

Do I need to use it? Factors influencing the intention to adopt automated parcel lockers as last-mile delivery services

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Abstract: Researchers have been intrigued by parcel lockers for last-mile delivery services, prompting them to investigate the matter more. This study examines factors affecting consumers' intention to use parcel lockers through the Unified Theory of Acceptance and the Use of Technology (UTAUT). This study proposed the mediating role of performance expectancy in the relationship between social influence and effort expectancy with the intention of adopting parcel locker services. An online structured questionnaire was employed and managed to collect data from 444 respondents. The non-probability purposive sampling technique was chosen as the sampling technique, while the SmartPLS version 4.0 analysed research data. The data found that performance expectancy and compatibility over consumers' intention strongly exerted the intention to use parcel lockers. For the mediator factor, the analysis uncovered evidence that performance expectancy can effectively mediate the relationship between social influence, effort expectancy, and intention to adopt parcel lockers. The research demonstrated the significance of the UTAUT model in pinpointing the reason for the parcel locker's adoption intention in Malaysia. The research findings could provide meaningful information to logistics businesses, courier companies, and relevant government bodies to design and implement strategies to enhance the acceptance and usage of parcel lockers as the last delivery option compared to home delivery.

1 Introduction

The sales from global e-commerce achieved an all-time high of 5.2 trillion US dollars in 2021, and it is anticipated that this figure will continue to rise in the years ahead [1]. As a result of the growing popularity of online shopping, last-mile delivery (LMD) has gained prominence and become an integral aspect of the supply chain. One of the potential options to improve the efficiency of LMD and logistics flow is automated parcel lockers [2]. In LMD, automated parcel lockers are a self-service technology (SST) that is a substitute for the more common home delivery practice, allowing onsite and offsite users to conveniently retrieve parcels, consolidate freight, enhancing the use of delivery transport, and shortening delivery routes [3]. As an SST, parcel lockers allow consumers to receive and send their parcels without third-party assistance and might solve the problems posed by home delivery. These benefits have positively increased the use of parcel lockers worldwide. In modern logistics systems, parcel lockers are essential, as they can enhance

the efficiency, convenience, and security of the parcel delivery process.

In Malaysia, Pos Malaysia created a parcel locker service in 2016 known as the "EziBox". Meanwhile, a partnership was initiated between Ninja Van and Prasarana Malaysia Berhad, fitted with 86 parcel lockers along Rapid KL Light Rail Transit (LRT) stations from Puchong to Gombak and Ampang. These lockers offer a convenient option for those not at home to receive deliveries and those who prefer to pick up their parcels at the station during their daily commute. In 2021, the Malaysian Communications and Multimedia Commission (MCMC) launched the National Courier Accelerator Package (PAKEJ) to boost postal and courier delivery services. PAKEJ concentrates on introducing more independent pick-up and drop-off (PUDO) activities for local distribution stations. Thus, consumers would be offered more PUDO services, such as a collecting point or parcel storage.

Even though shipping companies are interested in offering parcel locker services, the utilisation rate of parcel lockers is not encouraging. For example, a mere 5.8% of

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the parcels received by Ninja Van were delivered to designated collection points [4]. Extensive studies have indicated that the typical consumer remains uncertain about using these types of self-collection services because of innate inertia, concerns about the technology, the lack of convenience, and fear of being exploited if they use a parcel locker [5] and [6]. Past studies illuminated that consumers must embrace the technology instead of strict implementation since forced utilisation could affect attitudes negatively [7]. For the success of parcel locker services, an immediate investigation of consumers' intentions in Malaysia towards using parcel lockers is required. Moreover, although this innovation in LMD is gaining popularity, researchers have largely neglected it [8].

The LMD field gains a substantial depth of knowledge from this research. First, it could expand the existing knowledge regarding the intention to use parcel lockers among consumers, specifically those in Malaysia. Secondly, assessing the part played by performance expectancy as a mediator makes a useful contribution to the

body of work connected to last-mile delivery, especially in the context of parcel lockers. Third, the suitability of the UTAUT model for the Malaysian context could be established in this study.

2 Literature review and research hypotheses

2.1 Unified theory of acceptance and use of technology (UTAUT)

In the field of technology acceptance, the Unified Theory of Acceptance and Use of Technology (UTAUT) has been utilised extensively to examine different types of technologies, including learning systems [9], electronic government systems [10], and online banking [11]. The current work evaluates e-commerce-related behavioural intention to adopt one type of self-service technology (parcel lockers) as a last-mile delivery service due to its evident capacity to be utilised in an extensive array of technology acceptance studies. Hence, the study framework is based on the UTAUT presented in Figure 1.

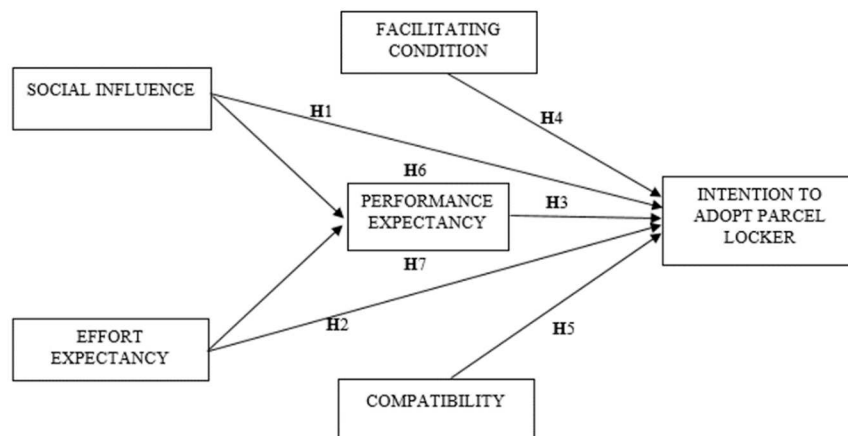


Figure 1 Framework of the study

2.2 Social influence

In the current work, social influence (SI) refers to significant individuals - for example, friends, family members, or those in the community and social circle - who might impact users by supporting the selection of parcel lockers when delivering online purchases. In LMD studies, past studies suggested that social influence assumes an important role in forecasting behavioural intention in utilising autonomous delivery vehicles [12] and parcel lockers [13]. Thus, the first hypothesis is:

H1: Social influence positively influences consumers' intention to adopt parcel locker services.

2.3 Effort expectancy

Effort expectancy is assumed as the belief that consumers held parcel locker delivery and collection is simple; it just requires a smidge of effort. Previous studies

have found that perceptions of EE affected the acceptance of various technologies: mobile applications [14], exoskeletons [15] and online pharmacy [16]. In this study, assigning EE as a predictor aids in analysing the belief patterns of consumers in terms of using self-service technology, i.e., parcel lockers. The study formulated the hypothesis:

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

2.4 Performance expectancy

In the present study, performance expectancy (PE) was measured by how much easier people thought sending and receiving packages would be if they used a parcel locker. In earlier LMD studies, PE was also crucial in determining the intention to select autonomous delivery vehicle services [17], express delivery service [18], and green

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banking technology [19]. Based on the flexibility of pick-up times and the availability of 24-hour operations, the performance of LMD was expected to improve with parcel lockers. Thus, the second hypothesis is:

H3: Performance expectancy influences consumers' intention to adopt parcel locker services.

2.5 Facilitating conditions

The current study defines facilitating condition (FC) as the availability of an environment and infrastructure that can support the parcel locker application as a last-mile delivery service for online purchases. Other papers have illuminated that FC significantly influence consumers' intention to embrace autonomous delivery vehicle services [17] and online shopping [20]. Thus, based on past finding, the next hypothesis stated that:

H4: Facilitating conditions positively influence consumers' intention to adopt parcel locker services.

2.6 Compatibility

This study proposed compatibility as to whether the LMD innovation - the self-service delivery known as parcel lockers - was compatible with consumers' current values and lifestyles. In the field of innovation acceptance, compatibility has been revealed to be a key element in many areas, such as e-wallets [21], self-collection services [3], and mobile wallets [22]. With the shift in consumers' lifestyles from offline to online shopping, most working consumers are not at home during delivery. Thus, parcel lockers could be another home delivery option corresponding to their requirements, values, and lifestyles. Thus, the following hypothesis was formulated:

H5: Compatibility has a positive influence on the intention of consumers to choose parcel locker services.

2.7 Mediating effect of performance expectancy

Limited research has explored how performance expectancy might mediate between effort expectancy and social influence in parcel lockers utilisation intention. Based on the previous literature, consistent correlations have been exhibited between EE and PE [24,25], SI and PE [25], and PE and intention [18]. Therefore, this study predicted that PE would play the mediator role in 1) linking EE to the intention to adopt parcel lockers and 2) between SI and parcel lockers adoption intention. Thus, H6 and H& are:

H6: Performance expectancy has a mediating effect on the association between social influence and the intention to select parcel lockers.

H7: Performance expectancy has a mediating effect on the association between effort expectancy and the intention to select parcel lockers.

3 Methodology

The completion of the objectives of the study was founded on the quantitative method. The unit of analysis in this study was a person, whereas the response refers to individual responses from e-commerce consumers who had never experienced using parcel locker services. This study conducts survey research by utilising voluntary sampling as a form of non-probability sampling technique. In determining the minimum sample size, G*Power 3.1 performed a priori power analysis [26]. Based on five predictors and to obtain 95% power, medium effect size of 0.15 and a confidence level of 0.05, 138 minimal sample sizes are needed for this study. As [27] suggested, a sample size of 30-500 was considered appropriate. Based on the G* power calculation, 444 responses were collected to test the suggested model. The data was collected during August 2022 through Google form in an online survey form.

The items used in the questionnaire were collected by procuring items from previous studies. The works of [13] were utilised for PE, EE, FC, compatibility, and intention; those of [28] were utilised for SI and FC; those of [21] were utilised for SI; those of [29] were utilised for compatibility; and those of [30] were utilised for intention. The first section inquires about the respondents' background. Meanwhile, section two focused on the factors that led consumers intention to adopt parcel lockers. Thirdly, the intention construct was assessed in the last section. The questionnaire utilised a seven-point Likert scale, from 1 (strongly disagree) to 7 (strongly agree). The study opts for Partial least square-structural equation modelling (PLS-SEM) to analyse the data. This study opted for PLS-SEM due to the capability of SEM to demonstrate statistically significant constructs and stressing predictions when estimating statistical models. Based on the recommendation of [31], a two-step SEM analysis was employed, featuring the measurement and structural models.

4 Result and discussion

4.1 Respondents' demographic

Regarding their demographic profile, from the 444 respondents, the proportion of female respondents (74.1%) outweighed that of male respondents (25.95%). Respondents looked to be largely in the 18-24 age range. In terms of employment, most of the online consumers in this study were students (59.9%), followed by those in full-time employment (32.0%). Meanwhile, most respondents made online purchases monthly (46.4%), but around a quarter of consumers rarely made such purchases (25.7%). Most respondents preferred a home delivery mode for obtaining their products bought online (96.40%). This implies that traditional home delivery remains popular among online consumers in Malaysia.

4.2 Common method bias

As the study only collected single source data, following the advice from [32], the first step was to check common technique bias. Using this method, each variable was regressed on a single common variable. Should the variance inflation factor (VIF) be below 3.3, no bias had been introduced from any single data source. Considering that the VIF in this study was smaller than the threshold value of 3.3, no conflict was seen with common method bias and no evidence of single-source bias in the responses.

4.3 Measurement model analysis

4.3.1 Reliability analysis

Before conducting the analysis, the measurement model has been developed as shown in Figure 2. The Cronbach's alpha and composite reliability values for each factor are shown in Table 2, demonstrating that every value was higher than the predicted factors' 0.7 cut-off point [33] and thus indicates the high reliability of the measures.

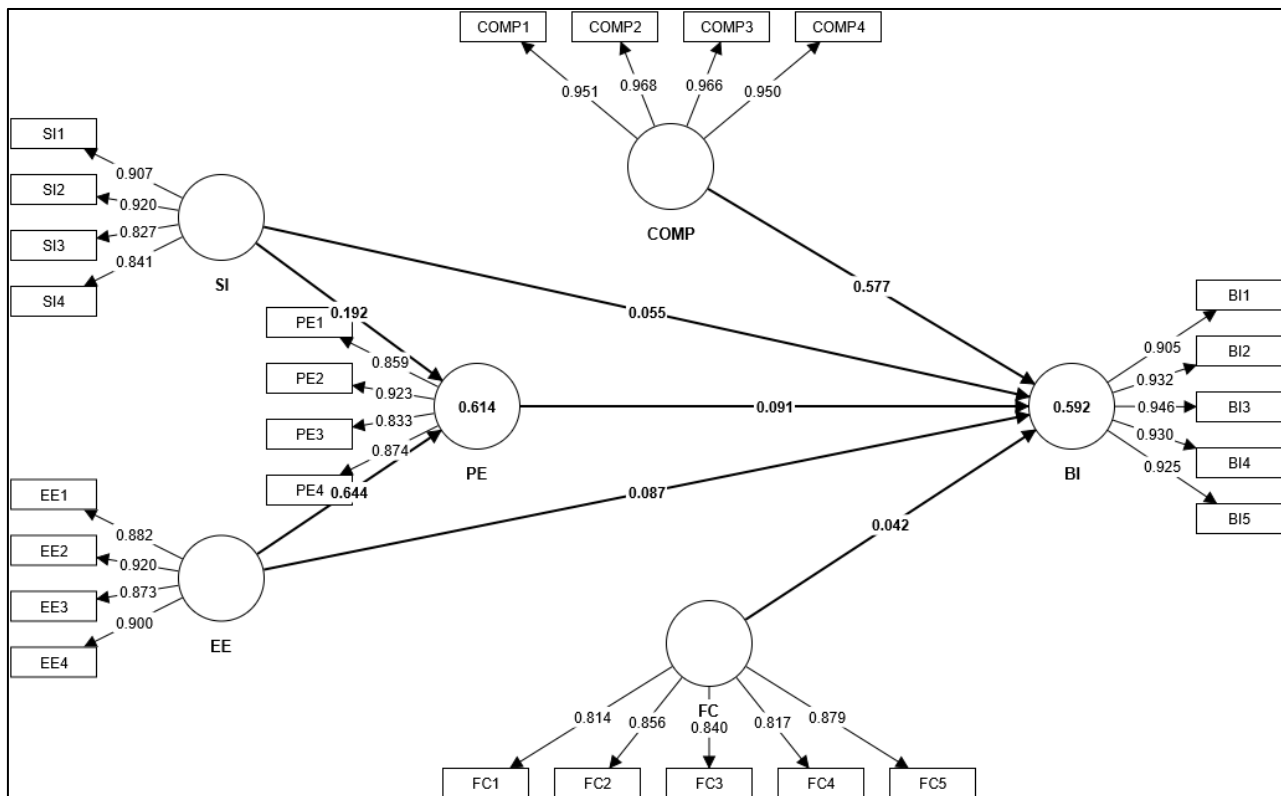


Figure 2 PLS-Path Model

4.3.2 Convergent validity

To determine the eligibility of employing a structural model to test these hypotheses, the measurement model's convergent and discriminant validity had to be determined. The first step was to construct the measurement model was created, as shown in Figure 2. Based on the views of [26], at the point at which the loading and average variance explained (AVE) reach 0.5, convergent validity is deemed to have been obtained. As each standardised loading item was above the 0.7 threshold value for their predicted factor,

they were considered significant. Meanwhile, over half of the item variances in each construct differed statistically significantly from the others because the latent constructs' extracted average variances (AVE) ranged between 0.708 and 0.919, above the optional 0.5 cut-off value [33]. Since all the values were above the minimum level recommended in the literature, the conditions of convergent validity were met in this study. The findings of the measurement model have been compiled in Table 1.

Table 1 Convergent validity

Construct	Item Code	Outer Loading	Cronbach's alpha	CR	AVE
Behaviour Intention	BI1	0.905	0.960	0.969	0.861
	BI2	0.932			
	BI3	0.946			

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Construct	Item Code	Outer Loading	Cronbach's alpha	CR	AVE
Compatibility	B14	0.930	0.971	0.978	0.919
	BI5	0.925			
	COMP1	0.951			
	COMP2	0.968			
	COMP3	0.966			
Effort Expectancy	EE1	0.882	0.916	0.941	0.799
	EE2	0.920			
	EE3	0.873			
	EE4	0.900			
Facilitating Condition	FC1	0.814	0.898	0.924	0.708
	FC2	0.856			
	FC3	0.840			
	FC4	0.817			
	FC5	0.879			
Performance Expectancy	PE1	0.859	0.895	0.927	0.762
	PE2	0.923			
	PE3	0.832			
	PE4	0.875			
Social Influence	SI1	0.900	0.899	0.929	0.766
	SI2	0.916			
	SI3	0.834			
	SI4	0.847			

4.3.3 Discriminant validity

Discriminant validity must be determined when convergent validity has been demonstrated. Discriminant validity was achieved when the heterotrait-monotrait ratio (HTMT) value was less than 0.90 [34]. Based on Table 2, all the HTMT values met the specified conditions, proving that the discriminant validity had not been affected.

Table 2 Discriminant validity: Heterotrait-Monotrait Ratio Statistics (HTMT)

	BI	COMP	EE	FC	PE	SI
BI	0.780					
COMP	0.780	0.740				
EE	0.660	0.740	0.615			
FC	0.513	0.573	0.615	0.546		
PE	0.620	0.673	0.844	0.546	0.670	
SI	0.601	0.683	0.715	0.723	0.670	0.670

4.4 Structural model analysis

Based on the suggestion by [35], standard beta (b) values, and t-values obtained through bootstrapping with a resample numbering 5,000 were analysed to measure the structural model. As indicated in Table 3, performance expectancy and compatibility were significantly linked to the intention for parcel lockers adoption, with each variable

having values of (b=0.091, t= 1.884: LL= 0.014, UL 0.174) and (b=0.577, t =10.091: LL= 0.481), respectively. Therefore, H4 and H5 were supported. Conversely, no support was demonstrated for social influence (b=0.055, t = 1.057), effort expectancy (b =0.087, t = 1.399), or facilitating conditions (b=0.042, t= 0.868). Regarding the mediation analysis, both H6 and H7 were supported. By following a suggestion by [36], the significant relationship that effort expectancy had intending to adopt when performance expectancy was the mediator is shown in Table 3 (SI → PE → INT; b = 0.017, t= 1.467) and (EE → PE → INT; b = 0.059, t=1.813). Concerning f², the investigation discovered that f² for COMP → INT = 0.358 and PE → INT = 0.008, indicating that the effect size of each hypothesis is either small or large.

Regarding the variation in intention, 52.9% might be explained by the exogenous variables, as shown by the value of the coefficient of determination (R²) being 0.529. [37] recommended using PLS predictive to improve predictive capability in response to the current critique of the blindfolding practice. Most RMSE values for PLS-SEM were below those of the LM for the dependent BI constructs, as Table 4 shows. The study concluded that the model has medium predictive power. Meanwhile, some indicators recorded lower RMSE values for predicting the

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errors of PLS-SEM than the LM for the PE construct, indicating the low predictive power of the model.

Table 3 Summary of hypotheses testing

Hypotheses	Path	Beta	Standard Error	t Value	Confidence Interval		Decision
					5.00%	95.00%	
Direct effects							
H1	SI -> BI	0.055	0.052	1.057	-0.032	0.139	Not supported
H2	EE -> BI	0.087	0.062	1.399	-0.017	0.188	Not supported
H3	PE -> BI	0.091	0.048	1.884	0.014	0.174	Supported
H4	FC -> BI	0.042	0.048	0.868	-0.041	0.116	Not supported
H5	COMP -> BI	0.577	0.057	10.091	0.48	0.670	Supported
Indirect effects							
H6	SI -> PE -> BI	0.017	0.011	1.647	0.004	0.039	Supported
H7	EE -> PE -> BI	0.059	0.032	1.813	0.01	0.117	Supported

Note: $p \leq 0.05$ (1-tailed test). LL, lower limit; UL, upper limit at 95% and 99% confidence interval

Table 4 PLS predict

Items	Q ² predict	PLS-SEM_RMSE	LM_RMSE
BI1	0.462	0.907	0.931
BI2	0.502	0.842	0.866
BI3	0.528	0.917	0.939
BI4	0.496	0.949	0.965
BI5	0.492	0.977	0.991
PE1	0.411	0.937	0.933
PE2	0.549	0.838	0.810
PE3	0.382	0.977	0.992
PE4	0.498	0.894	0.908

5 Discussion and conclusion

These results could become the basis for further studies on using the UTAUT model in the context of parcel lockers. Each predictor variable's standardised beta coefficient was checked to inspect the impacts on the endogenous variable of the exogenous variables, as the research hypotheses outlined. Nevertheless, no contribution was made to the intention to adopt parcel locker services by SI, EE, or FC.

As illustrated in Table 3, three hypotheses were rejected (H1, H2, and H4), and four hypotheses were validated (H3, H5, H6, and H7). Of the UTAUT predictors, performance expectancy (H3) was the most significant factor for the subjects studied. The current findings correspond to those obtained in different studies on LMD, which have illustrated how performance expectancy significantly impacts the intention to utilise various LMD-related technologies [18,19]. This shows that Malaysian consumers' intention to adopt parcel locker services was strongly founded on factors highlighting functional advantages (performance expectancy).

Except for that UTAUT construct, compatibility was also found to significantly influence consumers' intention

to adopt parcel lockers. These outcomes resemble those obtained by other researchers investigating technology adoption in e-wallets [22] and mobile banking [38]. In a trend predicted to be ongoing, the typical modern consumer has generally become familiar with online purchases. Furthermore, most consumers, especially those in cities, work and not at home for parcel delivery. Therefore, a parcel locker can be considered a delivery method compatible with modern consumers' lifestyles.

Social influence was found not to significantly influence consumers' intention to adopt parcel locker services, so H1 was not supported. Alignment was identified between this outcome and those of previous studies to have employed the UTAUT model, in which social influence was revealed as less relevant [14]. This could have been because the current research was conducted from the individual perspectives of consumers without experience using parcel lockers. It is highly likely that most of the respondents had a social circle or lived in a community that did not use parcel lockers. Therefore, social influence has no significant influence on the intention to use parcel lockers.

This study also shows that the exogenous variables of EE and FC did not significantly affect behaviour intention; hence, H2 and H4 were not supported. The outcome demonstrates inconsistency with certain previous works, which have illustrated the important influence of the EE factor on the intention to utilise technology [39]. Given that the parcel locker is a new method of delivery in comparison to standard home delivery, this finding was surprising, even though it was consistent with those of several other studies [40] and [21]. The facilitating conditions findings were consistent with those of other researchers [41] and [42] who found this was not a significant factor affecting individuals' intentions to utilise

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technology. In this study context, the sample consisted of non-users of parcel locker services, so they may have lacked the understanding and skills necessary to facilitate parcel lockers in terms of the organisational and technological infrastructure.

The study suggested that PE was a mediator between the relationship of SI and adoption intention and between EE and intention to adopt. The result validated the mediating influence of PE on the connection between H6 and H7. These results demonstrated the significance of performance expectations in shaping consumers' intention to utilise automated parcel lockers. The analysis of Hypothesis 6 revealed that performance expectancy would likely decline when individuals in a respondent's circle, such as their friends or family, did not use parcel lockers and thought the respondent should not use such services either, which appeared to affect the respondent's decision about whether or not to use the service themselves. The acceptance of H5 means that when consumers possess a high level of performance expectancy and are informed of the superiority of automated parcel locker services, they are more inclined to employ automated parcel lockers, even if they need to make additional efforts to receive their parcel compared to when arranging home delivery.

In conclusion, performance expectancy is a key influence on the intention to use parcel locker services. Therefore, delivery companies offering parcel locker delivery services should prioritise enhancing the functionality and performance of parcel lockers to encourage more consumer interest and adoption in the future. Apart from providing effective parcel locker services, delivery companies and relevant agencies should also disseminate details about the advantages and performance of parcel lockers, such as service efficiency, accuracy and reliability, convenience, and environmental considerations. As parcel lockers are useful and easier to collect and post, it is paramount to highlight these features among consumers to motivate them to move from the classic delivery modes to automated parcel lockers. Clear communication about the advantages and performance of parcel lockers can influence positive performance expectations, consequently increasing their intention to adopt parcel lockers services.

6 Theoretical and practical contribution

6.1 Theoretical contributions

The theoretical ramifications of the findings deliver a momentous contribution to the current knowledge and illustrate the significant predictors of consumers' behavioural intention to adopt self-service technology like automated parcel lockers. An important feature is a confirmation that the main influence on the intention of consumers to adopt parcel locker services is performance expectation. Using the UTAUT model and examining the mediating influences of performance expectancy yielded useful insights. In addition, using a quantitative methodology and PLS-SEM brought validity to the study's

findings, which are a valuable contribution to this type of research in the context of a developing country.

6.2 Practical implications

To ensure the outstanding performance of parcel lockers, courier managers should devise various techniques. This should lead to improved consumer expectations of the performance of parcel lockers and an increase in positive recommendations from those in their social circle. Once they recognise the good performance of parcel locker services, consumers will not hesitate to use such services even if they know they must participate and exert more effort to complete the delivery process. A further recommendation is to exploit media platforms - such as short message services (SMS), emailing, and social networks like Facebook - as these can be useful in fostering electronic and effective word of mouth. This would improve the function of future parcel locker consumer intention and adoption rates.

7 Limitations and suggestions for future research

The current research outcomes highlight how useful the UTAUT model could be in conducting analyses of Malaysian customers' perceptions of self-service parcel lockers. Regardless of the significance of the study's findings, some limitations may determine future research paths. Firstly, the sample could be expanded to allow for coverage of a broader geographical area of Malaysia, such as other rural areas, instead of focusing solely on an urban area. Secondly, this study utilised the UTAUT paradigm to examine potential drivers of intention to use. Therefore, the body of knowledge could be augmented by investigating online shoppers' motivations for using automated parcel lockers from various theoretical perspectives.

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References

- [1] CHEVALIER, S.: Global retail e-commerce sales 2014-2025, [Online], Available: <https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales> [24 Mar 2023], 2022.
- [2] IANNACCONE, G., MARCUCCI, E., GATTA, V.: What Young E-Consumers Want? Forecasting Parcel Lockers Choice in Rome, *Logistics*, Vol. 5, No. 3, pp. 1-16, 2021. <https://doi.org/10.3390/logistics5030057>
- [3] YUEN, K.F., WANG, X., MA, F., WONG, Y.D.: The determinants of customers' intention to use smart lockers for last-mile deliveries, *Journal of Retailing and Consumer Services*, Vol. 49, No. March, pp. 316-326, 2019.

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- <https://doi.org/10.1016/j.jretconser.2019.03.022>
- [4] PARCELMONITOR: The State of E-Commerce In Malaysia, [Online], Available: <https://www.parcelmonitor.com/blog/state-of-e-commerce-in-malaysia> [15 Dec 2022], 2020.
- [5] LEE, H.J., LYU, J.: Personal values as determinants of intentions to use self-service technology in retailing, *Computers in Human Behavior*, Vol. 60, pp. 322-332, 2016. <https://doi.org/10.1016/j.chb.2016.02.051>
- [6] WANG, X., YUEN, K.F., WONG, Y.D., TEO, C.C.: It is green, but is it fair? Investigating consumers' fairness perception of green service offerings, *Journal of Cleaner Production*, Vol. 181, pp. 235-248, 2018. <https://doi.org/10.1016/j.jclepro.2018.01.103>
- [7] VAKULENKO, Y., SHAMS, P., HELLSTRÖM, D., HJORT, K.: Service innovation in e-commerce last mile delivery: Mapping the e-customer journey, *Journal of Business Research*, Vol. 101, No. June, pp. 461-468, 2019. <https://doi.org/10.1016/j.jbusres.2019.01.016>
- [8] MOHAMAD, F.H., NGAH, A.H.: The role of openness to change in automated parcel locker usage among online buyers in Malaysia, *International Scientific Journal about Logistics*, Vol. 9, pp. 1001-1012, 2022. <https://doi.org/10.22306/al.v9iX.307>
- [9] KHAN, R.A., QUDRAT-ULLAH, H.: *Adoption of LMS in Higher Educational Institutions of the Middle East*, Springer Nature, 2021.
- [10] ALSHAHER, A.: IT capabilities as a fundamental of electronic government system success in developing countries from users perspectives, *Transforming Government: People, Process and Policy*, Vol. 15, No. 1, pp. 129-149, 2021. <https://doi.org/10.1108/TG-05-2020-0080>
- [11] RAHI, S., ABD.GHANI, M.: Investigating the role of UTAUT and e-service quality in internet banking adoption setting, *TQM Journal*, Vol. 31, No. 3, pp. 491-506, 2019. <https://doi.org/10.1108/TQM-02-2018-0018>
- [12] KAPSER, S., ABDELRAHMAN, M., BERNECKER, T.: Autonomous delivery vehicles to fight the spread of Covid-19 – How do men and women differ in their acceptance?, *Transportation Research Part A: Policy and Practice*, Vol. 148, pp. 183-198, 2021. <https://doi.org/10.1016/j.tra.2021.02.020>
- [13] ZHOU, M., ZHAO, L., KONG, N., CAMPY, K.S., XU, G., ZHU, G., CAO, X., WANG, S.: Understanding consumers' behavior to adopt self-service parcel services for last-mile delivery, *Journal of Retailing and Consumer Services*, Vol. 52, pp. 1-12, 2020. <https://doi.org/10.1016/j.jretconser.2019.101911>
- [14] WUT, E., NG, P., LEUNG, K.S.W., LEE, D.: Do gamified elements affect young people's use behaviour on consumption-related mobile applications?, *Young Consumers*, Vol. 22, No. 3, pp. 368-386, 2021. <https://doi.org/10.1108/YC-10-2020-1218>
- [15] ELPRAMA, S.A., VANNIEUWENHUYZE, J.T.A., DE BOCK, S., VANDERBORGHT, B., DE PAUW, K., MEEUSEN, R., JACOBS, A.: Processes: What Determines Industrial Workers' Intention to Use Exoskeletons?, *Human Factors*, Vol. 62, No. 3, pp. 337-350, 2020. <https://doi.org/10.1177/0018720819889534>
- [16] SABBIR, M.M., ISLAM, M., DAS, S.: Understanding the determinants of online pharmacy adoption: a two-staged SEM-neural network analysis approach, *Journal of Science and Technology Policy Management*, Vol. 12, No. 4, pp. 666-687, <https://doi.org/10.1108/JSTPM-07-2020-0108>
- [17] KAPSER, S., ABDELRAHMAN, M.: Acceptance of autonomous delivery vehicles for last-mile delivery in Germany – Extending UTAUT2 with risk perceptions, *Transportation Research Part C*, Vol. 111, No. June, pp. 210-225, 2020. <https://doi.org/10.1016/j.trc.2019.12.016>
- [18] ZHONG, S., LOMAS, C., WORTH, T.: Understanding customers' adoption of express delivery service for last-mile delivery in the UK, *International Journal of Logistics Research and Applications*, Vol. 25, No. 12, pp. 1-18, 2021. <https://doi.org/10.1080/13675567.2021.1914563>
- [19] BOUTERAA, M., RAJA HISHAM, R.R.I., ZAINOL, Z.: Challenges affecting bank consumers' intention to adopt green banking technology in the UAE: A UTAUT-based mixed-methods approach, *Journal of Islamic Marketing*, Vol. ahead-of-print No. ahead-of-print, 2022. <https://doi.org/10.1108/JIMA-02-2022-0039>
- [20] ERJAVEC, J., MANFREDA, A.: Online shopping adoption during COVID-19 and social isolation: Extending the UTAUT model with herd behavior, *Journal of Retailing and Consumer Services*, Vol. 65, No. July, pp. 1-12, 2022. <https://doi.org/10.1016/j.jretconser.2021.102867>
- [21] YANG, M., AL MAMUN, A., MOHIUDDIN, M., NAWI, N.C., ZAINOL, N.R: Cashless transactions: A study on intention and adoption of e-wallets, *Sustainability*, Vol. 13, No. 2, pp. 1-18, 2021. <https://doi.org/10.3390/su13020831>
- [22] CHAWLA, D., JOSHI, H.: Consumer attitude and intention to adopt mobile wallet in India – An empirical study, *International Journal of Bank Marketing*, Vol. 37, No. 7, pp. 1590-1618, 2019. <https://doi.org/10.1108/IJBM-09-2018-0256>
- [23] DUAN, S.X., DENG, H.: Hybrid analysis for understanding contact tracing apps adoption, *Industrial Management and Data Systems*, Vol. 121, No. 7, pp. 1599-1616, 2021. <https://doi.org/10.1108/IMDS-12-2020-0697>

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- [24] RAHI, S., OTHMAN MANSOUR, M.M., ALGHIZZAWI, M., ALNASER, F.M.: Integration of UTAUT model in internet banking adoption context: The mediating role of performance expectancy and effort expectancy, *Journal of Research in Interactive Marketing*, Vol. 13, No. 3, pp. 411-435, 2019. <https://doi.org/10.1108/JRIM-02-2018-0032>
- [25] RAMÍREZ-CORREA, P.E., GRANDÓN, E.E., ARENAS-GAITÁN, J., RONDÁN-CATALUÑA, F.J., ARAVENA, A.: Explaining Performance Expectancy of IoT in Chilean SMEs. *Lecture Notes in Business Information Processing*, Vol. 353, pp. 475-486, 2019. https://doi.org/10.1007/978-3-030-20485-3_37
- [26] HAIR, J.F., HULT, G.T.M., RINGLE, C.M., SARSTEDT, M.: *A primer on partial least squares structural equation modelling (PLS-SEM)*, 2nd ed., Thousand Oak, California: SAGE Publications, Inc, 2017.
- [27] ROSCOE, J.T.: *Fundamental research statistics for the behavioral sciences*, 2nd ed., New York: Holt, Rinehart and Winston, 1975.
- [28] VENKATESH, V., MORRIS, M.G., DAVIS, G.B., DAVIS, F.D.: Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology, *Management Information Systems Research Center*, Vol. 27, No. 3, pp. 425-478, 2003. <https://doi.org/https://doi.org/10.2307/41410412> 2003
- [29] WANG, X., YUEN, K.F., WONG, Y.D., TEO, C.C.: Consumer participation in last-mile logistics service: an investigation on cognitions and affects, *International Journal of Physical Distribution and Logistics Management*, Vol. 49, No. 2, pp. 217-238, 2019. <https://doi:10.1108/IJPDLM-12-2017-0372>
- [30] VENKATESH, V.L.J.Y., XU, X.: Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology, *Management Information Systems Research Center*, Vol. 36, No. 1, pp. 157-178, 2012. <https://doi.org/10.2307/41410412>
- [31] ANDERSON, J.C., GERBING, D.W.: Structural equation modeling in practice: a review and recommended two-step approach, *Psychological Bulletin*, Vol. 103, No. 3, pp. 411-423, 1988.
- [32] KOCK, N., LYNN, G.S.: Lateral collinearity and misleading results in variance-based SEM: An illustration and recommendations, *Journal of the Association for Information Systems*, Vol. 13, No. 7, pp. 546-580, 2012. <https://doi.org/10.17705/1jais.00302>
- [33] HAIR, J.F., BLACK, W.C., BLACK, B., BABIN, B.J., ANDERSON, R.E.: *Multivariate data analysis*, 7th ed., Englewood Cliff, New Jersey: Prentice Hall, 2010.
- [34] FRANKE, G., SARSTEDT, M.: Heuristics versus statistics in discriminant validity testing: a comparison of four procedures, *Internet Research*, Vol. 29, No. 3, pp. 430-447, 2019. <https://doi.org/10.1108/IntR-12-2017-0515>
- [35] HAIR, J., HOLLINGSWORTH, C.L., RANDOLPH, A.B., CHONG, A.Y.L.: An updated and expanded assessment of PLS-SEM in information systems research, *Industrial Management & Data Systems*, Vol. 117, No. 3, pp. 442-458, 2017. <https://doi.org/10.1108/IMDS-04-2016-0130.117>
- [36] PREACHER, K.J., HAYES, A.F.: Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models, *Behavior Research Methods*, Vol. 40, No. 3, pp. 879-891, 2008. <https://doi.org/10.3758/BRM.40.3.879>
- [37] SHMUELI, G., SARSTEDT, M., HAIR, J.F., CHEAH, J.H., TING, H., VAITHILINGAM, S., RINGLE, C.M.: Predictive model assessment in PLS-SEM: guidelines for using PLSpredict, *European Journal of Marketing*, Vol. 53, No. 11, pp. 2322-2347, 2019. <https://doi.org/10.1108/EJM-02-2019-0189>
- [38] MAKANYEZA, C.: Determinants of consumers' intention to adopt mobile banking services in Zimbabwe, *International Journal of Bank Marketing*, Vol. 12, No. 7, pp. 1-32, 2017. <https://doi.org/10.1108/02652323199400002>
- [39] SHARMA, S., SINGH, G., PRATT, S., NARAYAN, J.: Exploring consumer behavior to purchase travel online in Fiji and Solomon Islands? An extension of the UTAUT framework, *International Journal of Culture, Tourism, and Hospitality Research*, Vol. 15, No. 2, pp. 227-247, 2021. <https://doi.org/10.1108/IJCTHR-03-2020-0064>
- [40] ACHARJYA, B., DAS, S.: Adoption of E-learning during the covid-19 pandemic: The moderating role of age and gender, *International Journal of Web-Based Learning and Teaching Technologies*, Vol. 17, No. 2, pp. 1-14, 2022. <https://doi.org/10.4018/IJWLTT.20220301.0a4>
- [41] NIKOLOPOULOU, K., GIALAMAS, V., LAVIDAS, K.: Acceptance of mobile phone by university students for their studies: an investigation applying UTAUT2 model, *Education and Information Technologies*, Vol. 25, pp. 4139-4155, 2020. <https://doi.org/10.1007/s10639-020-10157-9>
- [42] POPOVA, Y., ZAGULOVA, D.: UTAUT Model for Smart City Concept Implementation: Use of Web Applications by Residents for Everyday Operation, *Informatics*, Vol. 9, No. 1, pp. 1-19. <https://doi.org/10.3390/informatics9010027>

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