

Determinants of Self-Pickup Service Adoption in Last-Mile Delivery among Online Shoppers in Johor, Malaysia

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Abstract

The rapid growth of e-commerce in Malaysia has intensified challenges in last-mile delivery particularly issues related to delivery failures, rising operational costs, and customer inconvenience. Self-pickup services have emerged as an alternative delivery solution that offers flexibility, reduced delivery attempts, and potential cost savings. However, the adoption of self-pickup services among Malaysian consumers particularly in Johor remains relatively low. This study aims to examine the determinants influencing consumers' intention to adopt self-pickup services for last-mile delivery in Johor, Malaysia. Guided by the Technology Acceptance Model (TAM), this research focuses on perceived usefulness, perceived ease of use, and trust as key influencing factors. A quantitative research approach was employed, using a structured questionnaire distributed to online shoppers residing in Johor. Data was analyzed using the Statistical Package for the Social Sciences (SPSS), incorporating descriptive analysis, reliability analysis, and correlation analysis. The findings indicate that perceived usefulness, perceived ease of use, and trust are positively associated with consumers' intention to adopt self-pickup services. The study provides practical insights for logistics service providers to improve service design and enhance consumer confidence, while also contributing empirically to last mile delivery literature within the Malaysian context.

1. Introduction

The rapid growth of e-commerce has transformed consumer purchasing behavior, increasing the demand for efficient last-mile delivery solutions. However, challenges such as high delivery costs, traffic congestion, and failed deliveries have led logistics providers to explore self-pickup services as an alternative. This system allows consumers to collect parcels at designated points, offering greater flexibility and reducing delivery inefficiencies. In Johor where e-commerce is expanding rapidly, adoption of self-pickup services remains moderate despite its potential benefits. Understanding what drives consumer adoption is therefore crucial. Guided by the Technology Acceptance Model (TAM), this study examines how perceived usefulness, perceived ease of use, and trust influence consumers' intention to adopt self-pickup services. The findings aim to provide insights for logistics providers and policymakers to enhance last-mile efficiency and promote broader acceptance of self-pickup systems in Malaysia.

The use of motorized vehicles in last-mile delivery began in the early 20th century and became a major development in delivery transportation (Cross, 2022). Although new innovations such as drones, autonomous vehicles, and parcel lockers are emerging, many consumers still prefer traditional delivery methods. The growth of online shopping has increased consumer demand for fast and convenient delivery services. Failed deliveries are a major issue because they increase logistics costs and cause inconvenience to customers (Zainuddin *et al.*,

2022). Self-pickup points such as parcel lockers and collection centers have been introduced to reduce delivery failure and provide flexibility. However, adoption in Malaysia is still low due to limited consumer awareness, even though the service has existed since 2016. Johor faces increasing last-mile delivery challenges due to population growth and rising e-commerce activity. Therefore, studying consumer acceptance and barriers toward self-pickup adoption in Johor is important to support better last-mile delivery solutions (Yusoff *et al.*, 2023).

Last-mile delivery is the final stage of delivering goods from a distribution center to customers. Conventional delivery is still widely used, but it faces problems such as high operational costs, traffic congestion, increasing fuel costs, and difficulty reaching remote areas (Dubey, 2024). Self-pickup service, where customers collect parcels at designated locations, is an alternative that can reduce delivery failure and lower delivery costs (Buldeo Rai, 2019). However, adoption in Malaysia is still low due to limited infrastructure, low awareness, and trust issues (Lam, 2021). Therefore, this study focuses on Johor and examines how perceived usefulness, perceived ease of use, and trust influence customer adoption of self-pickup services based on the Technology Acceptance Model (TAM) (Davis, 1989).

2. Literature Review

2.1 Last-Mile Delivery Transport

The technical term for the final process of delivering products from a distribution center to a client is "last-mile delivery." For this, vans, trucks, and motorbikes are usually employed. These traditional vehicles are plagued by issues like high fuel prices, traffic jams, and inability to access rural areas (Eskandaripour & Boldsai Khan, 2023). Because of this, numerous new-age solutions like driverless tractors and drones are being widely embraced. Drone usage can reduce pollution and speed up deliveries by avoiding traffic and using electricity (Jazairy *et al.*, 2023).

2.2 Adoption of Self-Pickup in Last-Mile Delivery

Adoption here means how open the people of Johor, Malaysia are to using self-pickup for last-mile delivery again. It has been found that if people find a delivery service convenient, easy to use, and trustworthy, they make use of it. Vans, trucks, and motorcycles have traditionally been used for last mile delivery because they have the capacity to carry a lot of packages and people are used to them. But they are plagued by problems like traffic jams, pollution norms, rising fuel prices, and high labor costs. The last mile delivery needs 30-35% of the total logistics expense on account of all these problems (Porsche Consulting, 2024; Deloitte, 2020). Self-pickup services, also referred to as self-collection or collection point systems, have emerged as an innovative last-mile delivery approach designed to overcome challenges such as failed deliveries, high transportation costs, and urban congestion (Janjevic, Winkenbach, & Merchán, 2019). These services allow customers to collect parcels at designated locations at their convenience, offering flexibility and potentially reducing environmental impacts. However, barriers such as limited consumer awareness, perceived ease of use, and trust issues remain challenges to wider adoption in Malaysia. Understanding the determinants is essential for logistics providers and policymakers to design effective strategies that enhance consumer engagement and increase the use of self-pickup services.

2.3 Determinants of Last-Mile Delivery Transport Adoption

Perceived usefulness is the degree to which an individual believes a system is useful and simple to operate (Davis, 1989). In last-mile delivery, when people feel that a delivery solution will improve their experience, they will be more likely to use it. Literature suggests that usefulness is critical in the adoption of new technologies like drone delivery (Leon *et al.*, 2021). Hence, people will choose delivery solutions with evident advantages.

Perceived ease of use is the degree to which people think that technology is easy to use (Davis, 1989). People are more likely to use technology if they know how to use it. A study by Georgieva (2022) found that the majority of people had never used drones before, and therefore, they found drones difficult to use. This makes it hard for the adoption of new technology. But people are accustomed to traditional means of delivery and hence find them more convenient.

Trust is the degree to which people trust and feel safe using emerging technology. When it comes to new delivery technologies like drones and autonomous vehicles, this is most important. Research by Georgieva (2022) established that concerns about safety and privacy make people less inclined to trust and use emerging options. Traditional delivery technologies are more trustworthy because people have been using them for decades.

2.4 Technology Acceptance Model: TAM and UTAUT2

Davis created the Technology Acceptance Model (TAM) in 1986, and in 1989, he refined it. It consists of two main concepts: perceived usefulness (how useful one thinks a system is) and perceived ease of use (how easy they think

it is to use) (Davis, 1989). They are what allow us to forecast whether someone will want to use technology and use it. TAM is employed in most studies, such as last-mile delivery, to determine how individuals embrace new and established ways of delivery.

The UTAUT model was formulated in 2003 by Venkatesh by integrating eight popular technology acceptance models, one of which is TAM. It contains four major factors that determine whether a person would want to use technology or not: its performance, how easy it is to use, social factors, and support. It also considers factors like age, gender, and experience. UTAUT was extended to UTAUT2 in 2012, with the addition of fun, cost, and habit as predictors. UTAUT2 has been used in many studies, including studies on last-mile delivery by Georgieva (2022). For the purposes of this study, perceived usefulness, ease of use, and trust will be investigated to see why people adopt last-mile delivery services.

3. Research Methodology

3.1 Research Design

Research design is the approach of how a study collects and analyzes data. It depicts the steps of gathering information and evaluating it. A good design entails choosing the research strategy, how to recruit participants, data collection tools, and the way to analyze the findings. It must also be flexible to handle any problem that may come up. This study utilizes a quantitative method, whereby it collects and analyzes numbers to understand what drives people in Johor, Malaysia to use self-pickup service again. The researcher gave questionnaires to random customers who have used these delivery services. The data were analyzed using SPSS software with correlation and reliability tests to see the correlation of perceived usefulness, ease of use, and trust in implementing last-mile delivery. From the findings, it was able to tell the major factors that influence people in Johor, Malaysia to use self-pickup service again. The researcher gave questionnaires to random customers who have used these delivery services. The data were analyzed using SPSS software with correlation and reliability tests to see the correlation of perceived usefulness, ease of use, and trust in implementing last-mile delivery. From the findings, it was able to tell the major factors that influence people in Johor to implement self-pickup services.

3.2 Data Collection

This study employed a quantitative research approach using a structured questionnaire to collect primary data from online consumers residing in Johor. The questionnaire was distributed using online survey platforms to ensure wider reach and convenience for respondents. A non-probability convenience sampling method was adopted as it is suitable for studies involving consumer perception and behavioral intention within a specific geographic context. Respondents were screened to ensure that they had prior experience with online shopping and self-pickup services. The questionnaire consisted of two main sections. The first section captured respondents' demographic information, including gender, age, employment status, education level, online shopping frequency, and experience with self-pickup services. The second section measured key study constructs, namely intention to adopt, perceived usefulness, perceived ease of use, and trust, using multiple items adapted from established literature. All measurement items were rated on a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). A total of 280 valid responses were collected and deemed suitable for further analysis.

3.3 Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) software. Descriptive analysis was first performed to summarise respondents' demographic profiles and to examine the overall levels of intention to adopt, perceived usefulness, perceived ease of use, and trust toward self-pickup services. Mean scores and standard deviations were used to interpret respondents' perceptions for each construct. Subsequently, reliability analysis was conducted using Cronbach's alpha to assess the internal consistency of the measurement items. Correlation analysis was then employed to examine the relationships between perceived usefulness, perceived ease of use, trust, and intention to adopt self-pickup services. These analytical procedures enabled the study to address its research objectives by identifying key factors influencing consumers' adoption intentions within the context of last-mile delivery services in Johor.

3.2.1 Descriptive Analysis

Descriptive research is used to understand past and current trends by transforming raw data into actionable information (Hassan, 2024). Its main purpose is to highlight key trends and findings related to a specific problem.

In this study, the meaning was applied as the measure of central tendency. As shown in Table 3.3, agreement levels can be classified by average values: 1.00–2.33 (low), 2.34–3.67 (moderate), and 3.68–5.00 (high).

3.2.2 Reliability Analysis

Reliability analysis is a fundamental principle in research, assessing the credibility, stability, and dependability of data and systems. It measures the consistency of results when methods or instruments are applied repeatedly under varying conditions (Gajendrakar, 2025). The aim of this study is to evaluate engineering and system dependability, focusing on the likelihood of a system performing its intended function without failure. Internal consistency was examined using Cronbach's alpha, a widely used coefficient ranging from 0 to 1, where higher values indicate stronger reliability. As shown in Table 3.5, alpha values below 0.5 are undesirable, 0.5–0.6 poor, 0.6–0.7 doubtful, 0.7–0.8 acceptable, 0.8–0.9 good, and above 0.9 excellent.

3.2.3 Normality Analysis

Normality analysis tests whether sample data follows a normal distribution, where most values cluster around the mean. Methods such as the Shapiro-Wilk and Kolmogorov-Smirnov tests, along with visual tools like histograms and probability plots, are commonly used. Results are interpreted using p-values: values below 0.05 indicate significant deviation from normality, while values above 0.05 suggest normality cannot be rejected (GeeksforGeeks, 2025). Since many statistical tests assume normality, deviations can affect validity. Sample size also matters small samples may mask deviations, while large samples can detect trivial ones (Editage, 2023).

3.2.4 Correlation Analysis

Correlation analysis measures the strength and direction of relationships between variables. Spearman's rank correlation coefficient is used to assess monotonic relationships, while Pearson's correlation coefficient evaluates the linear relationship between continuous variables (McClenaghan, 2024). Both are widely applied in statistical research.

4. Results and Discussion

4.1 Survey Rate Return

Researchers managed to collect 280 sets of respondents from distributing Google Form to online intended participants. The distribution of the Google Form questionnaire took place through various social media platforms including WhatsApp, Telegram, Instagram, and Facebook which help to contact and reach the respected group of respondents. The data collection period involved the distribution of the Google Form for recommended sample size of 384 for the study as the population are total 2.8 million of the online shoppers in Johor, Malaysia. Unfortunately, only 280 respondents were achieved resulting in the response rate of 72.92% for this study.

4.2 Reliability and Validity Analysis

To understand the relationship between perceived usefulness, perceived ease of use, and trust with adoption of self-pickup services among Johor's online shoppers, this study emphasized the reliability of data collected. Reliability analysis ensures internal consistency of findings, allowing results to be repeated with confidence (Mohajan, 2017). The reliability test was conducted in two phases: the pilot study and the actual study, each involving different subsets of the research process. Cronbach's Alpha, with values ranging from 0 to 1, was used to measure internal consistency for both phases.

4.2.1 Reliability and Validity of Pilot Test

The pilot study is conducted with a total of 15 respondents participating in this pilot study. Table 1 shows the result of this pilot study was analyzed using SPSS software and presented in Table 1. The pilot study results indicate encouraging reliability levels across all measured constructs. Perceived usefulness (PU) recorded a Cronbach's alpha of 0.912, showing acceptable reliability. Perceived ease of use (PEOU) and trust both achieved strong internal consistency with coefficients of 0.970, while adoption of self-pickup services as the dependent variable showed a reliability level of 0.929. Since all values are $\alpha \geq 0.7$, the items used under these variables are considered reliable and acceptable for this study.

Table 1 Reliability Test (Pilot Test)

Variables	Cronbach's Alpha value for the pilot study (15 respondents)	No. Items
Perceived Usefulness (PU)	0.912	4

Perceived Ease of Use (PEOU)	0.97	4
Trust (T)	0.97	4
Adoption of Self-Pickup Service (ADOPTION)	0.929	4

4.2.2 Reliability and Validity of the Actual Study

The actual study was conducted with a total of 280 sets of questionnaires that were successfully collected through Google Forms. Hence, the results of the actual study were analyzed using the SPSS software. Once the credibility and reliability of the preliminary pilot study were established, the main actual study was conducted. As indicated in Table 2, the reliability test result and Cronbach's Alpha values for each item demonstrated robust internal consistency with the actual study, with Cronbach's Alpha exceeding 0.7. The primary focus of this actual study comprised 280 online shoppers' respondents from Johor.

Table 2 Reliability Test (Actual Study)

Variables	Cronbach's Alpha Value	No. Items
Perceived Usefulness (PU)	0.925	4
Perceived Ease of Use (PEOU)	0.953	4
Trust (T)	0.959	4
Adoption of Self-Pickup Service (ADOPTION)	0.923	4

4.3 Demographic Background

The demographic, as in Table 3, included items such as gender, age, employment status, education level, online shopping frequency, prior experience with self-pickup services, and residential location. Most respondents were female (50.70%), aged 18–23 years old (43.20%), full-time employed (38.60%), and students (38.20%). Most respondents held a bachelor's degree (48.60%), shopped online monthly (45.70%), and had used self-pickup services once or twice (41.80%). All respondents (100%) were currently residing in Johor, confirming the sample's geographical relevance.

Table 3 Respondent's Demographic

Demographic	Details	Frequency	Percentage (%)
Gender	Male	138	49.3
	Female	142	50.7
	Total	280	100
Age	18-23	121	43.2
	255-34	80	28.6
	35-44	48	17.1
	45-54	16	5.7
	55 and above	15	5.4
	Total	280	100
	High School	57	20.4
Education Level	Diploma/Pre	73	26.1
	University/Matriculation/STPM		
	Bachelor's Degree	136	48.6
	Master's Degree	14	5
	Total	280	100
How Often You Shop Online	Daily	4	1.4
	Weekly	50	17.9
	Monthly	128	45.7
	Occasionally	69	24.6
	Rarely	29	10.4
	Total	280	100
Have You Ever Used a Self-Pickup Services for Online Shopping Deliveries	Once or Twice	117	41.8
	Sometimes	94	33.6

	Frequently	69	24.6
	Never	0	0
	Total	280	100
	Yes	280	100
Are You Currently Residing in Johor	No	0	0
	Total	280	100

4.4 Descriptive Analysis

The descriptive analysis, as indicated in Table 4, shows that respondents have a moderate perception of perceived usefulness ($M = 3.48$) and a moderate level of adoption intention toward self-pickup services ($M = 3.41$). In contrast, perceived ease of use ($M = 3.97$) and trust ($M = 3.97$) record high mean values, suggesting that respondents generally find self-pickup services easy to use and have strong confidence in the service. These findings imply that while consumers are comfortable with and trust self-pickup systems, their perceived benefits and overall adoption intention remain at a moderate level.

Table 4 Descriptive Analysis

	Mean	Level of Tendency
Independent Variable		
Perceived Usefulness	3.48	Moderate
Perceived Ease of Use	3.97	High
Trust	3.97	High
Dependent Variable		
Adoption of Self-Pickup Service	3.41	Moderate

4.5 Correlation Analysis

Spearman's rho correlation analysis shows that perceived usefulness, perceived ease of use, and trust are all positively and significantly related to adoption of self-pickup services. As presented in Table 5, perceived usefulness demonstrates a very strong positive correlation with adoption intention ($\rho = 0.852$, $p < 0.001$), indicating it is the most influential factor. Perceived ease of use ($\rho = 0.607$, $p < 0.001$) and trust ($\rho = 0.623$, $p < 0.001$) also exhibit moderate to strong positive relationships with adoption intention. Overall, the findings support all proposed hypotheses and are consistent with the Technology Acceptance Model.

Table 5 Correlation Analysis

Spearman's rho	PU (IV1)	PEOU (IV2)	T (IV3)
Correlation Coefficient	0.852**	0.607**	0.623**
Adoption of Self-Pickup Service			
Sig. (2-tailed)	<.000	<.000	<.000
N	280	280	280

5. Conclusion

This study examined the factors influencing consumers' intention to adopt self-pickup services in last-mile delivery, focusing on perceived usefulness, perceived ease of use, and trust within the Technology Acceptance Model framework. The findings indicate that all three factors play significant and complementary roles in shaping adoption intention. Overall, respondents viewed self-pickup services as both useful and easy to use, indicating that these services are perceived as practical alternatives to traditional home delivery. High perceived ease of use further reinforces perceived usefulness by reducing the effort required to use the service. Trust also emerged as a key determinant, as confidence in courier providers and supporting systems helps reduce uncertainty and encourages adoption. In summary, the results confirm that perceived usefulness, perceived ease of use, and trust jointly influence consumers' intention to adopt self-pickup services. The study contributes to understanding consumer adoption behavior in last-mile delivery and supports the applicability of TAM-based models in explaining self-pickup service adoption.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Farah Hanani Mohd Hairi, Mohd Zarir Yusoff; **data collection:** Farah Hanani Mohd Hairi; **analysis and interpretation of results:** Farah Hanani Mohd Hairi; **draft manuscript preparation:** Farah Hanani Mohd Hairi, Mohd Zarir Yusoff. All authors reviewed the results and approved the final version of the manuscript.

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