Adoption of Parcel Locker in Malaysia: Literature Review and Research Agenda

Fara Adura Mohd Yusoff
Faculty of Industrial Management, Universiti Malaysia Pahang
Commerce Department, Politeknik Sultan Haji Ahmad Shah

Fazeeda Mohamad*, Puteri Fadzline Muhamad Tamyez
Faculty of Industrial Management, Universiti Malaysia Pahang
Email: fazeedamohamad@ump.edu.my

Siti Aisyah Panatik
Faculty of Social Sciences and Humanities, Universiti Teknologi Malaysia, Johor Bahru, Johor.

* Corresponding Author

Abstract

Purpose: This paper intends to establish conceptual frameworks and propose groundwork for empirical research in identifying factors that influence consumers' intention and adoption of parcel lockers. A conceptual framework was developed based on the Unified Theory of Acceptance and Use of Technology (UTAUT) construct, i.e., effort expectancy, performance expectancy, social influence, and facilitating condition. In addition, this study also seeks to propose the role of resistance to change in moderating the relationship between intention and adoption of parcel locker.
Methodology: The methodology used in this article is a literature review and conceptualisation of how UTAUT constructs could influence the intention and adoption of Malaysian consumers on the use of parcel lockers as last-mile delivery services. Thus, this paper used a conceptual approach that reviewed the article from journals, conference papers, and theses. Dimensions and measurements of the variables in this investigation were derived from previous studies and suggestions.
Findings: The expected findings of this study were to determine the most important factors contributing to the intention and adoption of parcel lockers among Malaysian consumers. Therefore, the relevant companies and government agencies can improve services and meet the needs and preferences of consumers to utilise parcel lockers, thereby expanding parcel locker usage in the future.
Research limitations/implications: The quantitative technique will be employed for this study, limiting researchers' ability to investigate beyond the factors that will be investigated.
Practical implications: The findings are expected to be useful to several parties, including courier companies, the government, and online sellers, in terms of future planning to increase the intention and adoption of parcel lockers in Malaysia.
Originality/value: This study proposed a conceptual framework for the factors affecting the intention and adoption of parcel lockers service, specifically in the Malaysian context.

Keywords: Last-mile delivery, Automated parcel locker, E-commerce, Intention, Adoption

Introduction

Year after year, e-commerce has seen a substantial surge in online purchases and has become widely accepted. E-commerce has dramatically changed businesses, especially for young people, developing countries, and small businesses. Since 2015, e-commerce has grown fast on a global scale, and the current COVID-19 pandemic has led to tremendous development in e-commerce (Bhatti et al., 2020). Around 4.9 trillion US dollars were spent on retail e-commerce sales in 2021. The rise of e-commerce was more significant during the COVID-19 pandemic because users are concerned about the risk of virus transmission when buying in stores or supermarkets, social distancing practices, and store closures during Movement Control Order (MCO). This amount is expected to grow by 50% over the next few years, and by 2025 expected to reach about $7.4 trillion (Statista, 2022). Malaysia is a desirable e-commerce market in South East Asia with a population of 32.7 million, of which 22.2 million are working-age people. Moreover, the e-commerce market in Malaysia is expected to record a 24.7% growth in 2020. The development of the e-commerce market for 2020 to 2024 is estimated at 4.3%, and it is expected that in 2024, the market will reach up to MYR51.6 billion (Global Data's E-Commerce Analytics, 2020).

The growth of e-commerce in Malaysia is driven by many factors, especially the increasing use of technologies such as the computer, internet, mobile phones, and the development of information communication and technology (ICT) services. In 2020, the percentage of individuals using computers in Malaysia was 80.0 %, and the internet was 89.6 %. Additionally, the number of smartphone users in Malaysia is expected to reach 29 million in 2021, and around 1.74 million users are expected to join by 2025. E-commerce in Malaysia began with the launch of eBay Malaysia in 2004. Then in 2007, Lelong.com.my was launched, the customer-to-customer (C2C) platform that receives over 9.56 million visitors monthly. Lelong is recognised for inventing the Malaysian e-commerce business and had market domination for a few years until being joined in 2011 by Fashionvalet.com and Mudah.my. Two prominent companies, Lazada and Zalora, boosted e-commerce in Malaysia and began operations in 2012, followed by Shopee in 2015. The advent of this e-commerce has further increased online buying activity and Malaysia's e-commerce market value.

Shifts in consumer lifestyle, from offline to online shopping and growing demand for products from other countries have increased worldwide parcel growth for businesses to consumers (B2C). Along with the positive response to online shopping, the volume of parcels has also experienced a significant increase. Table 1 shows Malaysia's domestic and international courier traffic from 2017 to 2021. There is a substantial increase in courier traffic, especially for domestic parcels. In 2017 the number of domestic parcels was 34.26 million, which will increase to 623.18 million in 2021(Malaysian Communication and Multimedia Commission, 2022). Based on the favourable response to online shopping, parcels is expected to increase in the upcoming year. Generally, e-commerce operations in the B2C market are reliant on home delivery.

Table 1: Courier Traffic

Year	Parcel (000)	
	Domestic	International
2017	34,260.5	4,915.9
2018	85,674.8	11,6102
2019	120,297.4	9,3167
2020	303,160.7	19,658.0
2021	623,178.2	31,185.6

Source: Malaysian Communications and Multimedia Commission (2022)

The emerging trends in e-commerce and the increasing volume of parcels have led courier providers to develop and implement innovative last-mile delivery approaches to overcome the constraints of traditional methods like home delivery. Home delivery is deemed incapable of adapting to development and challenges; thus, the current way of home delivery must be replaced with a more efficient and innovative one (Vakulenko et al., 2019). Currently, delivery companies are starting to promote and implement innovative last-mile delivery (LMD) to increase the efficiency of LMD and solve the problem related to traditional delivery. Mangiaracina et al. (2019) have identified several possible solutions to overcome home delivery, such as reception boxes, collection points, crowdsourcing logistics, drones, robots, and automated parcel lockers. Among several innovative last-mile delivery methods introduced, self-service technology, an automated parcel locker (later used as a parcel locker), is one of the most popular and widely used worldwide. Although the delivery service provider has made automated parcel lockers service available, the level of usage among consumers in Malaysia is not favourable as the supplier expected. For instance, from January 2021 to September 2021, the average use of PosLaju EziBox is only 23% (Pos Malaysia Berhad, 2021). Meanwhile, usage of Ninja Box for 2019 is lower behind other countries such as Singapore. As reported by Parcel Monitor, in 2019, only 5.8% of the parcel received by Ninja Van went to the collection point (parcelmonitor, 2020). This show that consumers prefer traditional delivery, which is home delivery.

As e-commerce increases, home delivery will rise. If this trend continues, there will be more delivery vehicles on the road, which could have adverse effects like road congestion and air pollution. Therefore, it is crucial to research consumers' intention and adoption of self-service technology, i.e., parcel locker, particularly in major cities like Kuala Lumpur and Selangor. Furthermore, to increase the quality of courier services, more pickup and delivery points and parcel lockers will be provided as part of the National Courier Accelerator Plan (PAKEJ) (MCMC, 2021). Recent years have seen an increase in researchers exploring consumers' acceptance of parcel locker delivery services. Most studies focused on the intention to use parcel lockers (C. Chen et al., 2020; Y. Chen et al., 2018; Mohamad & Ngah, 2022; Tsai & Tiwasing, 2021; Xueqin Wang et al., 2018; Yuen et al., 2018, 2019); other academic articles recognised the value co-create that motivate consumers' adoption of parcel locker (Xueqin Wang et al., 2019); study on the elements of consumers' value in a parcel locker (Vakulenko et al., 2017); study on factors affect consumer behaviour towards self-service parcel delivery (Zhou et al., 2020); and research on consumers preference of delivery services (Oliveira et al., 2017). However, most of the studies on automated parcel lockers were conducted in other countries, and minimal studies have been conducted in Malaysia. In

addition, most research emphasises the factors influencing consumers' intention to use parcel lockers. Still, none considered resistance to change as a moderating variable affecting the relationship between intention and adoption of parcel locker. In light of the abovementioned issues, this study sought to establish a framework that can clarify the consumers' intention and adoption of parcel lockers and demonstrate the role of resistance to change in moderating the relationship between intention and adoption of parcel lockers as an LMD service in Malaysia.

Literature Review

Issues in Last-Mile Delivery

The explosive growth of e-commerce cannot be separated from the offline support of logistics services. The rapid use of the internet and e-commerce has made the express delivery industry gain the attention of online sellers and customers and become a part of people's lives for several decades (Farooq et al., 2019). Due to the advent of e-commerce, online retailers and last-mile delivery (LMD) companies are also dealing with a variety of challenges in managing B2C, including pressure on delivery times, consumer expectations for service levels, high transportation costs, and environmental effects (Thi Huong & Ngoc Thiet, 2020). Apart from that, the other major challenge in LMD service in managing B2C is ensuring packages are delivered quickly and cheaply (Yuen et al., 2019). The providers must choose the appropriate delivery modes to deliver fast, reduce cost, and improve services. There are three primaries of LMD modes which are attended home delivery (parcel directly sent to the doorsteps of consumers), unattended delivery (parcel is left at the premises specified by the consumer), and delivery at pickup location (parcel is left at pickup points such as lockers, shop, supermarkets or post office) (Nguyen et al., 2018).

For over one decade, the issue of LMD, especially home delivery, has been discussed among western and eastern scholars. Numerous academics concur that LMD, also referred to as the "last stretch" of product delivery, is the most crucial logistical stage for delivering goods purchased online to the end consumer (Lim et al., 2018) and has become one of the blockage in e-commerce (Xuping Wang et al., 2014; Y. Zhang et al., 2019). One of the problems with responding to a growing online order is that the order usually comes from a different location, involves a few meters and a few kilometres, and is generally derived by a tight time window (Gharehgozli *et al.*, 2017). Therefore, LMD is considered one of the critical parts for e-business and courier companies as it consumes the largest amount of time and cost for the entire logistics operations and involves issues relating to the logistics service's efficiency (Zhang *et al.*, 2016). Nonetheless, LMD is currently regarded as one of the most costly, inefficient, and polluting components of the entire supply chain (Manerba et al., 2018) and e-commerce activity (Ranieri et al., 2018). LMD costs account for between 28 to 75 % of overall supply chain costs, estimated to be between 30% and 40 %.

As a result, last-mile logistics is said to be the least effective segment of the entire supply chain (Olsson et al., 2019; Y. Wang et al., 2016). As such, home delivery services involve a lot of time and cost in the entire logistics operation and become the most critical problem affecting the efficiency of logistics services. The emphasis on quick delivery terms will prevent routing and grouping parcels efficiently (Savelsbergh & Van Woensel 2016).

Therefore, transporting the finished product directly to consumers' doors is logistically difficult, inefficient, and costly. The need for a customer's presence during the delivery process is another factor in the inefficiency and inflexibility of home delivery. Previous research has demonstrated that the failure of the first-time delivery is due to the receiver not being present at the delivery address. (Morganti et al., 2014; Song et al., 2009; Van Duin et al., 2016; Viu-roig & Alvarez-palau, 2020; Zenezini et al., 2018). Referring to data from Pos Malaysia Berhad, failed deliveries rose from 29% in 2020 to 32% in 2021 (Pos Malaysia Berhad, 2021). Most deliveries are made during office hours, and the recipient, especially those who work typically not at home when the delivery is made. As a result, the parcel failed to deliver, and customers needed to wait more days to get it. Failed delivery causes delays for consumers to receive their parcels and forces the company to reschedule parcel deliveries, which incurs additional costs and delivery trips.

Moreover, LMD is frequently associated with environmental concerns. Road transport is the most frequent form of transportation, which can impact system sustainability, particularly in financial and environmental terms (Lazarević & Dobrodolac 2020). LMD usually entails smaller volumes and frequent stops (Brown & Guiffrida 2014). From a broader perspective, the booming of e-commerce significantly increases road freight and home delivery, notably in cities (Oliveira et al., 2017). In the context of Malaysia, the rise in the number of courier vehicles is tremendously increasing significantly for delivery vehicles such as motorcycles, cars, and vans. Among the courier vehicles, a very significant increase is for cars, with 540 units in 2018 and 39,694 units in 2021. Meanwhile, motorcycles increased from 13,354 units in 2018 to 51,821 in 2021 (Malaysian Communication and Multimedia Commission, 2022). An increase can also be seen for courier vehicles such as vans and trucks. More deliveries and more movement of delivery vehicles cause traffic and pollution on the roads and in the environment.

Parcel Locker in Malaysia

An automated parcel locker is the service point for the self-collection service, and this technology has been used for storing and managing online parcels. It is also known as an automated delivery station, collects and delivery points (Kellie Oliveira et al., 2017), a smart locker, and an automated parcel station (APS). Parcel locker has been recognised as a safe, economical, and convenient package delivery and retrieval system. It is suitable to locate in apartment complexes, retail businesses, commercial areas and higher education campuses (Chen et al., 2020). Usually, users will be notified and receive a one-time password (OTP) to enable them to retrieve their parcel. Using this innovative self-service delivery, consumers can also receive and send their parcels at their preferred location and convenience, especially since it operates 24 hours a day and seven days a week.

Furthermore, consumers can dramatically lower opportunity costs by picking the time and location for the pickup of the items, i.e., at any time of the day, at their convenience (Deutsch & Golany, 2018; Mostakim et al., 2019). Meanwhile, from the service provider's point of view, a parcel locker enables last-mile service providers (LSPs) to deliver packages in shorter trips by reducing failed deliveries. E-commerce and online shopping boost the worldwide smart parcel locker market from $718.0 million in 2021 to $1,630.2 million in 2028 at a 12.4% CAGR (Statista, 2021). This projected number indicated that more parcel locker services would be used as an option for home delivery services.

Courier service providers in Malaysia are also interested in using parcel lockers as last-mile delivery services. In 2016 Pos Malaysia started providing parcel locker services known as Pos Laju EziBox. However, in the beginning, parcel locker service was only available at 60 locations in four selected states: Kuala Lumpur, Selangor, Johor, and Terengganu. Currently, there are 170 units of Pos Laju EziBox at 166 locations throughout Malaysia. Besides that, Ninja Van Sdn Bhd also offers a parcel locker service known as NinjaBox, located at the LRT station for the route of Puchong to Ampang and Gombak. Online shoppers also can use parcel locker services provided by other companies such as PopBox, Parcel 365, and BOXiT.

Prior Theories and Model on Technology Acceptance

Several theories and models are available for researchers in technology acceptance studies. Among them is the Theory of Reasoned Action (TRA), the Theory of Planned Behaviour (TPB), the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT). Fishbein and Ajzen (1975) devised a theory to explain how people use information technology (IT) and called it a theory of reasoned action. Three factors can be used to describe how people act. It consists of; attitude (good and bad feelings that people have regarding performing in each way), subjective norm (social impact), and intention (the choice of whether or not to participate in a particular behaviour). Subsequently, perceived behavioural control (PBC) was added as a new construct. The model was named as Theory of Planned Behaviour, with three main components that impact people when doing something: behavioural control, subjective norms, and behavioural attitudes. Next, Davis (1989) proposed a technology acceptance model based on the TRA. TAM discusses how individuals accept and use technology and is frequently used in studies related to technology acceptance. It has been tested in various ways to see if it works for different types of technology adoption. Venkatesh et al., (2003) have integrated and simplified constructs from multiple theories into one model based on the shortcomings and similarities observed in earlier theories. The integrated model is the unified theory of acceptance and use of technology (UTAUT). The model can understand people's desire to use information systems and their subsequent behaviour. UTAUT is an extension of the TAM, and previous studies have shown that it can explain technology acceptance.

Underlying Theory of the Study and Conceptual Framework

This study is based on UTAUT, which is a model resulting from a combination of several theories and well-known models in technology acceptance, such as the theory of reasoned action (TRA), the technology acceptance model (TAM), TAM2, the theory of planned behaviour (TPB), a combination of TAM and TPB (C-TAM-TPB), innovation diffusion theory (IDT), motivational model (MM), Model of PC utilisation (MPCU), and the social cognitive theory (SCT). In general, UTAUT proposed that the intention of using technology is affected by four components that directly predict behavioural intention and, ultimately, usage behaviour: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). Meanwhile, this model also predicts gender, experience, age, and voluntariness play a moderating role in various relationships of the model (Venkatesh et al.,2003).

Since its introduction, UTAUT has been one of the most extensively cited theories in the technology adoption literature. However, this theory is not without criticism. UTAUT

has been criticised and claimed to be difficult, and some studies that employed it did not use it in its original form. UTAUT has also been reported to have reached a saturation point, with no or little new information obtained (Blut et al., 2021). However, there are some strengths of UTAUT compared to other technology acceptance theories. Among them are UTAUT has been claimed to be able to offer more comprehensive insight (70%) on individual differences in the use of technology compared to other models and theories (50%) (Venkatesh et al., 2003). Besides that, UTAUT has also been proven suitable for utilised in Various fields of study and with different technologies such as information technology (Venkatesh et al., 2003), learning management systems (A. Khan & Qudrat-Ullah, 2021), the use of apps (Duan & Deng, 2021; Wut et al., 2021), electronic and mobile healthcare (Ben Arfi et al., 2021; Hoque & Sorwar, 2017; Rahi et al., 2021), drone (Holzmann et al., 2021; Liu et al., 2020), e-wallet (Yang et al., 2021), mobile banking (Rahi & Abd. Ghani, 2019), etc. In addition, a meta-analysis on UTAUT reported that UTAUT still provides a variety of opportunities for theoretical advancement, especially with the extension of new variables and moderators suitable for study contexts (Blut et al., 2021).

The use of UTAUT in the current study is considered suitable as parcel locker is self-service technology and one of the innovative ways to deliver items in last-mile delivery. As mentioned earlier, UTAUT has been used in different technology acceptance studies over the year. PE, EE, SI, and FC factors were predictors impacting behavioural intention and technology usage. In this study context, to use a parcel locker, consumers need to use a mobile phone; some require the user to download an available application. Users must also enter a personal identification number(PIN) or scan a quick response (QR) code to retrieve the parcel from the locker. Thus, using a parcel locker is related to self-service technology, and UTAUT is suitable for this study context. By implication, using UTAUT would enable logistics, courier service providers, and other interested parties to discover what factors drive consumer behavioural intentions and use of self-service technology, namely parcel locker.

Framework of the Study and Hypotheses Development

Previous literature shows most studies only focus on factors influencing the intention and use of parcel lockers. There is a lack of research that looks from the perspective of consumer reluctance to make changes in last-mile delivery services. Although there are several modes to deliver products to consumers, as reported by several researchers, globally, traditional last-mile delivery (home delivery) remains the most preferred delivery method among consumers (Zhang, Zhu, and Ye 2016; Yuen et al. 2018). As depicted in Figure 1, the study's conceptual framework refers to UTAUT theory. This study explains the relationship between UTAUT variables to use the parcel locker and between intention and adoption. As Blut et al. (2021) suggested, researchers can use the moderator results to determine whether specific predictors are more significant than others in different settings. Thus, the framework of the study also proposed a moderator between the intention and the adoption of parcel lockers.
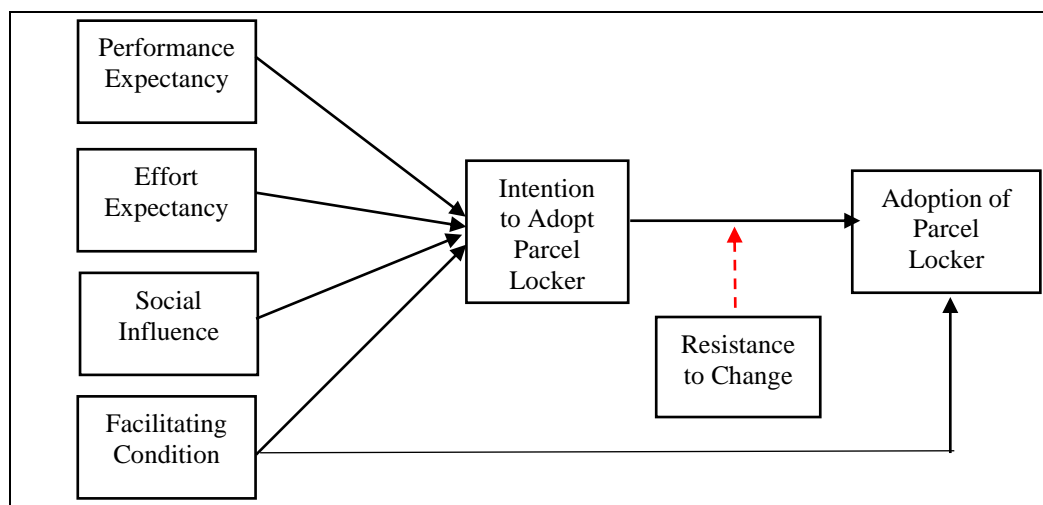
Figure 1: Conceptual Framework of the Study

Performance expectancy (PE) is how much a person thinks using a certain system would help them do their job better Venkatesh et al. (2003). In this current study, performance expectancy would be operationalised as the degree to which consumers feel utilising parcel lockers will help them receive and send express parcels more easily (Venkatesh et al., 2003). The performance expectancy dimension, adapted from previous studies (Zhou et al., 2020), measures flexibility, convenience, cost-effectiveness, and pleasure. The last-mile delivery study discovered that performance expectancy positively predicts consumers' desire to use self-delivery services (Zhou et al., 2020). In other technology acceptance studies, performance expectancy is claimed to influence the intention to use e-healthcare, mobile learning, autonomous delivery vehicle, and express delivery services (Ben Arfi et al., 2021; Chao, 2019; Kapser, 2019; Zhong et al., 2021). The following hypothesis is highlighted:

H1: *Performance expectancy positively influences consumers' intention to adopt parcel locker services.*

Effort expectancy (EE) is related to how simple to operate the system (Venkatesh et al.,2003). Hence EE variable is operationalised as the extent of ease related to receiving and delivering parcels using a parcel locker. Effort expectancy has four dimensions adapted from an earlier study by Zhou et al. (2020), which included the ease of use, picking, mailing, and operating of the parcel locker. Expectations of effort are connected with the belief that technology is accessible and has a positive impact on the intention to use technology in a variety of areas of study: mobile applications (Wut et al., 2021), self-service (Zhou et al., 2020), and a study on workers' intention to use exoskeletons (Elprama et al., 2020). This self-service technology, related to the parcel locker setting, requires customers to participate and exert effort in the last-mile delivery process. They must go to the parcel lockers, enter the code or PIN, retrieve the parcel, and take it home. However, using this self-service technology is simple and does not require significant technological knowledge. Furthermore, for this study, the ease of using technology, specifically parcel lockers, is expected to significantly impact consumers' intention to utilise the technology. Therefore, the following hypothesis was formed:

H2: *Effort expectancy positively influences consumers' intention to adopt parcel locker services.*

Meanwhile, social influence refers to the level to which consumers think that important people believe they need to utilise technology. In this context, social influence operationalises to the extent that consumers believe their family or friends think they should use a parcel locker as a delivery option. In this context, users must consult with their social circle (family or friends) before using self-service technology, parcel locker, instead of home delivery. Likewise, social influence denotes the effect of environmental factors that motivate customers to buy or sell new items (Venkatesh et al., 2012). This variable is measured by four dimensions adapted from (Venkatesh et al., 2003; Yang et al., 2021) that include important people's influence on parcel lockers' use. Social influence also favours behavioural intentions to utilise technology at work (Venkatesh et al. 2003). In last-mile delivery studies, social influence has been found to influence the intention to use autonomous vehicles and self-service delivery services (Kapser et al., 2021; Kapser & Abdelrahman, 2020; Zhou et al., 2020). Some studies also stressed the importance of social impact in influencing the acceptance of new technologies: drone delivery (Liu et al., 2020), learning management systems (Raza et al., 2021), tablet menus in the restaurant (Garg, 2021), and mobile technologies (Hu et al., 2021). Accordingly, the research hypothesis is stated as follows:

H3: *Social influence positively influences consumers' intention to adopt parcel locker services.*

Meanwhile, facilitating conditions refer to how individuals perceive that the technological and organisational infrastructure facilitates system usage (Venkatesh et al.,2003). Thus, for this study, facilitating conditions are operationalised as the extent to which consumers feel that an organisational and technological infrastructure enables parcel lockers. This variable is measured by guidance, information required, assistance, online system compatibility, and information provided by service providers. Everyone is believed to have varying levels of access to information to facilitate the use of technology. Consumers also differ in technology and mobile gadget generation (Venkatesh et al., 2012), which significantly affects the exposure to the technology used. Numerous studies have used UTAUT and verified that facilitating conditions affect how people use technology (Hossain et al., 2019; Palau-Saumell et al., 2019; Shahbaz et al., 2021). In the last-mile delivery setting, several studies have confirmed that a positive perception of the facilitating condition affects the consumers' acceptance and use of technology. For example, self-service technology (Zhou et al., 2020) and autonomous delivery vehicles (Kapser & Abdelrahman, 2020). Thus, facilitating condition variables is expected will influence the intention and adoption of parcel locker as hypothesised below:

H4: *Facilitating condition positively influences consumers' intention to adopt parcel locker services.*
H5: *Facilitating conditions positively influence consumers' adoption of parcel locker services.*

There are two dependent variables which are intention and adoption of parcel locker. The intention to adopt parcel lockers refers to consumers' likelihood of using them as a last-mile delivery option and using them in their daily lives. This variable was measured by a construct adapted from Venkatesh et al. (2012) and (Zhou et al. (2020). Empirically, the intention has been proven positively influence the adoption of self-service delivery in the last-mile study (Zhou et al., 2020) and other technology acceptance studies such as mobile

banking (Alalwan et al., 2017), mobile apps (Wut et al., 2021), mobile payment system (T. Oliveira et al., 2016). Meanwhile, adoption refers to the difference consumers make by using parcel lockers instead of home delivery. The dependent variable adoption's dimensions are adapted from previous studies (Zhou et al., 2020) and relate to the use of parcel lockers.

> *H6: Intention to adopt parcel locker positively influence the adoption of parcel locker.*

The moderating variable resistance to change is operationalised as consumers' reluctance to switch from standard home delivery to self-service technology or parcel locker services. This variable was measured by a construct adapted from Bhattacherjee & Hikmet, (2007). Previous studies reveal that resistance may influence users' intention to adopt or not to adopt the technology (Bhattacherjee & Hikmet, 2007; Guo et al., 2013; Hoque & Sorwar, 2017; Hossain et al., 2019; Kim & Kankanhalli, 2009). Additionally, resistance to change moderates the relationship between the intention and adoption of technology in the healthcare industry (Shahbaz et al., 2019). In this study context, consumers might resist changing how they receive their parcels as parcel locker delivery service differs from how they usually receive their parcels. Hence, this study intends to explore whether the strength between intention and adoption could be moderated by resistance to change. Accordingly, the research hypothesis is stated as follows:

> *H7: The relationship between behavioural intentions and adoption of parcel locker services are moderated by resistance to change.*

Methodology

This current article reviewed the UTAUT theory and an empirical investigation to construct the recommended framework. Articles, theses, and conference papers were reviewed and examined during the conceptual framework development. So, the method used in this research is a review of the literature and conceptualising how the UTAUT construct affects the decision to use parcel lockers as last-mile delivery services. The underlying theory is based on past research and reviewed to explain the relationship proposed in the study's framework.

Discussion and Suggestions for Future Research

This study is pertinent due to the necessity of last-mile delivery services to e-commerce consumers. Thus, many delivery companies worldwide have used innovative last-mile delivery, such as parcel lockers, to improve productivity in handling parcels and delivery processes. Although the development of parcel locker technology benefits various parties, it still faces problems (Lin et al., 2019) and mainly because of limited consumer expectations (Chen et al., 2018; Zhou et al., 2020). The utilisation rate of parcel lockers among consumers in Malaysia is somewhat less encouraging. Despite being available since 2016, few individuals are aware of or use this self-service option. Issues in last-mile delivery, such as the inefficiency and inflexibility of home delivery, increasing parcels, and delivery vehicles, must be handled seriously. These will impact the quality of last-mile delivery services and bring social and environmental effects such as road congestion and environmental pollution.

This rising issue further shows the need for innovative last-mile delivery to achieve efficient and sustainable operation while providing good quality last-mile delivery services. Therefore, it was appropriate to analyse the elements that influence or drive the intention and adoption of parcel locker, as it is one of the best solutions for last-mile delivery, especially in the urban area.

Specifically, this study aims to determine factors influencing the intention and adoption of parcel lockers and whether resistance to change can impact the relationship between intention and adoption among Malaysians. And once this relationship is established, it will guide related stakeholders such as courier companies, parcel locker providers, government, and related agencies. The findings from this study are expected to help relevant parties implement planning, strategies, and appropriate actions, such as programs or intervention activities, to increase user acceptance and use of parcel locker services. This study benefits researchers and stakeholders in Malaysia and provides helpful information to global researchers and related parties. Besides that, this study not only enriches the literature on UTAUT in the last-mile delivery context but also can test the usability of UTAUT in Southeast Asia countries, specifically Malaysia. As discovered from the literature, most of the study on last-mile delivery that applies UTAUT is outside Malaysia. Factors influencing the intention and adoption of parcel lockers might differ in Malaysia and other countries. This study also would serve as an eye opener for the e-commerce, courier industry, and parcel locker providers to explore new business opportunities through parcel locker services.

Based on the review, this article also comes with a suggestion for future research. Most of the previous studies applied quantitative methods and cross-sectional studies. Future studies are proposed to use other research methods, such as mixed methods (MM) and multilevel mixed-method research designs (MMMRDs). Combining qualitative and quantitative research techniques makes producing complex and reliable results possible. In the meantime, MMRDs are frequently employed in numerous investigations, particularly psychological studies. MMRD collects data at several levels of analysis and combines quantitative and qualitative research. Future studies could examine the relationship between organisational and individual levels in parcel delivery services. More significantly, several opportunities for future research might include longitudinal investigations. The review found that most studies applied cross-sectional studies to examine the intention and adoption of technologies. These might deal with some of the limitations of typical method bias. Therefore, conducting a longitudinal study can overcome the issues of common method bias and enable the researcher to examine the effect of intention on adoption in a certain period.

The framework can be enhanced by working with the courier firm and testing other variables such as promotions, discounts, etc. Blut et al. (2021) suggest adding other factors to UTAUT frameworks, such as personal innovativeness, technology compatibility, education, and cost. The framework may identify additional elements that can act as a mediator in influencing the intention of the parcel locker. Besides that, it is also beneficial to locate moderator variables that can strengthen the relationship between the intention and adoption of parcel locker.

Conclusion

This article explored the LMD's concerns and challenges regarding the social and environmental sustainability system. The earlier section of the article discussed the nature

and percentage of consumers who use parcel lockers. With the rise in e-commerce and the increasing number of parcels, Malaysia needs improvement and innovative last-mile delivery services. Thus, consumers' acceptance of self-service parcel locker technology is crucial. As a study guide, the conceptual framework addressed the specified variables and their measurement construct. The significant contribution of this paper is the new framework developed that incorporates resistance to change as a moderator between the intention and adoption of parcel locker. Resistance to change is infrequently used in last-mile delivery research, particularly in the moderator function. Most of the studies focus on the intention of using parcel lockers. However, the studies on resistance to change are essential, mainly because using parcel lockers is a new way of delivering services. Consumers must actively participate in the delivery process instead of just waiting at home. Thus, they might resist accepting these new innovative delivery services. In terms of theoretical contribution, this article fills more existing literature on last-mile delivery, especially in the Malaysian context. In addition, they are adding resistance to change as a moderator variable provides opportunities to test whether the proposed variable impacts the UTAUT model. This study will better understand the factors impacting the intention and adoption of parcel lockers. The article generally serves as a basis for future research in innovative last-mile delivery, specifically in parcel locker services.

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