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# Evaluating the Sabah Pay Mobile Application (e-Wallet) using the Technology Acceptance Model

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### ARTICLE INFO

### ABSTRACT

The Sabah Pay e-wallet has been introduced as a digital payment solution in the state of Sabah, Malaysia, as part of a digital transformation initiative. However, there is a lack of comprehensive understanding regarding its user acceptance and the factors influencing it. Specifically, there is a need to investigate whether users perceive Sabah Pay as useful and easy to use. This research problem arises due to the importance of user acceptance in the success and sustainability of the e-wallet. Hence, we used the technology acceptance model (TAM) to analyse the perceived usefulness (PU) and customer satisfaction in using the Sabah Pay mobile application and the relationship between perceived ease of use (PEOU) and customer satisfaction using the Sabah Pay mobile application. The Cronbach's Alpha and composite reliability values are higher than 0.7, and the average variance extracted (AVE) is higher than 0.5, which supports the TAM constructs' convergence validity. The square root of AVE for each construct is higher than the corresponding correlations between constructs, which suggests the discriminant validity of the constructs. We used the Partial least squares structural equation modelling (PLS-SEM) to assess the data from the 173 respondents who reported using the Sabah Pay mobile application. We found that PU did not significantly affect customer satisfaction (CS), with a p-value of 0.207, although the path coefficient is 0.109, thus disproving the null hypothesis (H1). However, we supported the second hypothesis (H2) by observing that PEOU substantially impacted CS, with a p-value of 0.000 and a path coefficient of 0.614. The correlation indices demonstrated a satisfactory relationship between the data and the model. This research adds to the body of knowledge on mobile payment platforms by shedding light on perceived usefulness and ease of use factors that most affect users' happiness with Sabah Pay. The study suggests and identifies extensive research into potential customer satisfaction aspects like safety, trust, and value. This study's findings have real-world applications for practitioners and regulators looking to improve the mobile payment platform user experience and, by extension, boost customer happiness and adoption rates.

### Keywords:

Technology acceptance model; Sabah Pay; e-wallet; customer satisfaction

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## 1. Introduction

The way individuals communicate, obtain information, and perform numerous tasks in their daily lives, including making payments, has been transformed by the Internet. With the rise of smart gadgets like smartphones and tablets, users can now make payments fast and easily without using actual cards or currency. Electronic wallets (e-wallets), a crucial component of the electronic payment system, are one of the most remarkable technologies of the twenty-first century. Now that cashless transactions are well-liked, e-wallet demand is rising rapidly globally [1]. Nizam *et al.*, [2] found that customers would instead use modern technology for daily routine banking transactions because it is faster, cost-effective, and more efficient. Using an e-wallet is an excellent solution to meet this demand. As part of the government's attempt to bolster a digital economy, eligible Malaysians can earn points using certain e-wallet providers, allowing for more secure and frictionless payment experiences while generating revenue for the country during the pandemic [3]. Customers are now switching from traditional payment gateways to e-wallet technologies to speed up transactions. A one-of-a-kind password protects this digital wallet and may be used to purchase anything from everyday necessities to high-priced luxury items [4].

A survey conducted by the Malaysian Communications and Multimedia Commission [5] showed that mobile payment apps as a substitute for traditional payment methods for 41.0% of the respondents. Despite the advantages and usability of mobile payment systems, their adoption still needs to improve in Malaysia. 59% of smartphone users cited a lack of knowledge, confidence, or expertise and a preference for cash or credit card purchases as the main barriers to utilising mobile payment apps. Touch 'n Go e-Wallet (71.3 %), Boost (35.1 %), and Maybank QRPay were the three most popular apps among the respondents (41.0 %) who said they used mobile payment apps (31.1%). GrabPay saw considerable usage (20.8%), while the remaining mobile payment apps saw the lowest use (4.0% for AEON Wallet, 3.6% for Razer Pay, 3.5% for WeChat Pay, and 2.8% for Shopee Pay). Although electronic-based payment has steadily increased, few know how users utilise its services [6].

Sabah, a north-eastern state in Malaysia, released Sabah Pay, an e-wallet app, on 12<sup>th</sup> February 2020. The Sabah Credit Corporation (SCC) implemented and oversaw Sabah Pay, a project aimed at the state's digital transformation. The lack of a user acceptance study for Sabah Pay and understanding of customer satisfaction could impact its future usage and sustainability. However, the launch of the Sabah Pay e-wallet application is expected to make people's daily lives more convenient, as they can now use their smartphones instead of cash or other tangible forms of payment. They can use their smartphones and install an e-wallet application. In other words, users can use the application to pay for all government expenses, including loans, permits, e-hailing, and food delivery services (GrabFood, Foodpanda). This e-wallet payment system does have some drawbacks despite having many useful features.

Customers' perspectives influence technology adoption in a world where change is occurring rapidly. On the other hand, the current study provides some quantitative information about the ideal number of these kinds of connections. This study attempts to fill this knowledge gap through these research questions

- i. Research Question 1 (RQ1): Does the perceived usefulness influence customer satisfaction in using the Sabah Pay mobile application?
- ii. Research Question 2 (RQ2): Does a customer's opinion of the ease of use affect their satisfaction with Sabah Pay?

Hence, to answer the above research questions, the study aims to analyse the perceived usefulness and customer satisfaction in using the Sabah Pay mobile application and the relationship

between perceived ease of use and customer satisfaction using the Sabah Pay mobile application. Therefore, this study aims to learn about customers' experiences with using the Sabah Pay mobile app. Thus, this research focuses on understanding how customers feel about Sabah Pay mobile application goods and services and identifying potential determinants of that satisfaction, such as usefulness, ease of use, and service quality. Hence, the following hypotheses are formulated to verify the study's findings

- i. Hypothesis 1: The perceived usefulness positively affects customer satisfaction using the Sabah Pay mobile application.
- ii. Hypothesis 2: Positive relationships exist between perceived ease of use and customer satisfaction using the Sabah Pay mobile application.

This research investigates user acceptance and customer satisfaction with the Sabah Pay mobile app by applying the Technology Acceptance Model (TAM) framework, commonly used to examine the adoption of new technical innovation, especially e-wallet technology. TAM seeks to improve our knowledge of user acceptability and provide a theoretical basis for designing future technological systems [7]. Other measurement frameworks, such as the Unified Theory and Use of Technology (UTAUT) and User Acceptance Testing (UAT), are unsuitable for this study as the study aims to answer the above research questions, specifically on the perceived usefulness and ease of use of the Sabah Pay e-wallet.

Using a unified e-payments platform, Lai [8] investigates the effectiveness of customers' perceived risks among Malaysians with higher TAM model threat perception. The investigation discovered that consumers' intentions to adopt single-platform e-payments could be affected by their risk perception [8]. We used TAM as our experimental framework to discover elements that affect users' acceptance and adoption of the Sabah Pay mobile application. A similar study conducted by Narayan and Singh [9] utilised TAM to identify the elements impacting Indian users' acceptance of mobile payment systems. The study discovered that the three main criteria affecting users' endorsement of mobile payment services were perceived usefulness, ease of use, and trust.

In Sabah especially, there has been a need for more research on e-wallet use and customer satisfaction within the last few years. The previous research regarding e-wallet payment acceptance in Sabah was conducted by Amin [10], who examined the factors influencing mobile wallets' use in Sabah, Malaysia. Although studies on using e-wallets in Malaysia have been carried out, future research is necessary to understand how e-wallet acceptance and customer satisfaction may vary in Sabah, a more rural and underdeveloped state, than in other parts of Malaysia. The study failed to give sufficient attention to the elements affecting customer satisfaction in favour of focusing on those affecting the adoption of e-wallets [10]. Sabah-based research could shed light on the aspects that influence customer satisfaction in this area, such as the effectiveness of the service quality and perceived ease of use on this latest e-wallet platform, Sabah Pay mobile applications. This study will, therefore, shed light on how satisfied Sabah Pay app customers are.

### *1.1 Technology Acceptance Model (TAM)*

Franchise firms in Indonesia have shown an increased interest in purchasing digital wallets. In a study with 53 franchise business owners, Farida and Ardiansyah [11] investigated how TAM affects elements of franchise firms' interest in purchasing digital wallets. The findings revealed that perceived utility and usability significantly increased franchise organisations' interest in purchasing digital wallets. The study also discovered that the attitude toward adopting digital wallets mediated the perceived utility and desire in purchasing.

Customers' intent to continue using mobile payment systems was the focus of a study conducted by Li and Liang [12]. The links between perceived usefulness, perceived ease of use, perceived enjoyment, perceived risk, social impact, and continuing discretion were examined using the TAM. As a result, customers' positive attitudes toward mobile payment systems influenced their opinions of the systems' usefulness, ease of use, and interest. On the other hand, the perceived danger harms customers' continuing intentions, whereas social influence has a mixed impact. Li and Liang [12] recommended that mobile payment providers concentrate on enhancing customers' perceptions of the service's usefulness and ease of use to boost customers' desire to keep using the service. The authors found that TAM is a good tool for estimating and comprehending customers' intent to utilise mobile payment systems.

Using a mix of the TAM and the Theory of Reasoned Action (TRA), Rahmayanti *et al.*, [13] intended to estimate the ongoing intention to use e-wallets in Indonesia. Structural equation modelling was applied to examine the data from 260 users of e-wallets. The results showed that customers' attitudes about using e-wallets were significantly predicted by both perceived usefulness and ease of use, affecting their intention to continue using e-wallets. According to the study's findings, combining TAM and TRA was a good strategy for determining the variables affecting customers' intentions to keep using e-wallets.

Hidayat *et al.*, [14] examined e-wallet customer behaviours among OVO customers in Indonesia by extending the TAM and including trust and mobility elements. The authors used 384 OVO customers' answers to a questionnaire and used a quantitative method to gather their data. The findings demonstrated that the enlarged model, which considered mobility and trust characteristics, was a more accurate predictor of e-wallet usage behaviour. According to the study, customers' behavioural intentions to use an e-wallet are positively influenced by perceived usefulness, simplicity of use, trust, and mobility. The study also discovered that perceived ease of use had less impact on e-wallet uptake than trust. To encourage e-wallet acceptance in Indonesia, the authors advise e-wallet providers to enhance trustworthiness and mobility characteristics. Generally, the study contributes to developing the TAM model and offers insights into the variables impacting e-wallet customer behaviours in Indonesia.

Lew *et al.*, [15] expanded the TAM to incorporate new categories like perceived value, perceived risk, and perceived trust with 413 eligible respondents in Malaysia who have used mobile wallets for purchases surveyed for the study. According to the authors, the extended TAM model, which considers perceived value, perceived risk, and perceived trust, offers a better understanding of customers' adoption behaviour than the conventional TAM. The findings indicate that customers in the hospitality sector are embracing m-wallets due to their benefits and ease of use. The study also demonstrates that customers' intentions to use mobile wallets in the hospitality sector are significantly influenced by perceived value and trust.

TAM is used in the literature to understand customers' intentions and behaviours toward e-wallets and mobile payment systems. The model's key constructs, perceived usefulness, and ease of use have consistently influenced user adoption and continued usage. The following section will review the literature on perceived ease of use, which has emerged as an essential factor in shaping user perceptions and behaviours toward e-wallets and mobile payment systems.

## 1.2 Perceived Ease of Use

The TAM construct, perceived ease of use, has been thoroughly researched in the literature. Perceived ease of use as a crucial factor influencing user adoption of technology describes the extent to which a user thinks utilising a specific technology would be effortless [7, 16]. Hansen *et al.*,

[17] focus on how risk, trust, perceived ease of use (PEOU), and behavioural control interact to predict how much social media would be used for customer transactions. 318 UK customers who do business using social media were surveyed for the study. The customers comprised 129 males and 189 females, where the female customers took the majority sample of 59%. The findings demonstrate that risk, trust, perceived ease of use, and behavioural control significantly influence customer intent to use social media for transactions. The result shows that customers' intentions are more strongly influenced by perceived ease of use when they have higher confidence in social media. In contrast, behavioural control more strongly influences customers' preferences when they perceive a higher level of risk with social media use. Hansen *et al.*, [17] demonstrated a better understanding of the effect of behavioural intention on social networking services by integrating perceived ease of use and behavioural control.

Another previous study examined the connection between acceptance of mobile payments and perceived ease of use and the mediating effects of perceived usefulness and attitude towards service. Hameed *et al.*, [18] recruited 252 respondents in Pakistan to participate in their self-administered survey. The findings demonstrated that perceived ease of use had a largely favourable impact on attitudes towards use and perceived usefulness, positively impacting acceptance of mobile payments. The authors advised e-wallet providers to create user-friendly and simple interfaces as this can improve customers' attitudes about the technology and their perception of its utility.

While utilising e-wallets and other systems, perceived ease of use significantly predicts perceived usefulness [19, 20]. Using the combination of the TAM and Innovation Diffusion Theory (IDT), Christian *et al.*, [20] examine how customer creativity and mobile skilfulness affect the acceptance of e-wallets in Vietnam. Quantitative data was gathered using a self-administered questionnaire in Vietnam's three most important cities: Hanoi, Ho Chi Minh, and Danang. Nine hundred eighteen respondents comprised the data samples, which were compiled using purposive sampling. Their findings demonstrate that customer creativity and mobile skilfulness favourably impact perceived usefulness and ease of use, positively influencing customer satisfaction and intentions to use e-wallets. The authors discovered that perceived ease of use, as opposed to perceived usefulness, significantly affects the choice to use e-wallets.

Osman *et al.*, [21] investigate the factors influencing millennial travellers' acceptance and use of e-wallets in Malaysia. The authors recruited 100 millennial travellers as the respondents to participate in their survey. Their findings show that perceived ease of use of e-wallets among millennial travellers proved to be the most significant cause among millennial travellers. Furthermore, the authors discovered that millennial travellers' adoption and use of e-wallets are not significantly correlated with perceived cost or security. To ensure that the e-wallet system is secure enough for millennial travellers, the authors recommended that e-wallet service providers offer a dependable and trustworthy architecture of security measures.

The literature suggests that perceived ease of use is vital in determining users' intentions to adopt and continue using e-wallets and mobile payment systems. The studies reviewed have identified several factors that contribute to perceived ease of use, such as user interface design, system navigation, and transaction speed. While e-wallet providers and policymakers have tried to improve these aspects, there is room for improvement to enhance users' ease of use. The following section will focus on another critical factor influencing user adoption: perceived usefulness.

### 1.3 Perceived Usefulness

Conceptually, perceived usefulness is defined as the degree to which users trust technological advancements that are a component of services that can deliver the best performance for their users [22]. Nirmawan and Astiwardhani [23] examined the desire of small vendors in Indonesia to adopt Go-Pay mobile payment services. One hundred twenty small vendors from Surabaya, Indonesia, participated in the questionnaire. The authors use multiple regression analysis to investigate the effects of four independent variables on the intention to use Go-Pay, including perceived cost, trust, usefulness, and customer value addition. The findings demonstrate that every independent variable significantly influences the choice of Go-Pay. Their results show that trust, usefulness, and customer value addition favourably affect the intention to use, while perceived cost negatively impacts them. Nonetheless, the authors concurred with De Luna *et al.*, [24], who claimed that perceived behaviour, usefulness, and simplicity of use all influence a person's intention to adopt the technology. Nirmawan and Astiwardhani [23] suggested that Go-Pay's provider improve its perceived value and usefulness to attract more customers and tiny businesses.

Mei and Aun [25] explore the aspects that affect customers' perceptions of the value of mobile wallets (M-Wallets) in Malaysia's Klang Valley. Three hundred eighty-four respondents who had used M-Wallet in the previous six months participated in a survey. The study assessed usefulness, perceived ease of use, and perceived risk using the TAM as its conceptual framework. Their findings indicate that while the perceived risk is negatively connected to the intention to use M-Wallet, perceived usefulness and ease of use are positively related. The authors also discovered that the perceived usefulness of the M-Wallet has an enormous effect on customer satisfaction and intentions to utilise it.

The studies reviewed have highlighted various factors that influence user adoption, including perceived usefulness, perceived ease of use, perceived security, social influence, trust, and customer satisfaction. While some studies have found demographic factors significant, others have found no such association. Overall, the findings suggest that e-wallet providers and policymakers should focus on enhancing the perceived usefulness and ease of use of e-wallet services while mitigating perceived risks to increase user adoption. The literature review has also identified the need for further research to explore the impact of emerging technologies and changes in consumer behaviour on the adoption of e-wallets and mobile payment systems. Hence, this study aims to address this research gap by using TAM to analyse the perceived usefulness and customer satisfaction in using Sabah Pay and the relationship between perceived ease of use and customer satisfaction using the Sabah Pay mobile application.

## **2. Methodology**

### **2.1 Data Collection**

This study focuses on evaluating the level of customer satisfaction with the Sabah Pay mobile application as an e-wallet service. We aim to identify the strengths and weaknesses of the Sabah Pay mobile application, assess the user experience, and provide insights for improvements to enhance customer satisfaction—a purposive sampling technique was used to collect data through an online Google Forms survey. The target population of this study consisted of individuals who had used the Sabah Pay mobile application at least once—the Google Form questionnaire was distributed through social media platforms like Facebook, Twitter, and WhatsApp. Participants were encouraged to share the survey link with their contacts who met the criteria.

One hundred seventy-three respondents filled out the survey, out of which 17 respondents answered that they had never used the Sabah Pay mobile application and were then excluded from the study. The subsequent analysis is conducted using the remaining 156 responses. The profile of

the respondents includes 106 females and 67 males (61.3% and 38.7%, respectively). The age groups of 31–50 (52%) and 18–30 (33.5%) had the highest percentage of respondents, while the age group of 51–70 (14.5%) had the lowest number of respondents. In the sample, there were 58 (33.5%) government employees, 41 (23.7%) students, 40 (23.1%) private sector workers, 24 (13.0%) people who were self-employed, and 10 (5.8%) people who were unemployed. In addition, 41 (23.7%) respondents earned between RM5000 and RM7000, 44 (25.4%) respondents had incomes of RM7000 or more, 55 (31.8%) respondents had revenues between RM0 and RM2500, 33 (19.1%) respondents had incomes between RM2500 and RM5000.

This questionnaire aimed to gather data for analysis on the Sabah Pay mobile application's perceived usefulness, ease of use, and customer satisfaction. The participant's gender, age group, occupation, and monthly income, which contain four items, were among the demographic questions included in the questionnaire. A Likert-Scale of 1–5 was used for the following components where participants had to express their thoughts on using the Sabah Pay mobile application. Customer satisfaction with Sabah Pay features (6 items), usefulness (5 items), ease of use (5 items), service quality (4 items), and behaviour intention concerning the Sabah Pay mobile application (4 items) are covered in these sections.

## *2.2 Data Analysis*

Data analysis was conducted using descriptive analysis to summarise the respondents' demographic information and level of satisfaction with the Sabah Pay mobile application. This study estimated and tested the proposed model using partial least square structural equation modelling (PLS-SEM). A PLS model's minimum sample size should be at least ten times the number of inner model paths directed at a specific construct. The sample size in this instance was 173, which was greater than the minimum needed size of 60 [26]. Some researchers found PLS-SEM to be very helpful when attempting to predict significant factors or to single out essential aspects [27, 28]. PLS-SEM has been chosen as the analysis method to identify the factors that significantly influenced the respondents' intention to continue using the application and to recommend it to others. The primary justification for using PLS-SEM is that PLS-SEM is the most effective way to deal with small sample numbers and irregular data distribution [26]. Therefore, the data in this study were analysed using SmartPLS 4.0.9.2's PLS-SEM.

Seven questions were used to gauge customers' happiness with the Sabah Pay mobile application. The first question intended to ascertain whether the user utilised the Sabah Pay mobile application daily, weekly, monthly, occasionally, or never. The sample consisted of 79 respondents (45.7%) who used Sabah Pay every month, 71 respondents (41%) who used Sabah Pay infrequently, 17 respondents (9.8%) who never used the application, five respondents (2.9%) who used Sabah Pay every week, and one respondent (0.6%) who used Sabah Pay daily. The following section of the questionnaire asked respondents to rank the many factors affecting the adoption of mobile wallets. The essential elements in that order were the Sabah Pay mobile application's usefulness, ease of use, and service quality.

PLS-SEM involves several steps to analyse data and test hypotheses, starting with descriptive statistics and reliability analysis to assess the data quality and measurement scales. We conducted a validity assessment to ensure that the measurement scales accurately measure the intended constructs. The primary analysis involves estimating the path coefficients between variables to test hypothesised relationships and model fit assessment to evaluate the model's overall fit. Finally, the results are interpreted to draw conclusions and implications from the findings. This study focuses on the independent variables: perceived usefulness and ease of use. The steps in PLS-SEM analysis

would involve assessing the quality and validity of the data, estimating the path coefficients to test the hypothesised relationships, and interpreting the results to conclude the relationship between perceived usefulness, ease of use, and customer satisfaction. In Russo and Stol [29], PLS-SEM basics are covered, including its software engineering research applications, benefits, and drawbacks.

We next conducted Structural Equation Modeling (SEM) Analysis to test the hypothesised relationships between perceived usefulness, ease of use, and customer satisfaction by performing Path Coefficient Estimation and Hypothesis Testing. The path coefficients between perceived usefulness and customer satisfaction, as well as between ease of use and customer satisfaction, can be estimated from the model. These coefficients indicate the strength and direction of the relationships between the variables. Positive coefficients support Hypotheses 1 and 2, meaning that perceived usefulness and ease of use positively affect customer satisfaction. Hypothesis testing involves examining the significance (p-value) of the path coefficients by using 0.05 as its significance level. If the p-values are below a predetermined significance level, the hypotheses can be supported, indicating a significant relationship between the variables. Suppose the p-values are above the significance level. In that case, the hypotheses may not be supported, suggesting that there may not be a significant relationship between the variables in the context of this study.

In PLS-SEM, we used t-tests to test the significance of the path coefficients (i.e., the strength and direction of the relationships between the latent variables). T-values are computed by dividing the path coefficient estimate by its standard error. The resulting t-value is then compared to a critical value based on the degrees of freedom and the desired significance level (0.05).

Lastly, the results of the data analysis are interpreted considering the findings. If the hypotheses are supported, it would suggest that perceived usefulness and ease of use positively influence customer satisfaction with the Sabah Pay mobile application. If the hypotheses are not supported, it would indicate that there may not be a significant relationship between the variables being studied. This could mean that the variables of perceived usefulness and ease of use may have a negligible influence on customer satisfaction towards Sabah Pay in the context of the research study.

### **3. Results**

#### *3.1 Measurement Model Assessment*

Testing the measurement model's validity and reliability results in an evaluation [30]. The Cronbach's alpha and composite reliability (CR) metrics were employed for reliability testing. Each of these measurements should have a recommended value of 0.70 [30]. Table 1 proves the reliability because the values of both measures are deemed adequate.

As shown in Table 1, the factor loadings of items C3, C4, C5, U2, E1, and E4 were less than 0.7, which may indicate potential issues with their validity and contribution to the measurement model. Factor loadings represent the strength of the relationship between each item and its respective construct, with higher values indicating stronger associations. Generally, a factor loading of 0.7 or higher is considered acceptable in social sciences research as it suggests that the construct explains at least 50% of the variance in the item. The decision to eliminate these items from the construct's structure may have been based on the established requirement of having factor loadings above 0.7 to ensure adequate measurement model quality. This decision may have been made to improve the overall reliability and validity of the measurement model, as items with low factor loadings may not accurately represent the underlying construct and may introduce measurement error or noise into the analysis. The decision to eliminate items should be based on sound theoretical or empirical justifications. Researchers should exercise caution when removing items from a measurement model, as it may impact the construct's validity and the interpretation of research findings. It is also



recommended to assess the potential impact of removing these items on the overall model fit and the consistency of the findings with prior research or theoretical expectations.

The average variance extracted (AVE) is a typical metric for determining convergent validity. It is defined as the grand mean value of the squared loadings of the items associated with the construct. The construct explains over 50 per cent of the variation of its elements when the AVE has a value of 0.5 or above. The Cronbach's Alpha and composite reliability values are higher than 0.7, and the AVE values are higher than 0.5, as shown in Table 1. As a result, the constructs' convergent validity is proven.

**Table 1**  
 Measurement model results

Constructs	Items	Loadings	Cronbach's alpha	Composite reliability	Average variance extracted
Customer satisfaction	C1	0.757	0.801	0.817	0.506
	C2	0.727			
	C3	0.640			
	C4	0.577			
	C5	0.691			
	C6	0.846			
Perceived usefulness	U1	0.795	0.859	0.871	0.639
	U2	0.691			
	U3	0.843			
	U4	0.845			
	U5	0.814			
Perceived ease of use	E1	0.530	0.770	0.796	0.494
	E2	0.800			
	E3	0.750			
	E4	0.634			
	E5	0.763			
Behaviour intention	B1	0.737	0.757	0.765	0.574
	B2	0.744			
	B3	0.814			
	B4	0.734			

Based on the findings in Table 2, the diagonal values (square root of AVE) for each construct (BI, CS, PEOU, and PU) are higher than the corresponding correlations between constructs. These values indicate that each construct's variance is more significant than its shared variance with other constructs, supporting the discriminant validity of the constructs. This suggests that the constructs have discriminant validity, as the shared variance between constructs is lower than the variance explained by each construct individually. This indicates that the constructs are distinct and do not excessively overlap in the variance they explain, supporting the notion that they measure different underlying concepts.

**Table 2**  
 Fornell-Larcker criterion results

	BI	CS	PEOU	PU
BI	0.751			
CS	0.453	0.835		
PEOU	0.620	0.686	0.787	
PU	0.680	0.514	0.659	0.833

For the behavioural intention (BI) construct, all four items (B1, B2, B3, and B4) have relatively high factor loadings, ranging from 0.687 to 0.831. This result suggests that these items are strongly

associated with the construct of BI and contribute significantly to its measurement. In the customer satisfaction (CS) construct, three out of four items (C1, C2, and C6) have relatively high factor loadings, ranging from 0.808 to 0.873, indicating solid associations with the construct of CS. However, item C6 has a slightly lower factor loading of 0.444, which may indicate a weaker association with CS than the other items. Perceived ease of use (PEOU) construct, three out of four items (PEOU, E3, and E5) have relatively high factor loadings ranging from 0.690 to 0.828, indicating solid associations with the construct of PEOU.

However, item E2 has a slightly lower factor loading of 0.356, suggesting a weaker association with PEOU than the other items. In the perceived usefulness (PU) construct, three out of four items (PU, U3, and U4) have relatively high factor loadings, ranging from 0.499 to 0.863, indicating solid associations with the construct of PU. However, item U1 has a slightly lower factor loading of 0.357, suggesting a weaker association with PU than the other items. Most items' factor loadings are above the recommended threshold of 0.70, indicating good reliability and validity of the measurement model. However, the slightly lower factor loadings of some items (C6, E2, U1) may raise concerns about their reliability and validity. Further investigation may be needed to determine their contribution to their respective constructs. The findings of factor loadings are shown in Table 3.

**Table 3**  
 Cross-loading results

	BI	CS	PEOU	PU
B1	0.687	0.204	0.420	0.599
B2	0.705	0.232	0.475	0.582
B3	0.831	0.391	0.505	0.499
B4	0.771	0.433	0.471	0.468
C1	0.396	0.873	0.639	0.368
C2	0.282	0.821	0.558	0.334
C6	0.444	0.808	0.517	0.577
E2	0.548	0.356	0.690	0.639
E3	0.474	0.592	0.828	0.447
E5	0.486	0.617	0.834	0.539
U1	0.513	0.357	0.532	0.784
U3	0.586	0.442	0.576	0.852
U4	0.598	0.472	0.585	0.863
U5	0.565	0.430	0.504	0.831

Constructs of BI and CS, CS and PEOU, CS and PU, PEOU and PU, and PEOU and PU are considered to have discriminant validity, as the hetero-trait correlations are lower than the monotrait correlations for these pairs of constructs (see Table 4). However, the discriminant validity between BI and PEOU and BI and PU is questionable, as the hetero-trait correlations between BI and PEOU (0.882) and BI and PU (0.878) are higher than the monotrait correlations for BI (1.000), indicating potential issues with discriminant validity between these pairs of constructs according to the HTMT criterion.

**Table 4**  
 Hetero-trait-monotrait (HTMT) results

	BI	CS	PEOU	PU
BI				
CS	0.531			
PEOU	0.882	0.889		
PU	0.878	0.621	0.887	

It is important to note that the HTMT criterion suggests that the hetero-trait correlations should be lower than the monotrait correlations, ideally below a threshold of 0.85, to indicate strong discriminant validity between constructs. If the HTMT values exceed the threshold, it may show potential overlap or similarity between the constructs. Further investigation may be needed to determine if discriminant validity is adequately established. The discriminant validity between BI, PEOU, BI, and PU must be investigated. It may require further investigation or refinement of the measurement model to establish adequate discriminant validity between these constructs.

The R-square values indicate the proportion of variance explained by the respective predictor variables (BI and CS) in the dependent or outcome variable. The R-square value for BI is 0.205, indicating that BI explains 20.5% of the variance in the outcome variable. This is considered a low R-square value, suggesting BI may negatively impact the outcome variable. Other factors not included in the model may also contribute significantly to the variance in the outcome variable.

On the other hand, the R-square value for CS is 0.477, which indicates that CS explains 47.7% of the variance in the outcome variable. This is considered a moderate R-square value, suggesting that CS has a moderate impact on the outcome variable and accounts for a substantial portion of the variance. Interpreting R-square values in the specific research or analysis context is crucial. A low R-square value does not necessarily mean that the predictor variable is unimportant or that the model could be more helpful, as other factors may be at play. Similarly, a moderate R-square value may indicate a meaningful impact of the predictor variable on the outcome variable, but further analysis and interpretation are needed to fully understand the findings and their implications.

### 3.2 Structural Model Assessment

The hypothesis testing data in Table 5 includes two hypotheses (H1: The perceived usefulness positively affects customer satisfaction using the Sabah Pay mobile application; H2: Positive relationships exist between perceived ease of use and customer satisfaction using the Sabah Pay mobile application) with their respective path coefficients and p-values, which are commonly used in PLS-SEM to test the significance of relationships between variables. Hypothesis 1 ( $B = 0.109, p > 0.05$ ) proposes a path from PU (predictor variable) to CS (outcome variable). The path coefficient represents the strength and direction of the connection between the predictor and outcome variables.

**Table 5**  
 Hypothesis test results

Hypothesis	Path	Path Coefficient	Mean	Standard Deviation	p-value	t-value	Remarks
H1	PU -> CS	0.109	0.113	0.086	0.207	1.262	Not supported
H2	PEOU -> CS	0.614	0.613	0.074	0.000	8.262	supported

In this case, the path coefficient of 0.109 indicates a positive relationship between PU and CS, suggesting that as PU increases, CS also tends to grow, but the relationship is relatively weak. The p-value of 0.207 indicates the statistical significance of the relationship between PU and CS. The p-value determines whether the observed relationship between variables is statistically significant. In this case, with a p-value of 0.207, higher than the commonly used significance level of 0.05, hypothesis H1 is not supported. This means the relationship between PU and CS is not statistically significant in the analysed data.

Hypothesis 2 ( $B = 0.614, p < 0.05$ ) proposes a path from PEOU (predictor variable) to CS (outcome variable). The path coefficient of 0.614 indicates a strong positive relationship between PEOU and CS, suggesting that as PEOU increases, CS also tends to grow, and the connection is relatively strong. The p-value of 0.000 indicates that the relationship between PEOU and CS is statistically significant at the commonly used significance level of 0.05. This means that there is strong evidence to support hypothesis H2 that there is a substantial relationship between PEOU and CS in the analysed data. These findings provide insights into the relationships between the variables. They can inform further analysis and interpretation in the context of the specific research or analysis being conducted.

The t-test results for the two hypotheses are tested in the study (H1: The perceived usefulness positively affects customer satisfaction using the Sabah Pay mobile application; H2: Positive relationships exist between perceived ease of use and customer satisfaction using the Sabah Pay mobile application). Hypothesis 1 ( $B = 0.109, \text{Mean} = 0.113, \text{Standard deviation} = 0.086$ ) was used to calculate the t-statistics. The t-statistics value of  $|O/STDEV|$  is 1.262, indicating a significant relationship between PEOU and CS ( $p < 0.001$ ).

Hypothesis 2 ( $B = 0.614, \text{Mean} = 0.613, \text{Standard deviation} = 0.074$ ) indicates the t-statistics value of  $|O/STDEV|$  is 8.262, indicating a significant relationship between PEOU and CS ( $p < 0.05$ ). The t-test results suggest a strong positive relationship between PEOU and CS, a statistically significant relationship between CS and BI, and an insignificant relationship between PU and CS. See Figure 1 for the full path analysis result.

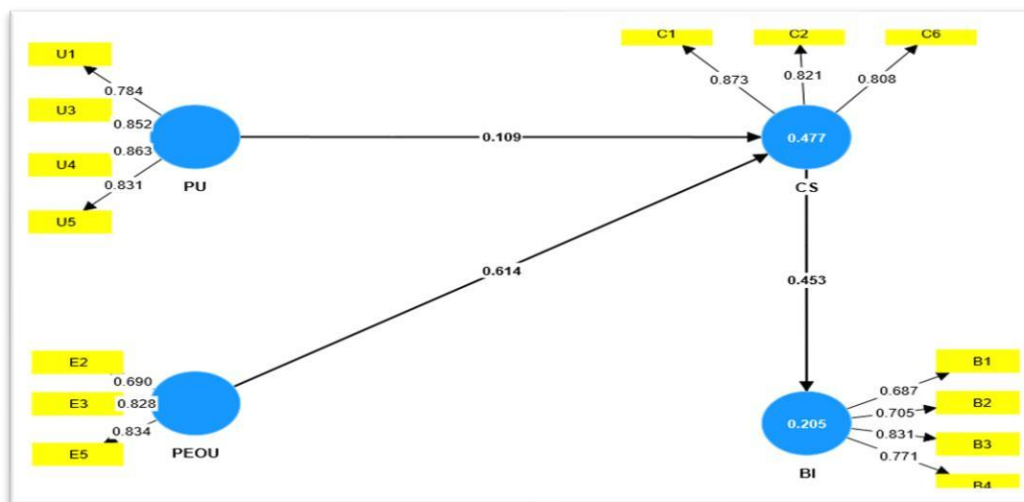


Fig. 1. Path analysis result

#### 4. Conclusion

This study investigates the influence of perceived usefulness and ease of use on customer satisfaction towards Sabah Pay, a specific payment system in a particular context. Although the hypotheses were not supported, the study provides valuable insights and directions for future research. Firstly, the study adds to the literature on technology acceptance and customer satisfaction by examining the relationship between perceived usefulness, ease of use, and customer satisfaction in the context of Sabah Pay, which may have unique characteristics and user behaviours compared to other payment systems. This contributes to the general knowledge of technology acceptance and customer satisfaction theories by providing empirical evidence in a specific context. Secondly, the study highlights the importance of context-specific analysis in research. The findings

suggest that the relationships between perceived usefulness, ease of use, and customer satisfaction may vary depending on the specific payment system studied. Several studies have found support for perceived ease of use on e-wallet studies by Johnson *et al.*, [31], Malik *et al.*, [32], and Raninda *et al.*, [33] and for perceived usefulness by Raninda *et al.*, [33] and Olivia and Marchyta [34] as opposed to the current study. This underscores the need for researchers and practitioners to consider the contextual factors that may influence the relationships between variables of interest.

Thirdly, the study contributes to the methodology of PLS-SEM by demonstrating the application of this statistical technique in analysing the research data. PLS-SEM is a flexible and robust method for analysing complex relationships in small sample sizes. The study provides an example of how it can be applied in technology acceptance and customer satisfaction research. Lastly, the study suggests further investigation, such as investigating potential mediating or moderating factors, refining measurement instruments, and exploring alternative theoretical frameworks. These suggestions can guide future researchers in advancing the understanding of the relationships between perceived usefulness, ease of use, and customer satisfaction in payment systems. In summary, while the study did not find support for the hypotheses, it contributes to the literature on technology acceptance, customer satisfaction, and methodology by providing insights and directions for future research and highlighting the importance of context-specific analysis.

Despite the rigorous methodology and careful analysis, this study has limitations that should be acknowledged. The findings of this study need to be revised in their generalizability to other contexts or populations. The study was conducted in a specific context (i.e., Sabah Pay), and the results may not apply to other payment systems, cultural contexts, or user groups. Caution should be exercised when extrapolating the findings to different settings or populations, and further research in diverse contexts is needed to enhance the external validity of the results. The study's sample may not fully represent the target population of interest, as it was limited to a specific group of participants who used Sabah Pay. The sample may not fully represent the broader population, and the findings may only apply to some segments of users or non-users of Sabah Pay. Care should be taken when generalising the results to the broader population. The study utilised partial least squares structural equation modelling (PLS-SEM) as the analysis method. While PLS-SEM is a widely used and valid approach, it does have limitations, such as sensitivity to sample size, the potential for measurement error, and limitations in hypothesis testing. Future research could consider employing alternative methods, such as covariance-based structural equation modelling (CB-SEM), to validate the findings. These limitations include generalizability, study design, sample characteristics, and methodological boundaries. Addressing these limitations in future research could further enhance the validity and reliability of the findings and contribute to a more robust understanding of the relationships between perceived usefulness, ease of use, and customer satisfaction in the context of Sabah Pay.

Understanding the dynamics of Sabah Pay in Malaysia is undoubtedly valuable, but situating these findings within the broader regional setting allows for a more comprehensive exploration of e-wallet acceptance. The current study focused on the direct relationships between perceived usefulness, ease of use, and customer satisfaction. However, there may be other factors that moderate or mediate these relationships. For example, factors such as user characteristics, contextual factors, or the type of mobile application users may influence the strength or direction of these relationships, like previous studies conducted by Narayan and Singh [9], Rahmayanti *et al.*, [13], Hidayat *et al.*, [14], Nirmawan and Astiwardhani [23], De Luna *et al.*, [24], and Mei and Aun [25].

While the present study illuminates the direct relationships between perceived usefulness, ease of use and customer satisfaction in the context of Sabah Pay, it is imperative to consider

potential variations across other Asian countries. These differences may arise from diverse cultural, economic, and technological landscapes, influencing the dynamics of e-wallet adoption. Considering the diverse socio-economic environments of Southeast Asia countries like Singapore, Philippines, or Brunei may uncover unique factors influencing user behaviour and acceptance of e-wallets. Future research could investigate potential moderating or mediating factors to provide a more nuanced understanding of the underlying mechanisms.

Additionally, the current study used quantitative data to examine the relationships between the variables. Future research could complement the quantitative findings with qualitative research methods, such as interviews or focus groups, to better understand users' perceptions and experiences of perceived usefulness, ease of use, and customer satisfaction. This could provide rich and contextualised insights that may not be captured by quantitative measures alone. The study was based on the technology acceptance model (TAM) as the theoretical framework. However, other theoretical frameworks, such as the unified theory of acceptance and use of technology (UTAUT), could be applied in the context of Sabah Pay. Future research could also explore alternative theoretical frameworks that provide different perspectives and insights into the relationships between perceived usefulness, ease of use, and customer satisfaction.

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