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Will You Pick Me? From Home to Parcel Lockers Delivery

Fara Adura Mohd Yusoff
Faculty of Industrial Management, Universiti Malaysia Pahang Al-Sultan Abdullah, Lebuh Persiaran Tun Khalil Yaakob, 26300, Gambang, Kuantan, Pahang, Malaysia

Commerce Department, Politeknik Sultan Haji Ahmad Shah, Pahang, Malaysia

Fazeeda Mohamad*, Puteri Fadzline Muhamad Tamyez
Faculty of Industrial Management, Universiti Malaysia Pahang Al-Sultan Abdullah, Lebuh Persiaran Tun Khalil Yaakob, 26300, Gambang, Kuantan, Pahang, Malaysia

Email: fazeedamohamad@umpsa.edu.my

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

**** Corresponding Author***

Abstract
Purpose: This study examines the impact of innovativeness and green knowledge on influencing consumers' intentions to use parcel locker services.
Design/methodology/approach: This study applied a cross-sectional approach, and data were collected through an online questionnaire. This study applied a non-probability sampling technique and got 268 usable data for analysis. Data were analysed using Smart PLS Version 4.0.
Findings: The findings reveal that innovativeness and green knowledge significantly impact consumers' intentions to adopt parcel locker services and play an important role in influencing the intention to use parcel lockers.
Research implications: This study enhanced the body of knowledge, especially on the impact of innovativeness and green knowledge on the consumer inclination to use parcel locker services.
Practical implications: The study's findings help parcel locker service providers and related parties better understand consumers' intentions to use parcel lockers. Additionally, the study aids practitioners in developing more effective strategies to influence the intention and subsequent use of parcel lockers in Malaysia.
Originality/value: The study's findings allow stakeholders to launch appropriate strategies for the target consumers to increase their intention to use parcel lockers and, in turn, switch to parcel locker services instead of home delivery.

Keywords: Last-mile delivery, Innovativeness, Green Knowledge, Parcel Locker, Intention.

Introduction

The rapid growth of e-commerce has significantly impacted last-mile delivery. This final delivery stage, from the distribution centre to the end consumer, presents challenges, particularly in meeting the demand for faster, more reliable, and flexible delivery options.

Based on the positive rise in e-commerce trends, it is estimated that the number of parcels will continue to increase over time. Subsequently, more home deliveries need to be performed by courier companies. The World Economic Forum (2020 expected global demand for LMD services to increase by 78% by 2030 (Delosion et al., 2020).

Changes in consumer behaviour, from offline to online shopping, have driven significant global parcel growth in the business-to-consumer (B2C) sector. This positive trend in online shopping has led to a notable increase in parcel volume. Malaysia's domestic and international courier traffic from 2017 to 2023 showed a substantial rise, particularly in domestic parcels. In 2017 domestic parcels numbered 34.26 million, surging to 853 million in 2023 (Malaysian Communication and Multimedia Commission, 2024). Given the favourable response to online shopping, parcel volumes will continue to increase in the coming years. Overall, e-commerce operations in the B2C market heavily depend on home delivery.

Home deliveries usually take place during office hours, when most of the recipients are not present. This results in unsuccessful delivery attempts, which cause inconvenience to the recipient because they need to wait for a second delivery attempt or later need to collect the parcel at the collection centre. Furthermore, a lot of homes lack safe, designated delivery sites, which increases the possibility of products being left in insecure areas and stolen. Most courier services now employ electronic proof of delivery (ePOD) systems to replace paper with digital copies to address this issue. Real-time delivery information is captured and transmitted via the ePOD system using smartphones and tablets. The use of ePOD allows courier services to complete the delivery by leaving parcels at consumers' locations even if recipients are not present during the delivery. Although using the ePOD system improved delivery efficiency, some other issues arose. For instance, consumers complain about the loss and damage of goods due to theft and exposure to rain. As reported by the Postal Forum (2023), there are complaints received from consumers related to poor delivery, delayed delivery, and loss of goods.

Parcel locker is a self-service system that is widely used and offers a more convenient and flexible service where users can pick up their parcels according to their preferred time and location. This solution reduces the possibility of theft and missing deliveries while also improving client convenience. Parcel lockers are useful in mitigating parcel theft because they offer a safe place to keep parcels until picked up (Faugere & Montreuil, 2020; Janjevic et al., 2019). Additionally, to retrieve parcels from the parcel locker, users need to enter a consignment number or password provided. This ensures the parcel's safety, which is taken by those entitled to it. However, Malaysian consumers' acceptance of parcel locker service is not as positive as the service provider expected. As reported by Pacer Monitor (2020), the use of parcel lockers in Malaysia is left behind compared to other countries such as Singapore.

In line with Malaysia's attempts to cut carbon emissions, the use of parcel lockers is seen as one of the good strategies to guarantee effective resource utilisation. Malaysia has achieved progress on its emission reduction targets; according to the Net Zero Readiness Index (NZRI) (KPMG, 2021), the country ranks 21st regarding greenhouse gas emissions. There is a need for more studies on consumer acceptability of parcel locker services because of the growing demand for last-mile delivery (LMD) services and the potential for parcel lockers to cut CO2 emissions and reduce traffic congestion. Hence, this study is conducted to investigate the factors influencing Malaysian consumers' intention to use parcel locker services.

Literature Review

Intention to Adopt Parcel Locker Services

The desire of customers to integrate parcel locker delivery as a daily activity and use it as a delivery option is known as behavioural intention. This also concerns how users plan to use gadgets, linked items, or technology. According to Venkatesh and Davis (2000), behavioural intention is one of the main mediators between system acceptance predictors. People's actions are determined by their intentions (Ajzen & Fishbein, 1980), and numerous studies have discovered a strong correlation between usage and behavioural intention (Davis, 1989). As a result, behavioural intention is the first stage in forming a new habit or usage. Adoption of technology is really about people's unique intentions, or how much they want to use it, and intention is a good indicator of how frequently they will use it.

Ajzen and Fishbein (1975) established that intentions are a crucial factor in behaviour. According to Ajzen (1991), behavioural intention in the context of the Theory of Planned Behaviour (TPB) refers to an individual's voluntary attempt or the amount of effort they plan to put into engaging in the behaviour. Behaviour can act as a control, dependent, and independent variable in a behavioural study. In investigating how people accept new technology, behavioural intention and behaviour have been included as dependent variables in several studies (Davis et al., 1989; Taylor & Todd, 1995; Venkatesh & Davis, 2000).

Innovativeness to Adopt Parcel Locker

Numerous studies have examined the impact of innovativeness on compatibility and have successfully demonstrated important relationships between these factors. According to Oliveira et al. (2016), users are more inclined to mobile payment technologies when they exhibit higher levels of innovation. Rahi and Ghani (2018) emphasised how important innovation is and how much it affects how compatible customers are with online banking. Furthermore, Talukder et al. (2018) asserted that users are more likely to be interested in new technology, particularly fitness wearables, if they exhibit higher innovativeness. Wang & Lin (2021) examine the effect of the perceived usefulness of online learning systems. In this study context, consumers are more likely to understand the potential benefits of using an innovative solution such as a parcel locker to improve their delivery experience, such as faster delivery times, real-time tracking, and flexibility. The capacity to perceive the benefits of using parcel lockers fosters a sense of compatibility with parcel locker technology.

H1: Innovativeness influences the intention to adopt the parcel locker

Consumers' Green Knowledge to Adopt Parcel Locker

Logistics firms were driven to adopt more sustainable solutions in last-mile delivery due to the increasing growth of e-commerce and the impact of stakeholders. Ignat and Chankov (2020) categorise these solutions in two ways: either (i) operational measures, or (ii). They are influencing online consumers to adopt more sustainable behaviours. Compared to larger vehicles, home delivery uses more light cars and produces more greenhouse gas emissions. Collection points are proposed as a more sustainable and environmentally friendly alternative to delivery at home (Rai et al., 2021). In actuality, parcel locker services can be seen as green initiatives, and the decision to use them depends on how knowledgeable customers are about environmental issues. Environmental awareness is crucial in influencing consumers' decisions when they buy green items, and it has often been assumed that it influences their intention to engage in green consumer behaviour. Zameer and Yasmeen (2022) also revealed that consumers' green knowledge significantly influences the intention to use green products.

A study by Rejikumar (2016) was conducted in the Indian state of Kerala, where customers' intentions to make green purchases are significantly influenced by their level of eco-literacy. Kader et al. (2022) discovered that customers' pro-environmental mindset substantially impacts behavioural intention in green last-mile adoption. Customers' awareness of

environmental issues may be critical in this study since they have not yet been educated about and shown the potential advantages of the package locker service. The effects of LMD activities on the environment, such as externalities and carbon footprint, may be known to those with green expertise.
H2: Consumers' Green Knowledge influences the intention to adopt a parcel locker.

Research Framework
The study's research framework has been developed based on the literature, as shown in Figure 1.

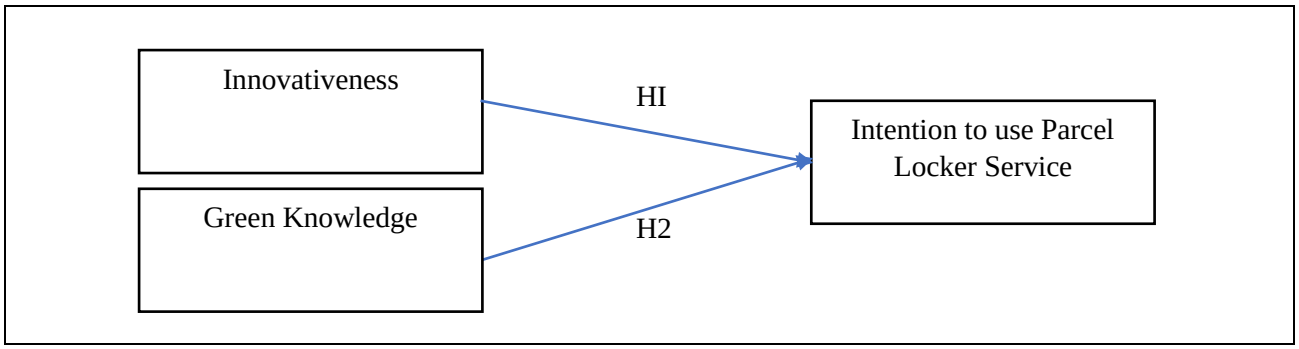

Figure 1: Research framework

Methodology of the Study
The study employed a quantitative strategy to address the research objectives. This approach was used to examine how the variables related to one another. This study assessed the conceptual model using the correlation between variables. The instruments of this study were adapted from previous researchers. A five-point Likert scale was used for innovativeness, green knowledge, and intention to adopt parcel locker. Academicians and two industry practitioners were asked to evaluate the instrument items as part of a pre-test during development. A non-probability technique called purposive sampling was applied to acquire data for this study. This research employs individual online consumers aged 18 to 65 as the unit of analysis since it focuses on consumers' intention to use parcel locker technology.
Google Forms was used to gather data for this study. Google Forms suits this study, especially because the respondents reside in a vast geographic area. Five hundred thirteen questionnaires were distributed to respondents through email, WhatsApp, or Telegram. There is are 52.2% response rate on the 513 completed questionnaires. Ultimately, 268 questionnaires were usable for this study.

Findings
The statistical program PLS-SEM was utilised to evaluate the proposed model. SmartPLS was employed to examine the causal links between the components (Hair et al., 2017). A two-step procedure was used to evaluate the hypotheses: first, a measurement model was used to assess the measuring tools' validity and reliability, and then a structural model was used to assess the developed hypothesis. The measurement model was evaluated by examining the value of outer loadings, composite reliability (CR), and average variance extracted (AVE). As suggested by Hair et al. (2017), the value for AVE should be >0.5, the CR should be >0.7, and the outside loadings should be >0.4. All the outer loading, CR, and AVE fulfil the minimum recommended value for this study. The results of the assessment measurement are exhibited in Table 1.

Table 1: Convergent Validity

Construct of Study	Item code	Measurement Item	Loading	CR	AVE
Behaviour Intention	T1BI1	I intend to use a parcel locker in the future	0.888	0.962	0.834
	T1BI2	I anticipate using a parcel locker in the future	0.917		
	T1BI3	I plan to use a parcel locker in the future	0.933		
	T1BI4	I will adopt a parcel locker to pick up or send packages.	0.918		
	T1BI5	I will always try to adopt a parcel locker in my daily life.	0.910		
Green Knowledge	T1GR1	I know that using a parcel locker can reduce carbon emissions.	0.928	0.947	0.782
	T1GR2	I am aware that the use of parcel lockers provides benefits to the environment.	0.945		
	T1GR3	I am aware that, over time, utilising a parcel locker system can be more sustainable.	0.947		
	T1GR4	I know there can be fewer negative externalities when using parcel locker services.	0.758		
	T1GR5	I know that current delivery methods (e.g., motorcycle, car or van) can lead to environmental pollution.	0.827		
Innovativeness	T1INNO1	When an innovative service becomes available, I am one of the first people among my friends to use it.	0.902	0.948	0.822
	T1INNO2	I will be interested enough to test a new service if I hear about it.	0.888		
	T1INNO3	I am the pioneer in my social group, discovering innovative service offerings.	0.929		
	T1INNO4	I like to experiment with the new innovative service offering	0.906		

After completing the convergent validity test, it is necessary to implement discriminant validity. To assess the discriminant validity, Franke and Sarstedt (2019) suggested that the Heterotrait-Monotrait Ratio (HTMT) must be less than 0.85. The HTMT values for this study were below the given value, proving that the discriminant validity is unaffected.

Table 2: The Result of Discriminant Validity: HTMT

	BI	GR	INNO
BI			
GR	0.656		
INNO	0.695	0.535	

The hypothesis result is displayed in Table 3 for innovativeness with a standardised β of 0.317, a p-value of 0.000, and a confidence range ranging from 0.217 to 0.412. This finding validated the hypothesis that innovativeness positively influenced behavioural intention.

Meanwhile, green knowledge has a standardised β of 0.194, 0.000 for p-value, and confidence between 0.112 to 0.279. This finding validated the hypothesis that green knowledge positively influences behavioural intention. The R^2 values for innovativeness are 0.165 and 0.065 for green knowledge. Cohen (1992) asserted that the assessment of f^2 shows how much an exogenous variable contributes to an endogenous variable. According to Hair et al. (2017), there are three values of f^2: Ranging from 0.02 for small, 0.15-0.34 for medium, and ≥0.35 for large. The effect size for green knowledge was medium, with a value of 0.165.

Table 3: Results of Hypotheses Testing

Path	Std. Beta	Std. Error	p-value	Confidence Interval		Decision
				5.00%	95.00%	
INNO -> BI	0.317	0.059	0.000	0.217	0.412	**Supported**
GR -> BI	0.194	0.051	0.000	0.112	0.279	**Supported**

Discussion and Conclusion

The findings indicate that consumers' propensity to use parcel lockers highly depends on consumer innovativeness. This result is also consistent with the UTAUT meta-analysis's findings, which suggest that innovativeness is important in influencing intention to use various technologies (Blut et al., 2021). Many other studies have proven innovativeness's positive and considerable impact on behavioural intention. For example, a study on automated parcel lockers conducted by Chen et al. (2018) found a similar conclusion that innovativeness has a major impact on behavioural intention. Additionally, Kapser et al. (2021), examining the impact of innovativeness, revealed that innovativeness has a significant role in the acceptability of ADV in Germany.

Wang et al. (2018) highlighted the link between individual innovativeness and the acceptance of parcel locker technology. They argued that innovative consumers are more likely to adopt parcel locker services than less innovative consumers and concluded that innovativeness significantly influences the use of the services. Delivery service providers and related agencies must consider this influence to customise services to meet various consumer groups' needs and preferences.

The term green knowledge in this study refers to the consumer's environmental knowledge that influences their concerns and actions on whether to employ eco-friendly last-mile delivery solutions, such as parcel locker services. The results of this study are consistent with other research that has effectively shown the significant effect of green knowledge on consumers' behavioural intentions. Yasmen (2022) found that consumers' environmental awareness influences consumer decision-making regarding green products, which enhances knowledge of green products. Liobikienė and Bernatonienė (2017) highlighted in their study that the consumer's green knowledge significantly correlates with using green products.

Wang et al. (2019) discovered that green knowledge is crucial in influencing green segments to choose green practices for last-mile delivery, such as parcel locker service. Consumers' preferences for last-mile delivery practices are influenced by their understanding of green knowledge. In this study, possessing green knowledge can affect a person's inclination to use parcel locker services by raising an understanding of how traditional delivery systems affect the environment, including their carbon footprint and environmental pollution. This awareness encourages consumers to practice sustainable options, such as parcel lockers. Furthermore, gaining a greater understanding of green knowledge encourages consumers to

support eco-friendly solutions like parcel lockers, which allow for faster and more efficient delivery by fostering a sense of environmental responsibility.
In conclusion, strategies must highlight innovativeness and eco-friendly benefits to promote parcel locker services effectively. By tapping into consumers' interest in the innovative solution and their awareness of environmental issues, related parties can encourage and motivate consumers to use parcel locker services, contributing to more sustainable and green practice delivery.

Contributions, Limitations and Future Research Suggestions

This study provides several contributions, especially from an academic and practitioner point of view. Based on behavioural theory, this study examines the factors influencing consumers' intention to use parcel locker services, which can increase knowledge in last-mile delivery. This study's findings also contribute to practitioners who can help parcel locker service providers identify and implement appropriate strategies to increase consumer desire to use parcel lockers as an alternative to home delivery. At the same time, increase the use of parcel locker services in the future.
Several limitations have been identified. This study used a cross-sectional approach. By conducting a longitudinal study, researchers can observe the development of participants' attitudes, intentions, and behaviours. In addition, by monitoring the same respondent over an extended period, the researcher can determine whether certain factors change over time and influence intention. Accordingly, a longitudinal study should be conducted for future studies. The next limitation is that this study focuses on intention. Therefore, in the future, this study can be continued by studying the intentions and behaviour of consumers. Examining the intention and actual behaviour in the study allows the researcher to confirm whether the intention leads to the actual behaviour. This can test the validity of the predictions in the study.

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