wireless communication. This parcel delivery system enables the entire parcel delivery process, such as the classification of parcels, vehicle scheduling, transportation monitoring, and path planning to become more intelligent and automatic to increase operational efficiency. Besides, this system enables the company to reduce delivery time for those emergency parcels by choosing faster vehicles or selecting a shorter delivery path.

The parcel delivery system is not only a theory but has also been implemented in real-case situations. Song and Han (2020) proposed a module to improve the parcel delivery system by reducing the total delivery distance through IoT technology provided by the SK Telecom (SKT) of the Republic of Korea. The functions of the IoT devices accelerate the calculation process as the data can be processed without going through the servers, thereby increasing the efficiency of the delivery system and tracking system. These systems can generate location information to check the other logistics delivery method and select the most appropriate one. In addition, the generated data from the system can be utilised to forecast and analyse the shortest path to reduce the total delivery distance, which improves the delivery speed.

Furthermore, blockchain technology is also considered a strategy to improve operational performance in the logistics industry. Tijan et al. (2019) stated that the implementation of blockchain technology in the logistics process enables the improvement of the operational performance, thereby achieving sustainable logistics. Additionally, the adoption of blockchain technology can improve the transparency and efficiency of the logistics process from storage to delivery and payment, whereby accelerating the speed of the physical flow of goods.

2.1.5. Customer Service

Customer service is important in a business because it might inspire customer loyalty, which helps businesses grow. Meeting the customers' expectations is one way for the company to establish or strengthen its relationship with its customers. According to Wamba et al. (2018), the adoption of big data technology enables the improvement of overall customer service. For instance, the LSPs will ask their customers through social networking sites regarding their expected delivery time for their ordered products and deliver their parcel within the time requested by the customers.

Fernando, Chidambaram and Wahyuni (2018) found that there is a positive impact on service supply chain performance with respect to customer services through big data analytics. Along with the adoption of big data analytics, it offers excellent customer service in supply chain performance. Also, the LSPs can adopt big data analytics

from inbound and outbound data sources to improve customer service. In addition, entrusting the control of data-sharing to customers has been considered as a potential solution to create a framework to reduce the amount of data (Rehman et al., 2016).

On the other hand, Wang et al. (2020) proved that dispatching operations through the adoption of IoT technology can increase the level of customer satisfaction. The dispatching system proposed in this research paper can be utilised to improve the efficiency of the existing dispatch operations and thus reduce labour costs through the adoption of intelligent pickup robots. It eventually leads the LSPs to increase their market share with increasing customer satisfaction as this dispatch system shortens the customer waiting time for collection.

2.1.6. Flexibility

According to Calatayud (2017), automated and real-time supply chains can increase the flexibility to react quickly by introducing smart supply chains. Based on Korpela, Hallikas and Dahlberg (2017), digital supply chains directly affect flexibility, such as smart contracts that are applied to enable programme transactions and machine-to-machine communication through IoT technology. Furthermore, Al-Talib et al. (2020) stated that smart technologies such as IoT technology allow the improvement of the supply chain flexibility by offering the constancy and capability of the supply chain to meet different or emergency circumstances through the application of programmable processes such as smart scheduling approaches.

Other digital technologies, such as blockchain technology, RFID and cloud computing, can also enhance the logistics industry's operational performance. According to Pournader et al. (2019), blockchain technology allows last-mile delivery to become more flexible and customisable to customers' requirements. For instance, the parcel can be delivered to houses, designated boxes, or a particular location for customers by utilising a blockchain identifier and encrypted key.

Zhou et al. (2017) proposed a smart warehouse environment to increase the flexibility of warehouse operations based on a real-time decision support system, and the system is enabled by the RFID-generated data. The study claimed that this smart system enables the company to cope with facility problems such as location constraints, local capacity constraints as well as transportation routes. This smart system is also able to enhance the flexibility of these aspects.

Kopanaki et al. (2018) explored that cloud computing allows the flexibility of logistics. For example, a cloud-based digital supply chain can centralize and share real-time information among the parties involved such as the manufacturer, administration, and those logistics systems which declines the barriers of physical infrastructures as the users are allowed to connect or share the data over the Internet thereby increasing the supply chain flexibility.

2.2. Research Gap

According to the Erratum (2018), efficient management and information technology solutions are considered as tools for offering high-quality logistics. With the development and popularization of technology, developed countries such as Germany, Sweden, Belgium, and Japan have adopted digitalization to their logistics operation. Also, these countries ranked high in the LPI ranking in 2018. Therefore, the researchers can assume there is a positive relationship between the adoption of digitalization and operational performance, which can enhance logistics operational performance. In the Malaysian context, Subramaniam (2021), mentioned that digital technology enables LSPs to manage their operations in an efficient and flexible way. However, Malaysia's LPI ranking is declining, which is from 32nd place (2016) to 41st place (2018). Thus, to increase the LPI ranking as well as the logistics operational performance, the adoption of advanced technology is critical in Malaysia to ensure the growth of the logistics industry.

3. Methodology

A qualitative research method is applied in this research to investigate the possible solutions or improvement strategies to enhance the operational performance of the logistics industry through the adoption of digitalization. Semi-structured interviews will be conducted virtually to consult with the interviewees and discuss possible solutions or improvement strategies to enhance the operational performance of the industry through digitalization. By utilizing the qualitative research method, the researchers can obtain detailed information relevant to the study as well as the viewpoints and insights of the experienced players in the Malaysian logistics industry.

3.1. Semi Structured Interview and Data Collection

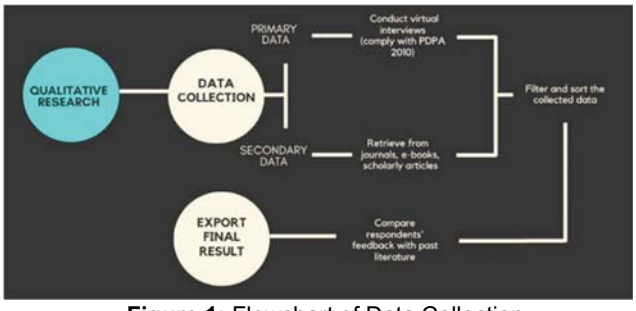

Figure 1: Flowchart of Data Collection

As shown in Figure 1, the data collection in this research is categorized into two groups: primary data and secondary data (Paradis et al., 2016). The virtual interviews were conducted as the data collection method for the primary data in this study. On the other hand, secondary data was retrieved from various sources, such as journals, e-books, and scholarly articles, which can be searched in libraries, government authorities, etc.

In this study, the targeted population is companies in the Malaysian logistics industry. As depicted in Table 1, the targeted respondents or interviewees are the company's middle-level or top-level management team, such as the executives, managers, etc. The researchers have selected nine enterprises in the logistics industry in Peninsular Malaysia as their potential target respondents. Besides, judgmental sampling, a type of non-probability sampling technique, will serve as the sampling technique to collect the data in this research.

Table 1: Details of Respondents

Interviewee	Company	Position
1	A	Assistant Manager
2	B	Company Co-founder
3	B	Corporate Relation Officer
4	B	Corporate Relation Officer
5	C	Forwarding Manager
6	D	General Manager
7	E	Customer Service Officer
8	F	Fleet Communicator
9	G	Business Solution Executive
10	H	Customer Service Executive
11	I	Operation Executive

Data collection is focused on semi-structured interviews. All interview questions aimed at answering the research objectives formed for the study. Table 2 shows the interview questions matching the research objectives:

Table 2: Research Objectives and Interview Questions

Research objectives	Interview questions
RO1: To identify the existing performance of the logistics industry in Malaysia	• How do you manage your operational performance? • What are the common obstacles or challenges that you face in your operation? • Do you have a particular system to manage operational performance? Can you elaborate on it? • Does your company implement any digitalization technology to enhance operational performance? • Based on your perspective, what do you think about existing logistics performance in Malaysia?
RO2: To determine the role of digitalization in enhancing performance for the logistics industry	• Many studies have shown that ensuring service quality is one of the most successful ways to attract clients, including time guarantees, pricing guarantees, and money-back promises. Does your company's current technology is manageable to ensure service quality? *(Quality)* • The lack of real-time logistics information and appropriate route optimization methods would waste loading capacity, mistakes in loading activities, and lead to low-efficiency logistics delivery. In your opinion, does your company's current technology can avoid the above delivery problems? *(Delivery)* • In your opinion, which logistics section (transportation cost, storage cost, packaging cost, logistics management cost, etc.) in the enterprise cost the most? Does digitization help save that cost? *(Cost)* • Speed is considered as an element that will directly influence the customer's experience. Does the adoption of digitalization help to improve delivery speed? *(Speed)* • It is important to maintain or create a good relationship with the customer. How does the adoption of digitalization improve or maintain the relationship between your company and the customer? *(Customer Service)* • In logistics, flexibility is the ability of a firm to respond quickly and efficiently to continuously changing customer needs in inbound and outbound delivery, support, and services. Can you share how does the adoption of digitalization improve or maintain the flexibility of your company? *(Flexibility)*
RO3: To recommend higher level adoption of digitalization for the logistics industry	• The six operational performance dimensions in our study include quality, delivery, cost, speed, customer service, and flexibility. In your opinion, do you think your company's current system or technology can provide positive feedback on the above dimension? If yes, please elaborate. • In your professional opinion, why does your company still rely on current technology but not others? • Do you think your company should transfer to a higher level of technology? (Such as IoT, Blockchain, Cloud Computing, etc.) • What type of technology that your company plan to implement in the future and what aspects does your company expect to improve through the adoption of this technology? • Will you recommend the other company to adopt digital technologies in their operations and what are the reasons?

3.2. Data Processing and Validation

The collection, filtering, selection, processing, and analysis of raw data and its conversion into useful information is called data processing. In this study, the semi-structured interview content is recorded by a voice recorder or online meeting recorder and will be converted into readable and easier-to-understand formats, such as tables and transcripts. and transcripts.

Data validation is the process of filtering and sorting the collected data to ensure accuracy and quality. In addition, data validation is also a stage to keep the data relevant to the research and prevent repeated input of the same information. If the researchers find any inconclusive or suspicious information, they can double-check with the participants by phone, email, or by rearranging the meeting.

3.3. Data Analysis

Data analysis is the process of applying logical system techniques to examine and evaluate data to obtain constructive and valuable information. After collecting the required data through interviews, the researcher reorganizes the feedback from the respondents and response data. The reconstituted information will be compared with past literature and research questions to check for gaps. After that, the result of the data is transformed into well-structured helpful, information.

3.4. Ethical Consideration

Ethical considerations are the practice of collecting data and information correctly and ethically. All information that interviewees provide is strictly confidential, protected, and used for academic purposes only. Furthermore, researchers sought permission from each interviewee to record the interview and ensure that they would not disclose any information provided to other parties. The study complies with Malaysia's Personal Data Protection Act 2010 (PDPA) to avoid invasion of privacy and harm to respondents.

4. Results and Discussion

The target region of this research is Peninsular Malaysia, which consists of the states of Perlis, Kedah, Penang, Perak, Selangor, Negeri Sembilan, Melaka, Johor, Kelantan, Pahang, Terengganu, and the federal territories of Kuala Lumpur and Putrajaya. The names of the nine companies participating were purposely made anonymous as per the requirements concerning ethical considerations, and they used the alphabet (A-Z) to represent the company. The interviewees included the company's founder, managers, executives, and officers. The duration for conducting each interview session is between thirty and sixty minutes, which is between the representatives of the companies. Interview questions were sent to the respondents before the interview session to ensure they knew the questions that would be asked during the interview. Hence, the respondents can prepare for the interview. During the interview, the researchers asked open-ended questions regarding the research topic.

Table 3 depicts the demographic profiles of respondents of the study:

Table 3: The Demographics of the Study

Participated Companies	Profiling
Company A	Company A, founded in 1989 in Ipoh, Perak, initially served as an alternate port for traders but has since become the primary import and export port for businesses in Kinta Valley. With 14 employees, the company has a 23-year-experienced logistics professional handling operations, warehouse, administration, and finance, currently serving as an assistant manager.
Company B	Company B, a Malaysian-based corporation, was founded in 1994 and expanded into integrated logistics solutions in the early 2000s. It was awarded ISO 9001:2015 quality system accreditations by Platinum Shauffmantz Veritas in 2018. The company has 50 employees, including a co-founder with 28 years of experience and two corporate relations officers with 7 months and 3 years of experience respectively.
Company C	Company C, a leading parcel delivery company in Korea, began as a forwarding agent in the 1970s and has since expanded into integrated logistics, oil logistics, procurement logistics, and data management solutions. With 44 branches and 1,800 employees in Malaysia, the company has experienced a forwarding manager with 30 years of experience in the logistics industry.
Company D	Company D, established in 1967, has a global network of 350 locations in 95 countries, 32 offices, and over 120 modern container ships. Its services include freight forwarding, chemical logistics, inbound logistics, warehouse, consulting, distribution, rail, and value-add center. The interviewee, with 20 years of experience, serves as the company's general manager.
Company E	Company E, a Malaysian freight transportation company, was established in 1992 and operates in various sectors including freight forwarding, warehousing, and transportation support. The interviewee, a customer service officer with 2 years of logistics experience, is currently employed.

Participated Companies	Profiling
Company F	Company F, a Southeast Asian tech-enabled express logistics company, began operations in Singapore in 2014 and has grown rapidly. With a network in six Southeast Asian countries, it has 20,000 employees. The company's fleet communicator, with 2 years of experience, is a key player in its network.
Company G	Company G, a Malaysian one-stop logistics service provider, offers services such as sea freight forwarding, air freight forwarding, contract logistics, ship chartering, land transport, engineering logistics, e-commerce logistics, and shipping agency services. With around 100 employees, the company is seeking a business solution executive with one year of experience in the logistics industry.
Company H	Company H, based in Shah Alam, Malaysia, provides freight transportation services, including warehousing, logistics, and forwarding agency for sea and air imports and exports. With 190 branches and 4,400 global employees, the interviewee is a customer service executive with 2.5 years of experience.
Company I	Company I, established in 2014, offers various services including vehicle transportation, professional house moving, furniture disposal, office relocation, and commercial logistics solutions. It focuses on fast-moving consumer goods, apparel distribution, line haul, and e-commerce deliveries. The company collaborates with over 10,000 skilled drivers. An operation executive with three years of experience is interviewed.

4.1. Findings of the study

4.1.1. The Existing Performance of The Logistics Industry in Malaysia

In a nutshell, all interviewees mentioned there are some challenges facing the operations, such as vessel delays, delays in delivery, lorry shortages, etc. Based on the interviewed information, it seems most companies still implement median technologies such as barcode scanning and WMS in their operations, while some have implemented advanced technologies such as cloud computing and IoT in their operations. However, there are few companies that still rely on paper-based documents to manage their operations.

There are some differences in the adoption of digitalization between small, medium, and large enterprises. For example, large enterprises such as Company C, D, F, G, and I invest in various digitalization technologies and implement the technologies in the operations of the company. In contrast, small enterprises such as Company A and B invest less in digitalization or still rely on traditional approaches in their operations. There are several reasons for the low adoption of digitalization, such as high digital implementation costs. Therefore, the investment in the digitalization of small and medium-sized enterprises (SMEs) is relatively less compared to large enterprises. According to Interviewee 5, investing in digitalization costs approximately a million Ringgit Malaysia or higher, whereas SMEs might not be able to afford the implementation cost.

Furthermore, most of the interviewees viewed the existing logistics performance in Malaysia as relatively poor compared to other countries and as requiring room for improvements to enhance the Malaysian existing logistics performance. According to Interviewee 7, the port performance of Malaysia is ineffective, thereby causing severe delay issues that are unavoidable during peak season. Moreover, the Malaysian logistics industry is still not able to eliminate the labor-intensive workforce, and technology involvement is low in many areas of logistics. Also, Interviewee 5 mentioned that the logistics players in Malaysia are struggling with the government system, such as Sistem Maklumat Kastam; the instability of the system could affect the daily operations of the company. Therefore, it is essential to improve the system to ensure the efficiency of the logistics process.

4.1.2. The Role of Digitalization in Enhancing Performance for The Logistics Industry in Malaysia

Table 4: Information obtained from interview results and literature review (Refer section 2.1.1. Quality)

Theme	Explanation (Interview)
Quality	- Cover a wide range of tasks. - Narrow down the delivery time range - Real-time tracking - Record customer feedback
	Explanation (Literature Review)
	- Time guarantees - Pricing guarantees - Money-back promises - Boost export volume

According to both primary and secondary data as shown in Table 4, the implementation of digitalization has the potential to enhance the efficacy of logistics operations. Nevertheless, a connection cannot be established between the interview and the literature review. All companies except Company C expressed confidence in the manageability of their existing technology to guarantee service quality. The researchers discovered that each interviewee possessed distinct definitions and interpretations of quality after amalgamating the interview contents from the interviews. This manifestation aligns with the delineation of quality as outlined in section 2.2.1.. It is noteworthy that individuals employ the term "quality" in varied ways, each with their

own distinct implications (Aggarwal, 2018). Various interviewees have varying definitions of quality when it comes to logistics services. This is because the quality of such services is inherently unknown, unlike tangible items that can be managed and measured (Park, 2020).

During the interview, Interviewee 7 from Company E highlighted the company's ability to effectively manage time through the utilization of their comprehensive system, which encompasses all documents linked to logistics. According to Interviewee 8 from Company F, their approach to customer service involves utilizing digital technology to save transit time instead of providing time guarantees. Additionally, Interviewee 8 said that a majority of their clientele exhibit a willingness to select their organization on account of the efficiency of their real-time monitoring system. The company I own has implemented a customer feedback system to capture and analyze consumer input, with the aim of making improvements based on the data collected. The quality of a country's logistics network has a significant impact on its performance in global trade. Hence, it is recommended to enhance the quality by embracing advanced digital technology.

Table 5: Information obtained from interview results and literature review (Refer section 2.1.2. Delivery)

Theme	
Delivery	**Explanation (Interview)** - Track speed for vehicle - Real-time information - Arriving time estimation - Reduce human error in loading activities - Avoid mistakes in loading activities - Task Allocation
	Explanation (Literature Review) - Real-time information - Appropriate route optimisation - Maximise loading capacity - Avoid mistakes in loading activities - Provide more delivery choices (rapid delivery & standard delivery) - Determine customer's expectation toward logis tics service - Customer can avoid miss picking of parcel - Contactless delivery

Based on Table 5, the adoption of digitalization in the logistics industry has been shown to improve the delivery process. The literature review described in section 2.1.2. and interview findings suggest that digitalization can provide real-time information and prevent mistakes in loading activities. Companies like Company B, C, E, F, and H can track their drivers, parcels, and containers in real-time. Companies I can manage and restrict trucks to prevent loading goods on the wrong truck, while Company D uses a barcode scanner for goods verification. Company C can estimate arrival times and provide this information to customers. Company H uses a task allocation app for drivers to choose delivery tasks according to their preferences. The results suggest that digital technology can provide positive feedback towards delivery, enhancing the operational performance of the logistics industry.

Table 6: Information obtained from interview results and literature review (Refer section 2.1.3. Cost)

Theme	
Cost	**Explanation (Interview)** - Reduce labour cost - Reduce paperwork - Record expenses and income accurately - Reduce cost in mailing, printing hardcopy - Burden to SMEs
	Explanation (Literature Review) - Reduce labour cost - Greater compression space for logistics cost - Real-time modify each line's capacity and mileage - Minimise fuel consumption - Autonomous vehicles sustain low management costs - Route monitoring - Fail to achieve greater financial performance

As shown in Table 6 and section 2.1.3 referred, the adoption of digitalization has been shown to enhance the cost of logistics processes, particularly in reducing labor costs. Companies like Company B, C, and D have reported that wrapping systems, automotive technology, robotic warehousing, and digital technology can help reduce these costs. However, adopting digital technology is not entirely cost-efficient, as the high costs may lead to failure in achieving greater financial performance. Only Company C and D have expressed a positive view of digital technology saving costs, while other companies, such as Company B, D, H, and F, have expressed that the cost of embracing new technology is a reason they stay with their current technology. Some companies cannot afford the high cost of acquiring new digital technologies, indicating that most companies are not optimistic about the cost savings of digital technology.

Table 7: Information obtained from interview results and literature review (Refer section 2.1.4. Speed)

Theme	
Speed	**Explanation (Interview)** - Classification of parcel - Vehicle scheduling - Provide route options - Visibility of data - Transportation monitoring - Real-time information
	Explanation (Literature Review) - Classification of parcel - Vehicle scheduling - Transportation monitoring - Path planning - Enables transparency - Generate location information - Real-time information

As shown in Table 7 and section 2.1.4 referred, digitalization has been shown to significantly improve the speed of the logistics process, providing real-time information, transparency, and task arrangements. This allows customers and employees to track parcel locations, assign drivers, and use vehicles effectively. The literature review highlights the importance of parcel classification, with companies like Company D sorting parcels based on urgency or priority level. Digitalization also helps in determining the most efficient and ideal route for drivers, ensuring delivery speed. Uncertainty during deliveries, such as traffic congestion and truck breakdowns, can lead to delays. Digitalization can provide alternative routes or alternative trucks to ensure the delivery process is not seriously affected. For example, digitalization can improve delivery speed for Company F and I by finding alternative routes with shorter or fewer traffic congestions for drivers. This results in improved logistics operational performance and improved delivery speed. Overall, digitalization has the potential to significantly enhance the logistics process and overall efficiency.

Table 8: Information obtained from interview results and literature review (Refer section 2.1.5. Customer Service)

Theme	Explanation (Interview)
Customer Service	- Provide estimated delivery time - Entrust the control of data-sharing - Collect customer feedbacks - Consistent updates
	Explanation (Literature Review)
	- Ask customers through social networking sites regarding their expected delivery time for their ordered products - Entrust the control of data-sharing - Gather customer information, market analysis, products review, surveys, and customer information

As shown in Table 8 and referring to section 2.1.5., the adoption of digitalization has been shown to improve customer service by enabling companies to provide estimated delivery times, reducing delivery failures, and increasing customer satisfaction. Companies like Company F have a 97.7% satisfaction score from customers, demonstrating the benefits of digitalization. Trust between the company and the customer is also crucial, with real-time data transparency increasing trust. Companies like Company C, F, and H have implemented digitalization systems that allow customers to access logistics information, resulting in time-saving and real-time updates. Feedback from customers is essential for business growth, and companies like Company F have implemented software to collect customer feedback, enhancing their service and business growth. Consistently updating information about market situations, new services, and vessel information is another way to maintain good relationships with customers. Therefore, improving customer service is crucial for enhancing operational performance in the logistics industry.

Table 9: Information obtained from interview results and literature review (Refer section 2.1.6. Flexibility)

Theme	Explanation (Interview)
Flexibility	- Centralise and share information - Real-time information - Monitoring and communication flexibility
	Explanation (Literature Review)
	- Monitoring and communication flexibility - Constancy and capability - Real-time information - Centralise and share information - Smart contracts

As shown in Table 9 and referring to section 2.1.6., the adoption of digitalization in the logistics industry has been found to provide numerous benefits, including flexibility, monitoring, communication, and centralization of information. This allows companies to meet customer requirements and demands before physical product delivery, share information with logistics parties, and centralize information in a system. For example, a company can use a system to gather information on freight forwarders, allowing them to compare and find the best vessel at a good price. Digitalization also enables real-time monitoring of shipments and vessels, allowing companies to make timely decisions or arrangements. Additionally, digitalization can achieve smart contracts, enabling programme transactions and machine-to-machine communication. However, some revisions or changes still need to be made due to related parties in the logistics process. In conclusion, digitalization offers numerous benefits, providing flexibility in the logistics process and improving operational performance in the industry. However, some revisions or changes may still need to be made due to the involvement of related parties.

Table 10: Summary of the Interview

Company (Interviewee)	Attitude toward CURRENT technology	Attitude toward ADOPT new technology
A (1)	Satisfied	Dissatisfied
B (2,3,4)	Satisfied	Neutral
C (5)	Dissatisfied	Satisfied
D (6)	Satisfied	Neutral
E (7)	Neutral	Neutral
F (8)	Satisfied	Neutral
G (9)	Satisfied	Hard to Define
H (10)	Neutral	Neutral
I (11)	Satisfied	Neutral

As depicted in Table 10, in terms of attitude toward current technology, 'satisfied' is defined as satisfied with the current digital technology and not questioning it at all;

'neutral' is defined as thinking that digital technology is now acceptable; 'dissatisfied' is defined as believing that the current digital technology is unacceptable and must be changed. After a brief breakdown, researchers found that six out of nine companies are satisfied, two companies are neutral, and one company is dissatisfied with the company's current digital technology.

In terms of attitude toward adopting new technology, 'satisfied' is defined as owning an eagerness to switch to new or higher-level digital technologies; 'neutral' is defined as keeping a wait-and-see attitude towards new or higher-level digital technologies; and 'dissatisfied' is defined as resistance to new or higher-level digital technology. Six out of nine companies are neutral; one is satisfied, one is dissatisfied, and one company is hard to define as accepting new digital technologies.

4.1.3. Recommendations for Increasing Digitalization Adoption Level Amongst Logistics Companies in Malaysia

This research explored and examined the acceptance of digital technology by Malaysian logistics operators, focusing on the factors that influence their willingness to adopt new technologies. A framework was created by Mubarak et al. (2023) to help supply chain operational network collaborate and operate in a way that is resilient, visible, and integrated. This framework directs policy makers in creating open innovation networks for various functions, including the supply chain. The technology acceptance model (TAM) is used to analyze the impact of perceived ease of use (PEOU) and perceived usefulness (PU) on the adoption of digital technologies (AT) (Ramkumar et al., 2019; A Breckon et al., 2019; Thu-Huong et al., 2019). The study found that external variables such as company size, nature, and employment duration significantly influence the adoption of digital systems.

Companies A, B, D, and H, which are small logistics companies, are generally reluctant to adopt advanced technology due to their preference for user-friendly systems. However, companies C, which have 1,800 employees and high-end digital technologies, are ready to replace their current systems. Companies B, D, H, and F, on the other hand, are reluctant to adopt advanced digital technologies due to the high cost of acquiring them. This suggests that Malaysia should focus on improving its government systems related to logistics to increase digital adoption. PEOU, PU, and AT have a significant link with behavioral intention to use (BI) but a weak relationship with actual use. All interviewees recommend other logistics companies adopt digital technology to gain benefits and avoid losses. However, only Companies B, C, and D have specific goals in terms of accepting higher-level digital technologies.

4.2. Conclusion

The study found that most companies are satisfied with their current digitalization status and neutral towards adopting new technology. The adoption of digital technology is crucial for improving logistics efficiency and sustainable development. Challenges include the cost and inefficiency of Malaysia's logistics system, and the government's support is needed to stimulate ease of use, publicity, and the establishment of a digital environment. The study recommends more detailed data and expanding the scope to include other logistics companies in Malaysia. The adoption of digitalization is essential for enhancing logistics operations, competitiveness, and economic growth.

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