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# Assessing the Viability of Crowd Logistics for Last-mile Delivery: Case Studies in Malaysia Logistics Industry

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**ABSTRACT**

This study focuses on crowd logistics challenges in Malaysian crowd logistics companies. To the author's best knowledge, there is limited empirical qualitative research on crowd logistics, especially in the Malaysian logistics sector. This research aims to identify and examine the challenges that hinder the success of crowd logistics and how crowd logistics can shape the future of the logistics industry. A semi-structured interview with six industry experts, including logistics service providers and platform operators, were selected in this study to gain insights into their experiences and perspectives on crowd logistics. Additionally, a data analysis process is presented. The findings of this study suggested three main themes and six sub-themes, including operation management, resource management, and technology and communication management as the main themes. The sub-themes include delivery operation, service offered, rider issues, demand issues, delivery platform, and technology implementation issues. This study provides implications in two-fold. First, for the theoretical implication, it provides empirical case studies and highlights critical challenges faced by crowd logistics companies in Malaysia. Secondly, for practical implications, it offers valuable insights for logistics companies, especially those engaged in crowd logistics, to understand the challenges customers and service providers face. However, this research is limited in its generalizability and triangulation studies which calls for further investigation.

***Keywords:*** *crowd logistics, on-demand logistics, last-mile delivery, challenges*

## 1.0 INTRODUCTION

Managing delivery and last-mile operation has progressed significantly over the years due to customer demand and requirement changes. According to Rutner and Langley Jr. (2000), logistics management plays a vital role in an organization's operations, particularly in managing transportation to ensure the availability of goods, services, and related information. The Council of Supply Chain Management Professionals

(2013) notes that logistics is a critical aspect of supply chain management as it enables the efficient transport of goods or services from one location to another. It encompasses planning, implementing, and managing inbound and outbound movement within a supply chain. Lai (2004) depicts that logistics service capability refers to a logistics firm's ability to create and deploy resources to enhance service performance and customer satisfaction. Key logistics capabilities include demand-driven operations, on-time delivery, problem-solving skills, and providing accurate storage and delivery information throughout the logistics chain to support customers in making informed decisions (Mohd Zawawi & Abdul Wahab, 2018).

Crowd logistics is a developing field in both academia and industry. A conceptual definition by Carbone et al. (2017) defines "*Crowd logistics that is done through collaborative platforms and mobile apps that connect individuals and firms to peers (travelers, movers, authorized drivers, owners of empty storage spaces, etc.) to make the best use of distributed, idle logistics resources and capabilities. Crowd logistics calls on individuals to perform basic logistics services on an ad-hoc basis."* The concept of crowd logistics has enhanced logistics services to become more resourceful and provide reliable services in delivery operations. Crowd logistics refers to a logistics system where multiple parties, such as individuals or small businesses (Ranard et al., 2014), collaborate to transport goods from one place to another. This approach is based on sharing economy and resources (Rai et al., 2017), such as vehicles and warehouses. It can help to reduce costs, increase efficiency, and improve the overall performance of the logistics system.

The issues and problems of crowd logistics and its practices are not well explored in the Malaysian context. Most of the previous literature focuses on exploring the crowdsourcing practices among SME businesses conducted by Mansor et al. (2018). The qualitative findings show crowdsourcing can serve many benefits, such as operational cost reduction, acquiring new skills, knowledge and expertise, shortening delivery time, brand recognition, organizational innovation, and problem-solving tools, thus improving their business performance. Likewise, a study by Janom et al. (2020) reported that crowdsourcing was a new way for the company to allow individuals outside the organization to apply their expertise and make the best use of their time by participating in available jobs. This research explores and ranks the multi-perspectives of the crowdsourcing ecosystem in Malaysia using the analytical hierarchy process (AHP) method by weighting each factor that can assist in prioritizing factors based on their level of importance. The result discovers players in the crowdsourcing industry can use the findings to develop a more strategic approach to crowdsourcing in Malaysia. Furthermore, a study by Bakar and Jaafar (2016) measured the logistics performance index (LPI) from the user perspective, resulting in logistics facilities ranking number one in the performance measurement. This indicates that the logistics infrastructure in Malaysia is conducive to providing users with superior services.

Most existing studies have focused on evaluating the logistics as a whole and ranking the crowdsourcing ecosystem based on the user perspective. However, studies analyzing global real-world applications of crowd logistics are scarce despite considerable industry demand (Bortolini et al., 2022). Furthermore, there is limited empirical qualitative studies especially in Malaysian crowd logistics. Thus, this research aims to identify and examine the challenges that hinder the success of crowd logistics and examining the potential of crowd logistics to drive innovation and transformation in the logistics industry. Following the statement mentioned above, this study aimed to answer two research questions: (1) What are the challenges faced by crowd logistics in the industry? (2) How does crowd logistics influence the future of the logistics industry?

Firstly, this study defines crowd logistics in the literature presented to understand better and explore the current condition of crowd logistics worldwide and in Malaysia. Then, the methodology was introduced based on qualitative research design. In the following section, themes and sub-themes were described based on the qualitative findings, highlighting the challenges in the crowd logistics context. Then, the practical and theoretical implications are discussed accordingly. The limitations and future research avenues are presented at the end of the article.

## 2.0 LITERATURE REVIEW

### 2.1 Conceptual Background

In more specific words, logistics is what drives the goods or materials to move from one location to another (Council of Supply Chain Management Professionals, 2013). It is crucial to have effective logistics to ensure smooth supply chain management. Basic logistics functions include transportation planning, execution and control, warehouse management, storage, inventory planning and development, order processing, information system, and packaging. Each function has its characteristics and own purpose to ensure the smooth of operation.

The search for crowd logistics literature has exponentially grown in the research context. It started with an introduction from Howe (2006), where the author introduced the word "crowd, " which means the use of crowd in managing operational activities. Crowd logistics is a new strategy for bolstering fast shipping services that entrust the management of last-mile delivery to the crowd, i.e., ordinary people who agree to deliver goods to customers located along the route they must travel using their transportation means in exchange for a small reward (Bortolini et al., 2022). In general, crowd logistics aims to link people with specific logistical resources with those who require logistics services (Andreji & Jeremic, 2019).

### 2.2 Overview of Malaysia Crowd Logistics

In Malaysia, crowd logistics has become increasingly popular as local and international companies have started offering ride-hailing and delivery services. The emergence of the logistics sector has created operational differences in managing delivery operations. According to Tan and Yen Li (2018), demand for logistics services in Malaysia will continue to increase due to growing foreign trade and consumer spending behaviour. The emerging trend will also depict the growing use of the internet and applications that can assist in spending behaviour, such as using mobile applications through mobile phones, using last-mile for one of the delivery methods, and using high-speed internet.

In Malaysia, crowd logistics companies use mobile applications and internet platforms to link consumers with a network of freelance or part-time delivery employees capable of providing on-demand delivery services. Malaysian Communications and Multimedia Commission (MCMC) (2019) has identified companies that can offer a wide range of services, from food delivery to parcel delivery, and use various modes of transportation, including motorcycles, cars, vans, and even bicycles. Several crowd logistics companies, such as Lalamove, GoGet, and Pgeon Delivery, have emerged in Malaysia. These companies have disrupted the traditional logistics industry, providing consumers with affordable and convenient delivery services. Additionally, FoodPanda and Grab majoring serve for food delivery, TheLorry for big and bulky items, BungkusIt for delivery of any items, and special runner service. However, they have also faced various challenges, including the need for efficient and reliable logistics infrastructure, quality control issues, and concerns about the requirement of the legal status of delivery personnel, including the privacy policy of customers.

The Malaysian government has taken steps to regulate crowd logistics companies and ensure compliance with local laws and regulations. For instance, a guideline has been introduced by Land Public Transport Agency (APAD) in order to ensure the safety of both passengers and drivers (APAD, 2023). Moreover, a certification program for delivery personnel has also being introduced by the Ministry of Human Resources for enhancing the delivery personnel skills and knowledge. Crowd logistics in Malaysia is an expanding business that offers consumers economical and convenient delivery services while posing new difficulties and opportunities for the logistics industry and the government.

To gain a better understanding on the topic, an interview has been conducted with several practitioners to get an initial exploration on the topic and discover the crowd logistics challenges to be implemented in Malaysia. This article shall also highlight future research agenda in crowd logistics.

## 3.0 METHODOLOGY

This study adopts an empirical qualitative approach, and the informant is one of the industrial practitioners in Malaysia who is highly involved in crowd logistics. A qualitative research design is an inductive research method where data interpretation is made once interviews have been conducted. This data is then analysed and formed into themes that best describe the particular topics (Creswell & Creswell, 2018). An in-depth interview is an effective tool to understand a new phenomenon, such as the study of crowd logistics in the Malaysia delivery operation. The semi-structured interview is chosen because it provides a flexible instrument and more flexibility in data gathering (Yin, 2018). Furthermore, a case study is also appropriate when the researcher wants to grasp the phenomenon in real-world conditions, where it is not yet fully understood (crowd logistics) and univocally understood.

### 3.1 Data Collection

The data collection method for this research is using in-depth interview, with semi-structured question. The purpose of the in-depth interviews is to better understand the challenges and problems associated with crowd logistics. Through this study, the most important aspect to understand is the challenges and problems faced by the crowd logistics practitioners. The expressions used and words spoken will also be taken into consideration during the interview. The sample of this study is using convenience sampling, where practitioners from crowd logistics company were invited to the online interview session. A semi-structured interview was conducted as it is the most appropriate tool for field data collection. It is also an approach where there is no rigid answer for the question, where informant can growingly answer the question according to their own opinion, and also promotes two-way communication (Kallio et al., 2016). Additionally, a secondary data analysis also conducted to gathered relevant information regarding crowd logistics literature review and informants' company details and characteristics, where internal presentations, company reports, journals and website are also included as part of the data collection.

### 3.2 Informant Demographic and Company Case

Informants are selected from companies that practice crowd logistics, especially in the courier service and last-mile delivery team. The case company chosen for this paper generally engaged in crowd logistics, offering last-mile delivery or on-demand delivery services. The interview was held for two months, which started on December 2020 and ended in January 2021. Table 1 shows the six companies contacted to assist with the interview. The informant is from top management, including the CEO, general manager, regional manager, supply and delivery manager, and assistant manager. The interview protocol is conducted to gather information precisely on what challenges and problems the industry faces in the crowd logistics avenue. The interview is conducted online, where the average interview duration takes about 30 to 45 minutes for each session. Table 1 explains the profile of the informant for this study.

**Table 1: Informants Designation of Case Company**

| *Case Study* | *Informants Details* |
|---|---|
| *Company A* | Informant Designation: CEO |
| *Company B* | Informant Designation: Regional Manager |
| *Company C* | Informant Designation: Supply & Delivery Manager |
| *Company D* | Informant Designation: General Manager |
| *Company E* | Informant Designation: Manager |
| *Company F* | Informant Designation: Assistant Manager |

### 3.3 Data Analysis

The responses were recorded and transcribed in verbatim accordingly. Figure 1 explains the data analysis procedure consisting of four main steps. Stage 1 started with the planning of designing the study. This will involve defining methodologies such as sample size and unit of analysis and developing the interview protocol, ultimately assisting in refining the research problems. The procedure continues with Stage 2,

where the data is collected through an interview with the informants, followed by data transcription. This step is crucial to clearly defines research objectives and questions. Next, qualitative data analysis is conducted for Stage 3 to form meaningful analytics data. It started with decontextualization, where the researcher would identify meaning units from the gathered data into a coding system. Then, the data is gathered into similar groups, which will make the data more organized. Afterward, it is compiled with similar groups to identify the underlying meaning of the data. Then, the compiled data will be identified into patterns and themes. Each step in this stage needs to be repeated several times to achieve the analysis's quality and trustworthiness (Bengtsson, 2016). Through the compilation, a validation process for the existing data will also be employed by checking whether the result is reasonable, logical, and corresponds with the literature. Finally, a conclusion and report writing will be established at stage 4 to complete the data analysis.

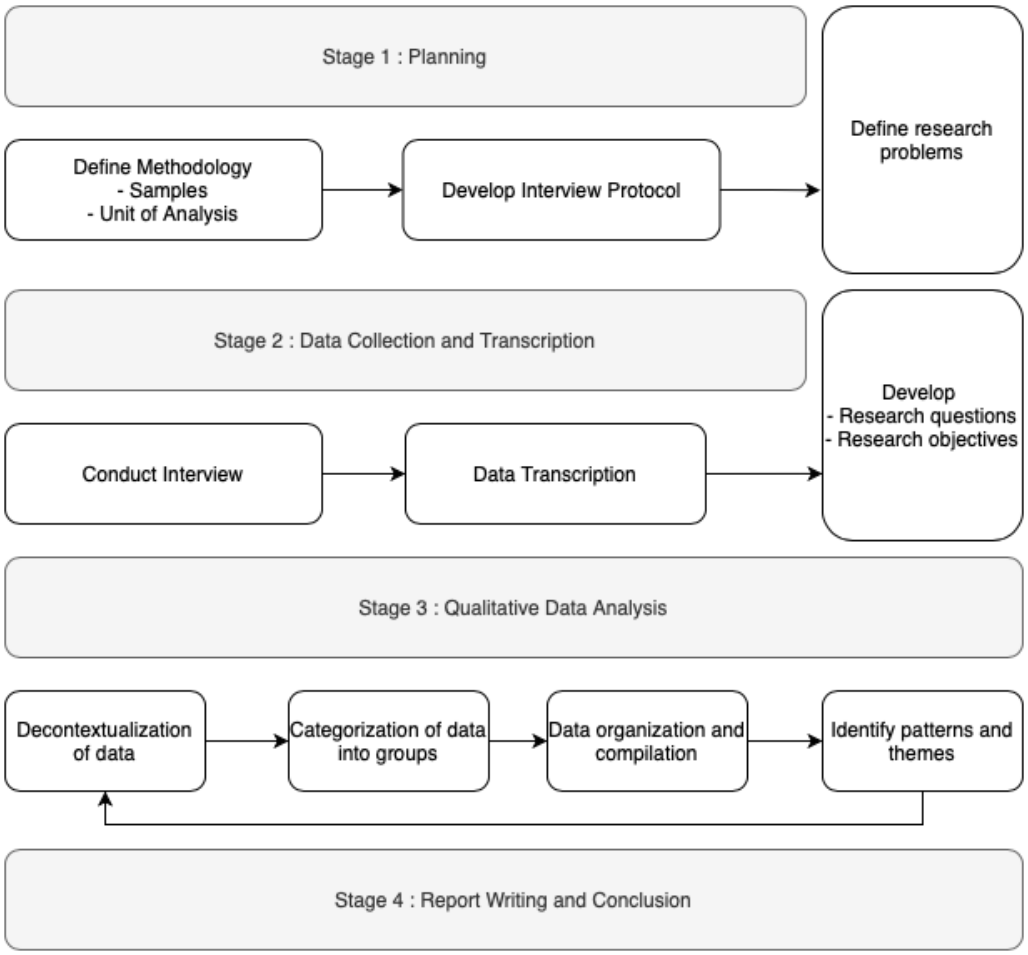


**Figure 1: Data Analysis Procedure**

## 4.0 RESULT AND DISCUSSION

Based on the interview, a themed analysis has been conducted and discussed. The results can be categorized into several themes and sub-themes. The result starts with the case company demographic, followed by themes and sub-themes for the interview. The result will start with headings indicating the themes, which are proportional to the problems and challenges faced by the crowd logistics parties in Malaysia. The themes can be categorized into operation management, that consists of delivery management and service offered. Then followed by the second theme which is resource management, which addresses riders' issues and demand issues as the sub-theme. And lastly, technology and communication management which consist of delivery platform and technology and implemented issues as the sub-themes.

### 4.1 The Case Company Demographic

Table 2 shows the result for the case company profile. The first company case, Company A, started their business in 2017 and is one of the locally grown companies. While Company B was founded in 2013, and the headquarter is located internationally, similar to Company C, established in 2012. While Company D has already been almost two decades in Malaysia, where it started its operation on 2004 in South Malaysia. Company E and F shared the same year of initially founded and operated, which is on year 2014. Companies A and D ownership are Malaysian fully owned, where they have the full authority to control their operation. While for Companies B, C, E, and F, ownership is based on joint ventures from local and foreign companies, which limits their control and the need to comply with headquarters rules and regulations without compromising their operation. This difference addresses the company's ownership and reflected their operations in Malaysia. For instance, should the company comply with their headquarters, they will be restricted on complying the policies, rules and regulation set by the headquarters. This can also impact the company's operations, decision making process and business strategy. In terms of geographical coverage, only Company A is restricted to local suppliers and customers, while others cover local and international suppliers and customers. Only Company D is considered a small company with less than 50 employees. Companies A, E, and F are considered medium-sized companies in terms of their number of employees while Company B and C are under a large-scale size company with more than 200 employees at one time. For the mobile application only, Company D does not have a mobile application, where they still use a traditional application method for delivery. Most of their customers are existing customers that preferred Company D to communicate through emails, websites, and phone calls and also pick up at their respective companies. Other Companies in the case study already deployed their mobile applications and websites to facilitate access to the offered service.

**Table 2: Case Company Profile**

| | | *Company A* | *Company B* | *Company C* | *Company D* | *Company E* | *Company F* |
|---|---|---|---|---|---|---|---|
| *Founded* | | 2017 | 2013 | 2012 | 2004 | 2014 | 2014 |
| *Company Headquarters* | Local | ● | ● | ● | ● | ● | ● |
| | International | | ● | ● | | ● | ● |
| *Ownership Status* | Malaysian | ● | | | ● | | |
| | Fully Own | | ● | ● | | ● | ● |
| | Local and Foreign Joint Venture | | | | | | |
| | European-based | | | | | | |
| | Japanese-based | | | | | | |
| *Geographical coverage* | Local | ● | ● | ● | ● | ● | ● |
| | International | | ● | ● | ● | ● | ● |
| *Company size* | Micro (<5) | | | | | | |
| | Small (5-75) | | | | ● | | |
| | Medium (75-200) | ● | ● | ● | | ● | ● |
| | Large (>200) | | | | | | |
| *Mobile Application* | Yes | ● | ● | ● | | ● | ● |
| | No | | | | ● | | |
| *Website* | Yes | ● | ● | ● | ● | ● | ● |
| | No | | | | | | |

### 4.2 Crowd Logistics Emerging Theme

This section will discuss the emerging themes that have been identified as key challenges faced by crowd logistics in Malaysia. Drawing on insights gained from in-depth empirical interview, we presented the following figure summarizing these themes.

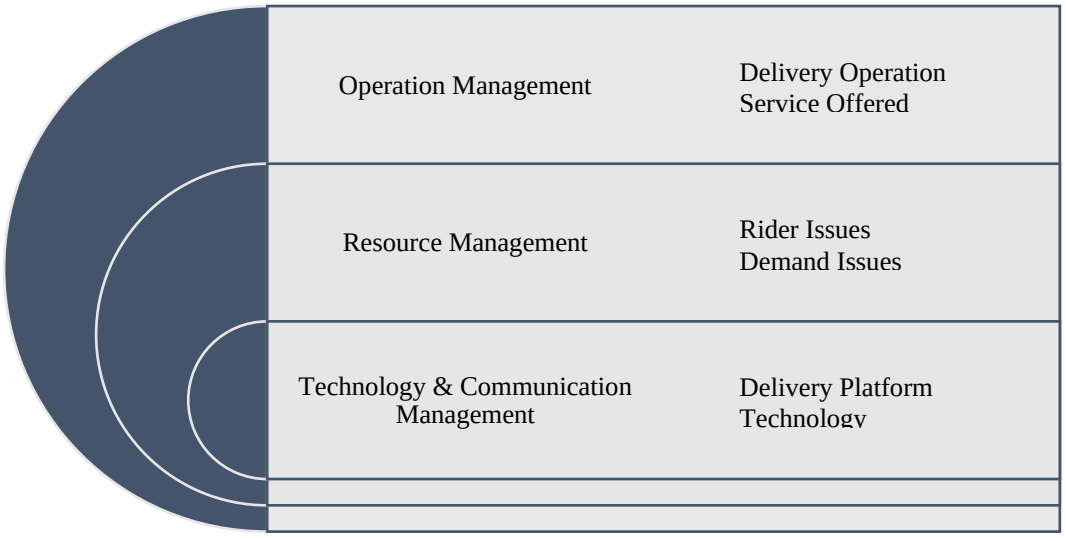


**Figure 1: Emerging Themes for Crowd Logistics Challenges**

#### *4.2.1 Operation Management*

##### *4.2.1.1 Delivery Operation*

The ultimate goal of a logistics company is to deliver the required parcel to customers successfully. In the delivery operation, all six companies notified that their main business is focusing on delivery and last-mile delivery, where the only difference between the company is the method and transportation used for the delivery. For instance, company E acts as a hub by collaborating with small companies and delivering the parcel required according to customers. Company F only uses trucks, which focus more on handling oversized goods. For companies A, B and C, their operations are more towards on-demand delivery and rely heavily on mobile applications for daily operation. For Company D, as this company's operation relies on a traditional method, it will likely have the least number of customers and depend on its existing customers.

As Yi et al. (2020) mentioned, crowd logistics can be applied to two main sections, where the first one is for last-mile delivery (Rai et al., 2018) and the second one for urban freight transport (Kafle et al., 2017; Le & Ukkusuri, 2019; Li & Yu, 2017; Rai et al., 2017). The main difference between both relies on the participants that use the service, such as for last-mile delivery. The participants consist mostly of amateurs such as students, part-time workers, and pizza delivery. For urban freight, most participants, such as professional couriers and taxi drivers, are professionally involved in the delivery process. For this interview, the companies consist of both last-mile delivery and urban freight transport, with their own participants available based on companies' direction and operation.

##### *4.2.1.2 Service Offered*

The types of services conducted during the delivery can be picking up the goods, offering services to the customers, personalized services, and doing some tasks and errands according to customer requirements. For example, in the case of Company A where the main mission is to make delivery or get the task done within 60 minutes. Uniquely, this statement works efficiently as more people are willing to use the service and expect the company to deliver as its promise. This indicates the importance of providing tailored services that meet the customer's specific needs. Additionally, the delivery operation would require multimodal types of vehicles used during daily operations, depending on customer requirements. The types of transport also vary, such as using cars, vans, motorcycles, lorries, and pickup trucks. This highlights the

importance of providing various delivery options to meet the diverse needs of customers. A regional manager of Company B explains;

> "*... we offer different types of vehicle classes, vans, lorries, and so that as well and platforms are not that many people or platforms play in that space at the moment. And so having multimodal vehicle types for last-mile delivery is quite different*."

The findings indicate flexibility and variety of delivery operations that can assist in managing customer needs. Currently, not many platforms operate for the same purpose, thus giving them better chances to gain a larger market share. The findings also suggest that the company may have a competitive advantage by offering differentiated services and having a relatively unique position in the market. Another example is Company F, where fully operational transportation depends on the lorry and truck, which are deemed for large and bulky delivery. This type of delivery also has a different target market compared to other companies. Additionally, by offering extensive flexibility and variety of delivery operations, company can enjoy benefits such as increasing the customer satisfaction and lead to high customer loyalty. For example, in one of the interviews, Company D addresses their various mode of transportation where it highlights the flexibility in the company.

This statement is also supported by Wang (2020), where the author conducts a purposive sampling in Australia to identify and measures the logistics capabilities, focusing on flexibility in the delivery for scheduling and routing. If the company is willing to implement a flexible delivery, it can also mean that it adapts to change (Yang et al., 2019). A supply chain visibility study by Wang and Sarkis (2021) describes various types of transport collaboration and implementing crowd logistics to grasp the benefit of sharing economy.

### *4.2.2 Resource Management*

#### *4.2.2.1 Riders Issues*

To have a smooth operation of an on-demand service, the company should take careful responsibility for its riders. The issues with riders vary greatly depending on how the company operates. From the interview, the issues concern constantly changing government regulations related to e-hailing services. This unclear regulation can create confusion and uncertainty for both company and riders, especially on the legal status of their job and job requirements. As stated by a Manager from Company E;

> "*It can be everything from product issues, regulatory issues, supply issues, demand issues, sales issues, management issues, support issues.*"

This statement indicates that a lot of regulation needs to be followed, and thus create confusion in term of compliance and operations. Companies also need to stay updated on the latest regulation and adapt their operations accordingly. Secondly, most of the riders are concerned about the job security provided by the company. Most employees are freelance or contract, thus offering no job security or other benefits such as healthcare, bonuses, or paid leave. In consideration of the nature of this job, there are many riders available but only a limited number of jobs to be done. Thus, this situation resulted in high competitiveness in securing the job. Lastly, due to the high competitiveness of this job, most of the riders received low pay, and minimal or no incentives and remuneration were offered. This creates tension among the riders and impacts the company's operation, resulting in low job satisfaction among riders. As the CEO of Company, A mentioned regarding low pay and minimal incentives provided as below;

> "*There are incentives available, but that is only a small portion of the whole delivery. Some riders don't even get the incentive as they do not achieve the requirement for that day*."

#### *4.2.2.3 Demand Issues*

Despite the rider's issues and problems, the issues on demand also greatly affect the operation and resources on the on-demand delivery. As there are increased numbers of riders, the job demand is lower, resulting in only a small percentage of riders being full-time employees. Moreover, the inconsistent demand for on-demand delivery is also unpredictable and making it difficult for companies to focus on resources and manpower planning. The unpredictable demand also explains some seasonal demand during certain seasons, holidays, and promotions only, thus straining the delivery capacity and resources. The inconsistent

demand can create difficulties to companies in allocating resources and route effectively. Another issue the riders and company faces is capacity, with limited vehicles or riders available during peak season demand. Thus, this will result in the cancellation of orders and lower customer satisfaction. Company B Regional Manager shared his point of view where;

> "*This can be difficult job as sometimes as we have enough riders to deliver the job but the platform itself doesn't have enough jobs available. Thus, this making this situation even harder*"

The interview findings also lead to riders' willingness to do the job effectively (Shaheen et al., 2016). With the job done, the work condition of company and job itself can be improved and completes the operational process. Thus, it can prevent the issues to be expanded further, and competent riders can be found to fulfil the required demand (Dablanc et al., 2017).

### *4.2.4 Technology and Communication Management*

#### *4.2.4.1 Delivery Platform*

For on-demand delivery, the role of technology and delivery platforms is important. For example, the technology and mobile application used by Companies B and C mainly outsource their technological capabilities and rely on their headquarters, where if any technical problems or issues arise, they need to correct them accordingly. As for Companies A and F, they have their local developer who works on the application and can solve any technical problems immediately. All of the technical glitches and problems, such as website errors, system errors, or applications not functioning at the moment, can cause delays and disruption in the delivery process. Furthermore, miscommunication can cause problems for a company that does not imply a delivery platform. For instance, Company D does not have a mobile application which causes inaccurate information flow between the company and riders, as stated by General Manager;

> "*We often have the operation side talking about sending the items in the morning, end up the items delivered in the evening due to riders normally finishing all near address*."

Other than that, inaccurate information, such as incorrect delivery address and package information, can cause miscommunication between both parties. The inaccurate flow also can result in delayed delivery and low customer satisfaction. Furthermore, the mobile application and website tend to have poor customer service, leading to customer complaints and negative reviews of the delivery process. This happens when no dedicated personnel is in charge of the social platform, mobile applications, and website.

The delayed delivery, as mentioned by Laucirica (2020), has also mentioned that the delivery service quality is low if there is a late delivery and parcel damage. At the same time, Liu et al. (2018) measure low service delivery based on timeliness, security, and accuracy of logistics distance. Both of these works of literature support the interview findings in a matter of issues and causes of delayed delivery. Furthermore, the damage and deterioration also can be caused by incorrect critical information shared during the operation (Mladenow et al., 2015).

#### *4.2.4.2 Technology Implementation Issues*

Based on the interview, the major issues for implementing technology are the low penetration of internet connection, where companies cannot invest more, and services are often unavailable in rural areas. For example, as Company A is a fully owned Malaysian company, their technology investment is minimal, and they are unwilling to invest more money in the technological side. Thus, this will slightly impact their daily operation, especially in the analysis part. They cannot measure their performance based as it is not available in the application and the website. As a result, rural areas may be excluded from the benefit of on-demand services. Apart from this, the high cost associated is also one reason for most of the company's unwillingness to venture more broadly on the technological side. For instance, Companies D and F mentioned they are not willing to invest more as their operation cost will be too high and unable to cover the expenses soon. Furthermore, as technology becomes part and parcel of on-demand delivery, some companies cannot cope with the emerging and are willing to stay outdated with the current trend. They tend to maintain what they have as like what Company E reported;

> "*It really depends on where the maturity of the city some sort of technological education. City becomes ready, then you move in. It is very expensive if the city is not ready*."

Based on the interview findings, rural areas have low internet connection penetration. Thus, the company is not willing to invest further in this area. As mentioned by Liu et al. (2019), the information gathered in the rural area is not smooth and highly interrupted by the network. This circumstance will result in the first collection of inaccurate data. Furthermore, technology barriers are also one of the issues that must be tackled for smooth on-demand last-mile delivery (Lozzi et al., 2022). The author mentions that minimizing barriers and improving support for technological investment would assist on-demand last-mile delivery to be successfully implemented. In addition, Hao et al. (2020) also discover most of small firms reluctant to invest and introduce new technology as they are doubtful on the promise of technology improvement, a part of the high cost associated.

## 5.0 RESEARCH IMPLICATION

### 5.1 Theoretical Implication

This article provides theoretical implications by providing empirical case studies analysis on crowd logistics challenges that can be valuable to the existing literature on crowd logistics. This will also highlight critical challenges faced by crowd logistics companies in Malaysia, thus contributing to developing theoretical frameworks for further understanding the crowd logistics avenue. The unique challenges face by crowd logistics companies can also enrich the existing literature in the crowd logistics context, especially in Malaysia. This article will also provide insights into the key factors impacting crowd logistics operations and suggest ways to improve them. Furthermore, this study may leverage the power of the digital economy, where crowd logistics can match demand with supply more efficiently and effectively by providing more flexibility to both customers and the company.

### 5.2 Practical Implication

The practical implications of this study on crowd logistics challenges are numerous. Firstly, it provides valuable insights for logistics companies, especially those engaged in crowd logistics, to understand the challenges faced by customers and service providers. Based on the findings, companies can develop strategies and tactics to overcome the challenges and improve service quality, thus enhancing customer satisfaction and loyalty. The study also highlights the significance of effective communication and collaboration between service providers and customers. This information can be utilised by businesses to enhance their communication channels and provide more proactive customer service. This article also emphasises the importance of technology innovation in crowd logistics. For instance, by investing in the development and implementation of new technologies, such as mobile applications and tracking systems, this technological advancement can assist businesses in streamlining their operations, enhancing transparency and visibility, and eventually achieving a market advantage. It is also crucial for businesses to provide the infrastructure and resources required to facilitate crowd logistics in their operations. By looking into appropriate technological advancement, it will create a technology-enable crowd logistics which can be highly useful for its supply and demand match as well as in providing real-time and transparency to the deliveries.

## 6.0 CONCLUSION

Crowd logistics represents a new frontier in logistics innovation, having the ability to shape the industry's future by enabling more efficient, flexible, and sustainable operations. This preliminary interview analysis can aid future research and development in the field of crowd logistics by shedding light on the challenges in the field of crowd logistics and suggesting ways to overcome the challenges.

To overcome these challenges, companies need to invest in technology and infrastructure to support crowd logistics operations and establish clear standards and processes for collaboration and coordination between parties. Additionally, measures must be taken to ensure the quality and reliability of the services provided and mitigate the risks associated with sharing resources with unknown parties. With the right approach, crowd logistics can transform the logistics industry and help companies meet the growing demands of consumers and businesses alike.

This study has several limitations. Firstly, in terms of generalization where the findings of the study might not be generalizable to other industries or contexts. It also have limited scope, where it solely focusing only on the crowd logistics area. Furthermore, this article also only focuses on exploratory analysis, where to enhance this study, an explanatory analysis would be sufficient to triangulate the findings.


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## REFERENCES


(APAD), T. L. P. T. A. (2023). *Perkhidmatan Teksi dan e-hailing*.

Andreji, M., & Jeremic, M. (2019). Crowd logistics - a new concept in realization of logistics services. *4th Logistics International Conference*, 170–179.

Bakar, M. A. A., & Jaafar, H. S. (2016). Malaysian Logistics Performance: A Manufacturer's Perspective. *Procedia - Social and Behavioral Sciences*, *224*(August 2015), 571–578. https://doi.org/10.1016/j.sbspro.2016.05.442

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, *2*, 8–14. https://doi.org/10.1016/j.npls.2016.01.001

Bortolini, M., Calabrese, F., & Galizia, F. G. (2022). Crowd Logistics: A Survey of Successful Applications and Implementation Potential in Northern Italy. *Sustainability (Switzerland)*, *14*(24). https://doi.org/10.3390/su142416881

Carbone, V., Rouquet, A., & Roussat, C. (2017). The Rise of Crowd Logistics: A New Way to Co-Create Logistics Value. *Journal of Business Logistics*, *38*(4), 238–252. https://doi.org/10.1111/jbl.12164

Council of Supply Chain Management Professionals. (2013). *Supply Chain Management* (Issue August).

Creswell, J. W., & Creswell, J. D. (2018). Research Design:Qualitative, Quantitative, and Mixed Methods Approaches. In *Journal of Chemical Information and Modeling* (5th ed.).

Dablanc, L., Morganti, E., Arvidsson, N., Woxenius, J., Browne, M., & Saidi, N. (2017). The rise of on-demand 'Instant Deliveries' in European cities. *Supply Chain Forum*, *18*(4), 203–217. https://doi.org/10.1080/16258312.2017.1375375

Hao, J., Shi, H., Shi, V., & Yang, C. (2020). Adoption of automatic warehousing systems in logistics firms: A technology-organization-environment framework. *Sustainability (Switzerland)*, *12*(12). https://doi.org/10.3390/su12125185

Howe, J. (2006). *The Conflicts of the Faculty*. Critical Inquiry. https://doi.org/10.2307/25599409

Kafle, N., Zou, B., & Lin, J. (2017). Design and modeling of a crowdsource-enabled system for urban parcel relay and delivery. *Transportation Research Part B: Methodological*, *99*, 62–82. https://doi.org/10.1016/j.trb.2016.12.022

Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *Journal of Advanced Nursing*, *72*(12), 2954–2965. https://doi.org/10.1111/jan.13031

Lai, K. hung. (2004). Service capability and performance of logistics service providers. *Transportation Research Part E: Logistics and Transportation Review*, *40*(5), 385–399. https://doi.org/10.1016/j.tre.2004.01.002

Laucirica, J. (2020). *Disruptive technologies in last mile delivery*. https://www.linkedin.com/pulse/crowdshipping-next-big-thing-logistics-jorge-laucirica

Le, T. V., & Ukkusuri, S. V. (2019). Modeling the willingness to work as crowd-shippers and travel time tolerance in emerging logistics services. *Travel Behaviour and Society*, *15*(April 2018), 123–132. https://doi.org/10.1016/j.tbs.2019.02.001

Li, Y., & Yu, Y. (2017). The use of freight apps in road freight transport for CO2 reduction. *European Transport Research Review*, *9*(3). https://doi.org/10.1007/s12544-017-0251-y

Liu, H., Pretorius, L., & Jiang, D. (2019). The construction of a crowdsourcing-based logistics network in rural China. *PICMET 2019 - Portland International Conference on Management of Engineering and Technology: Technology Management in the World of Intelligent Systems, Proceedings*, *0*.

https://doi.org/10.23919/PICMET.2019.8893791
Liu, J., Yuan, C., Hafeez, M., & Yuan, Q. (2018). The relationship between environment and logistics performance: Evidence from Asian countries. *Journal of Cleaner Production*, *204*, 282–291. https://doi.org/10.1016/j.jclepro.2018.08.310
Lozzi, G., Iannaccone, G., Maltese, I., Gatta, V., Marcucci, E., & Lozzi, R. (2022). *On-Demand Logistics : Solutions , Barriers , and Enablers*. 1–21.
Malaysian Communications and Multimedia Commission (MCMC). (2019). *Consumer Satisfaction Survey for Courier 2019*.
Mansor, M. F., Abdul Halim, H., & Hazlina Ahmad, N. (2018). Leveraging crowdsourcing practices in small and medium enterprises (Smes). *Journal of Entrepreneurship Education*, *21*(4).
Mladenow, A., Bauer, C., & Strauss, C. (2015). Crowdsourcing in logistics. *IiWAS '15: Proceedings of the 17th International Conference on Information Integration and Web-Based Applications & Services*, 1–8. https://doi.org/10.1145/2837185.2837242
Mohd Zawawi, N. F., & Abdul Wahab, S. (2018). Information Technology, Logistics Performance and Moderating Effect of Firm Size: Empirical Evidence From East Coast Region of Malaysia. *Journal of Nusantara Studies (JONUS)*, *3*(1), 87. https://doi.org/10.24200/jonus.vol3iss1pp87-102
Rai, H. B., Verlinde, S., & Macharis, C. (2018). Shipping outside the box. Environmental impact and stakeholder analysis of a crowd logistics platform in Belgium. *Journal of Cleaner Production*, *202*, 806–816. https://doi.org/10.1016/j.jclepro.2018.08.210
Rai, H. B., Verlinde, S., Merckx, J., & Macharis, C. (2017). Crowd logistics: an opportunity for more sustainable urban freight transport? *European Transport Research Review*, *9*(3), 1–13. https://doi.org/10.1007/s12544-017-0256-6
Ranard, B. L., Ha, Y. P., Meisel, Z. F., Asch, D. A., Hill, S. S., Becker, L. B., Seymour, A. K., & Merchant, R. M. (2014). Crowdsourcing--harnessing the masses to advance health and medicine, a systematic review. *Journal of General Internal Medicine*, *29*(1), 187–203. https://doi.org/10.1007/s11606-013-2536-8
Shaheen, S., Cohen, A., & Zohdy, I. (2016). Shared Mobility: Current Practices and Guiding Principles. In *Fhwa-Hop-16-022 2.* (Issue Washington D.C.).
Tan, Y., & Cheong, Y. L. (2018). Logistics in Malaysia Market overview and M&A trends. In *PricewaterhouseCoopers (Pwc)* (Issue October).
Wang, M. (2020). Assessing logistics capability for the Australian courier firms. *International Journal of Logistics Systems and Management*, *37*(4), 576–589. https://doi.org/10.1504/IJLSM.2020.111827
Wang, Y., & Sarkis, J. (2021). Emerging digitalisation technologies in freight transport and logistics: Current trends and future directions. *Transportation Research Part E: Logistics and Transportation Review*, *148*(March). https://doi.org/10.1016/j.tre.2021.102291
Yang, W., Zhou, Q., Fang, G., & Chen, C. (2019). Adapting Market Uncertainty in Digital Innovation Based on Adaptive Capability Configurations. *Technology Management in the WOrld Intelligent Systems*.
Yi, Z., Xiang, C., Li, L., & Jiang, H. (2020). Evolutionary game analysis and simulation with system dynamics for behavioral strategies of participants in crowd logistics. *Transportation Letters*, *00*(00), 1–15. https://doi.org/10.1080/19427867.2020.1783609
Yin, R. K. (2018). Case study research and applications: Design and methods. *Los Angeles, UK: Sage*.