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Factors Influencing Customer Acceptance Towards Electronic Wallets (E-Wallets) in Malaysia: Perceived Security as Focus Variable

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Abstract: *An electronic wallet is a form of online service that facilitates the electronic transfer of funds through the utilization of Internet connectivity. The utilization of electronic wallets has been expanded to encompass a wide range of online activities, including the facilitation of purchasing transactions through e-commerce platforms. From the data collected by the Statistica Research Department, from 2020 until May 2023, the number of e-commerce scams in Malaysia is 19, 252 cases. In addition, Malaysia saw a drastic increase in online scams over the last two years during the COVID-19 pandemic. According to the Royal Malaysia Police (PDRM) Commercial Crimes Investigation Department (CCID), a total of 71,833 scams, amounting to more than RM5.2 billion in losses, were reported from 2020 until May 2022. This situation creates a need to perform research that addresses this problem. Therefore, this study explored the perception of security factors linked to the acceptance of e-wallet usage among Malaysian customers. This study uses a quantitative research method with a questionnaire. The underpinning theory is the Technology Acceptance Model (TAM), which consists of two variables namely perceived usefulness (PU) and Perceived Ease of Use (PEOU). This theory is widening by including one additional variable, Perceived Security (PS). Then collected data were analysed using structural equation modeling. The population is Malaysian consumers who use e-wallet. The number of samples is 150 respondents. The finding shows all three variables are significant in increasing the adoption of e-wallets among Malaysian consumers. The findings of this study help e-wallet providers to develop better facilities to meet the customers' expectations. At the same time, this study provides insight to the central bank to develop policy on the security aspects of e-wallet services. This study also exposes the public to financial literacy of security for e-wallet usage to prevent deceived by scam activities.*

Keywords: E-Wallet, Perceived Security, Digital Payment, Scam, Technology Acceptance Model

1. Introduction

The digital payment landscape was shifting Malaysian culture from traditional business to electronic commerce (e-commerce). The market size for e-commerce increased from $USD 3

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billion in 2019 to $USD 6 billion in 2020. Thus, Malaysia was forecast to increase the market size for e-commerce to $USD 13 billion by 2025 (Koon, 2023). In fact, internet technology has transformed conventional banking services to such an extent that instead of a customer visiting a bank, banking services are now available at the customer's choice of time and place (Mohsin Butt & Aftab, 2013). Currently, users of digital payment come from various backgrounds either distinctly poor or wealthy. People from any segment of society are equally participating in digital payment. Hence, digital payment is likely to benefit people from all segments of society, whether rich or poor, once participation is initiated (Apiors & Suzuki, 2018). Thus, the demand from users to use digital payment increased drastically.

E-wallet payment which is under the umbrella of digital payment systems is one of the famous digital payment methods that provides an easier, safer, and customer-friendly payment. E-wallets also help users make payments without having to make direct physical contact with the seller and people will no need to carry cash (Rantung et al., 2020). The government of Malaysia gives more advantages to the use of e-wallet payment to achieve the national agenda of digitalization. In the year 2020, the government of Malaysia introduced the e-Tunai Rakyat program and the ePENJANA initiative, which grants consumers cash handouts through e-wallets like Touch 'n Go (TNG), Boost, and Grab. As a result of this, the combination of government financial incentives and the COVID-19 lockdown that happened in the year 2020 was restricted to encourage more Malaysians to forgo cash in favor of contactless payments, including the use of smartphone-embedded e-wallets to fund online and physical in-store purchases. E-wallets are a type of technology that allows financial transactions to be conducted using mobile phones rather than bank accounts, to increase financial inclusion, particularly in developing economies (Amankwa et al., 2023). The development of an e-wallet aims to encourage customers and small business owners to use digital payments for safer, cashless, and more efficient transactions (Abu Bakar et al., 2020).

Although the number of users who use the e-wallet platform has increased, it still has customers who want to use manual methods of payment because they are not confident using e-wallets and worry the transactions will not succeed. Factors such as security, trust, and safety are serious issues in digital payment because many suspicious activities occur in online transactions. The study from Undale et al., (2021) mentioned that people are very concerned related with issues of security. Thus, the main point of this study is to investigate the factors influencing customer acceptance of e-wallets with a focus on the security variable.

2. Literature Review

A review of the literature on the subject of e-wallets revealed that most of the previous investigations were related to security and trust issues regarding the online payment transaction (Patel et al., 2010). The issues of security, safety, and trust in digital transactions are very important and serious because the safety of digital payment can protect against malicious and illegal activities. The study found that the model tested clearly suggests that the use of online banking services is influenced, respectively, by technological leadership, e-trust, e-loyalty, customers' value for online personalization, customers' concern for privacy, and the propensity of technology adoption (Salem et al., 2019; Kaabachi et al., 2017; Mansour, 2016). Thus, most of the studies suggested that security and trust is a crucial variable in determining the acceptance of customers to use online digital (Abdul Sathar et al., 2023; Kaur & Arora, 2020; Kaabachi et al., 2020); Sikdar & Makkad, 2015; Maditinos et al., 2013; Yee-Loong Chong et al., 2010).

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A study by Sikdar & Makkad, (2015) suggests that trust, usage constraint, ease of use, accessibility, and intention to use as reliable and valid factors in determining the adoption of customers to use Internet banking. While, Rod et al., (2009) show significant relationships among online customer service quality, online information system quality, banking service product quality, overall internet banking service quality, and customer satisfaction.

The original Technology Acceptance Model (TAM) was developed by Davis in 1989 and intends to identify the factors that facilitate the integration of technologies into an organization and discover why users accept or reject a technology (Revathy & Balaji, 2020; Lindsay et al., 2011). TAM theory has supported the acceptance of customers to use online transactions. Abdul Sathar et al. (2023) used TAM theory to investigate customers' acceptance to use online banking and found that perceived usefulness and perceived ease of use are positively related to the attitude of the consumers to use online banking. A study by Yee-Loong Chong et al., (2010) indicated that perceived usefulness, trust, and government support are positively associated with the intention toward online banking. A study by Pikkarainen et al., (2004) indicates that perceived usefulness and information on online banking on the website were the main factors influencing online banking acceptance.

Besides that, some results supported the extended TAM model and confirmed its robustness in predicting the intention of customers to adopt online banking (Maditinos et al., 2013). Senali et al. (2022) extend the TAM theory in the context of e-wallets, by testing the influences of product-related factors namely perceived compatibility, perceived risk, and perceived emotions, and investigating the moderating impacts of personal innovativeness and propensity to trust. The results showed that perceived usefulness, perceived ease of use, perceived risk, and perceived emotions significantly influence the intention to adopt an e-wallet.

3. Research Methodology

This section explains the population and sampling, underpinning theory, and hypotheses development.

3. 1 Population and sampling procedure

The population in this study are Malaysian citizens who possess practical experience in implementing e-wallet transactions in various aspects of their lives, such as food purchasing and transportation. This study employed the simple random sampling method. A total of 170 surveys were distributed, out of which 150 were successfully returned. The survey response rate is 88.2%. The gender distribution of respondents consists of 69 females and 81 males. Each participant was allotted time to complete the survey at their convenience utilizing an online platform. Each component consists of five items, resulting in a total of 20 items in this study. These items are used to assess the intention to adopt e-wallets in their daily financial funds transactions. This study employs a ten-point measuring scale to ensure that all data is interval, which allows for valid parametric analysis in the statistical technique of structural equation modeling.

3. 2 Underpinning Theory

The Technology Acceptance Model (TAM) is a theoretical framework introduced by Fred D. Davis, an esteemed scientist in the field of information systems (Davis, Venkatesh, 1996). The purpose of TAM model is to forecast and elucidate adoption or usage behavior towards information technology. Moreover, TAM model also explain the factors that influence

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individual willingness to adopt new technology, as well as the reasons why some may oppose or hesitate to do so.

The TAM model was derived from the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB). The TRA claims that human action is deliberate and influenced by personal views and subjective norms. Individuals with a favorable disposition towards something and experience favorable social influence are more inclined to engage in corresponding behaviors (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The TPB was developed by Icek Ajzen as an attempt to predict human behavior (Ajzen, 1991). The TPB posits that attitude toward the behavior, subjective norm, and perceived behavioral control influence behavioral intention. The TPB incorporates the concept of perceived behavioral control, in addition to the principles of the TRA. The theory also suggests that, apart from personal attitudes and subjective norms, the perception of human ability to control or conduct also affects intents and behaviors.

TAM model is an information systems theory that explains how to encourage users to accept and utilize new technology (Davis, 1989). The TAM model integrates these two theories and condenses them into two main concepts: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived Usefulness refers to an individual perception of the extent to which employing technology will benefit their professional or personal life, reflecting their attitudes. PEOU refers to the subjective assessment of how easy it is to learn and use a particular technology, which is influenced by their perceived level of control over their behavior (Chen & Tsai, 2019). Based on the TAM model, individuals are more inclined to adopt and utilize a technology if they see it as both valuable and easy to use. The TAM model is frequently employed to forecast the behavior of users in adopting technology, including their acceptance of novel software, applications, or information systems. This model has been extensively utilized in studies within the information systems field to assess the possible incentives and obstacles for users to embrace and implement different technologies (Chen et al., 2012).

The TAM Model is extensively utilized to predict the acceptance, adoption, and use of information technology. Legris et al. (2003) and Serenko et al. (2008) propose that the predictive and explanatory capabilities of TAM can be enhanced by incorporating additional constructs that are relevant to the circumstance or technology being studied (Su & Li, 2021). The TAM framework is also applied to the area of blockchain technology (Han, 2020; Chen, 2023).

3. 3 Hypotheses development

The objective of this study is to evaluate the adoption of e-wallets among Malaysian citizens with security as the focus variable. There are three variables namely Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Perceived Security (PS).

3.3.1 Perceived Usefulness (PU)

Perceived Usefulness (PU) refers to an individual subjective evaluation of how technologies, or a specific technology, might enhance their activities or roles by increasing efficiency and effectiveness (Bolodeoku et al., 2022). PU was operationalized based on evidence confirming the effect of system performance expectancy on system usage (Robey, 1979). PU was defined as the individual perception of the extent to which the use of a given technology improves performance. The conceptualization of this construct stemmed from Bandura concept of outcome judgement, which refers to an individual expectation of a positive outcome triggering behaviour (Bandura, 1982).

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Hypothesis 1: Perceived Usefulness (PU) has positive and significant influence towards the technology acceptance of e-wallets.

3.3.2 Perceived Ease of Use (PEOU)

Perceived Ease of Use (PEOU) is defined as the degree to which an individual believes that using a particular technology would be free from effort (Ooi & Tan, 2016). PEOU relates to the extent to which an individual believes that using a specific technology would require minimal effort. As an individual perception of the ease of using a certain technology improves, their inclination to utilize the technology likewise grows (Lew et al., 2020). Perceived usefulness has revealed that mobile clients are increasingly encouraging mobile payment systems (Kim et al., 2010). PEOU is the degree to which a person believes that using a particular information system or information technology would be free of effort (Taylor and Todd, 1995). While Choi & Sun (2015) claim that the ease of use of e-wallets has already prompted the younger generation to utilize them as payment methods.

Hypothesis 2: Perceived Ease of Use (PEOU) has a positive and significant influence towards technology acceptance of e-wallets.

3.3.3 Perceived Security (PS)

Perceived Security is defined as the customer perceptions and subjective valuations toward the system security, and how well they are protected against potential risks (Linck et al. 2006). Consumers who are willing to use a mobile payment system are influenced by their perception of security (Andrew et al., 2019). Perceived security pertains to the individual perception of the ability of a system to protect the transactions they are conducting. Perceived security is influenced by factors such as data protection and legislation that are comprehensible (Punwatkar & Verghese, 2018). Felix and Wella (2019) found that people's sense of security is influenced by their perception of legal control and protection. Security measures are essential to convince customers to protect their personal information and to encourage them to adopt emerging technology (Mohd Razif et al., 2020).

Perceived Security refers to the level of confidence a user has in the absence of risks when using a specific program (Fang et al., 2006). Security refers to the level of protection that a consumer desires for their personal information and payment details. This includes concerns about unauthorized access, misuse, errors, data gathering, fraud, and financial harm (Gao et al., 2015; Kim et al., 2011; Tsai et al., 2011).

Hypothesis 3: Perceived Security (PS) has a positive and significant influence towards the technology acceptance of e-wallets.

4. Result and Discussion

This chapter explains the respondent profile, model fit analysis for measurement model, reliability and validity evaluation, and structural model analysis including hypotheses testing result.

4. 1 Respondent profile

The study focuses on Malaysian residents who have hands-on experience in carrying out e-wallet transactions in several domains of their daily life, including buying meals and using transportation services. The sample size is 150. Table 1 shows according to the gender

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demographic variable; male respondents are 81 which contributes 54 percent of the overall sample of respondents. Meanwhile, female respondents contribute 46 percent of the total sample.

Table 1: Respondents profile

Variables	Frequency	Percentage
(i) Gender		
Male	81	54.0%
Female	69	46.0%
(ii) Age group		
Below 20 years old	28	18.7%
21-30 years old	72	48.0%
31-40 years old	34	22.7%
Above 41 years old	16	10.6%
(iii) Occupation		
Private sectors	55	36.7%
Government Servant	51	34.0%
Students	39	26.0%
Others	5	3.3%
(iv) Education level		
University degree and above	57	38.0%
Diploma	33	22.0%
Certificate	31	20.7%
High school	29	19.3%

4. 2 First stage of measurement model assessment

A measurement model measures the latent variables or composite variables (Hoyle 1995, 2011; Kline, 2010). In developing a reliable measurement model, this study needs to perform the procedure of confirmatory factor analysis. Therefore, the process of scrutinizing depends on the model fit indexes. Hair et. al (1995, 2010) and Holmes-Smith (2006) recommend the use of at least three fit indexes by including at least one index from each category of model fit.

Fit indices are prone to bias and exhibit significant fluctuation. Certain fit indices, such as the Comparative Fit Index (CFI) and Root Mean Square Error of Approximation (RMSEA), are more resistant to the impact of extraneous factors (Cangur & Ercan, 2015). Nevertheless, many estimate methods notably exaggerate the standardized root mean squared residual (SRMR). For instance, the generalized least squares methodology exhibits inflation when compared to the asymptotically distribution-free strategy. Additional research has indicated that the Tucker-Lewis Index (TLI) and the Normed Fit index (NFI) can be significantly influenced by the size of the sample (Yadama & Pandey, 1995). In addition, certain fit metrics, including as the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA), have a bias towards favoring bifactor models (Morgan et al., 2015). The different susceptibility to external variables amplifies the level of variation among fit metrics.

Table 2 shows the index category and the acceptance level for measurement model. There are two indexes, namely GFI and NFI do not meet the requirement level. Figure 1 shows the measurement model of the technology acceptance or e-wallets. According to (Hair et al.,2010), an acceptable factor loading value is more than 0.5 and when it is equal to 0.7 and above it is considered good for one indicator. All the factor loadings are achieved the requirement level.

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Table 2: Index category and acceptance level

Category	Index	Acceptance level	Result	Conclusion
1. Absolute fit	RMSEA	RMSEA < 0.08	0.105	Accept
	GFI	GFI > 0.9	0.760	**Not accept**
2.Incremental fit	CFI	CFI > 0.9	0.914	Accept
	TLI	TLI > 0.9	0.901	Accept
	NFI	NFI > 0.9	0.860	**Not accept**
3.Parsimonius fit	Chisq/df	Chisq/df < 3.0	2.316	Accept
	PNFI	PNFI > 0.5	0.742	Accept

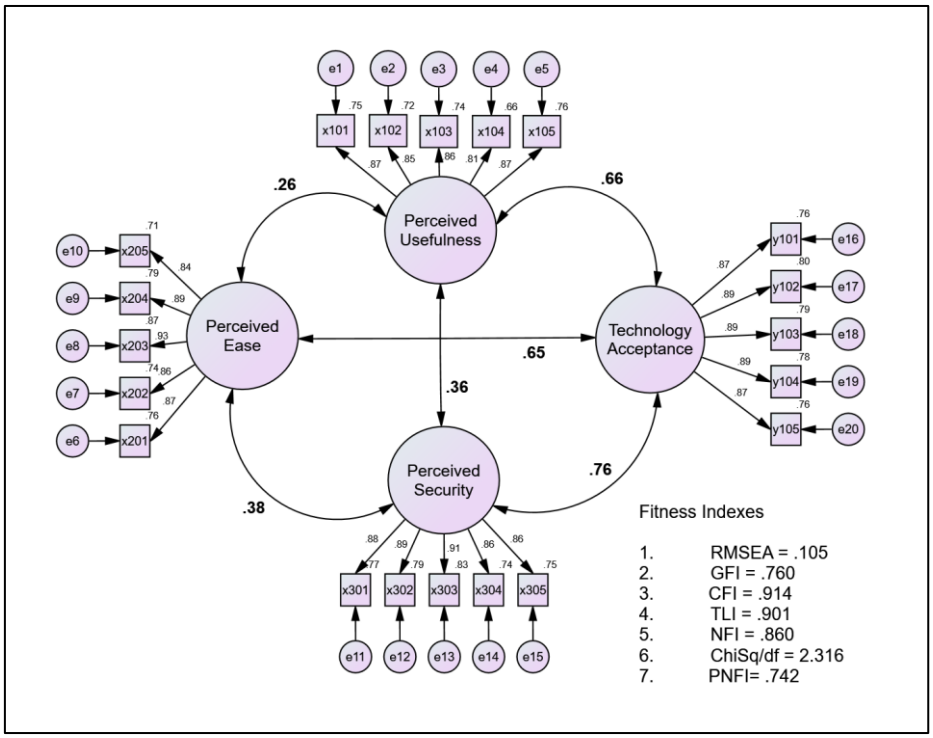


Figure 1: First stage of measurement model

4. 3 Second stage of measurement model assessment

SEM uses Confirmatory Factor Analysis (CFA) to assess the measurement model (Hair et al., 2020; Hayes et al., 2017). It differs from Exploratory Factor Analysis (EFA) in that it validates the existing factor specification using empirical data. The adequacy of the model fit is assessed in Confirmatory Factor Analysis (CFA) to validate the measurement. After completing the model fitting process, the path models between the latent variables are evaluated.

Table 3 shows the index category and acceptance level for the measurement model, after items deletion process. The items are deleted based on the value of modification index. Table 3 indicates the requirement for indexes are fulfilled according to the acceptance level. Figure 2 shows the measurement model after CFA procedure.

Table 3: Index category and acceptance level

Category	Index	Acceptance level	Result	Conclusion
1. Absolute fit	RMSEA	RMSEA < 0.08	0.027	Accept
	GFI	GFI > 0.9	0.914	Accept
2.Incremental fit	CFI	CFI > 0.9	0.996	Accept
	TLI	TLI > 0.9	0.995	Accept
	NFI	NFI > 0.9	0.952	Accept
3.Parsimonius fit	Chisq/df	Chisq/df < 3.0	1.090	Accept
	PNFI	PNFI > 0.5	0.743	Accept

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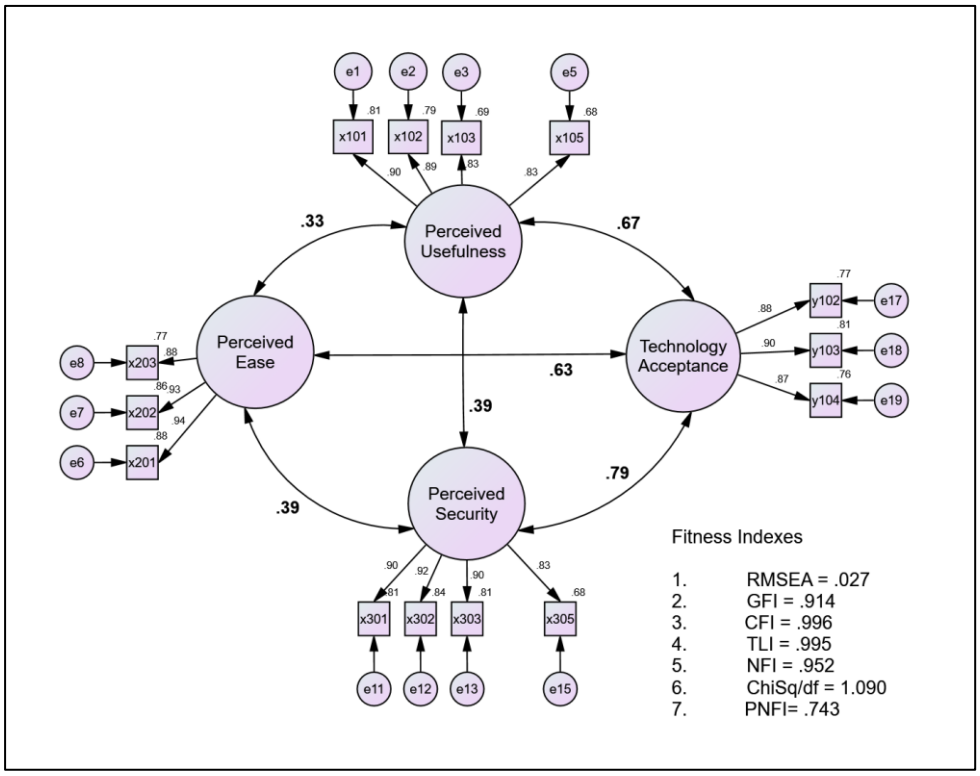


Figure 2: Second stage of measurement model

4.4 Structural Path Model

Path model is a case of multiple regression models estimated simultaneously. The structural link between the latent variables and the observable indicators is established. Once CFA validates the measurement models of the latent constructs, the path might be either causal or covariance-based. It can assess the unidimensional, validity, and reliability of an unobserved latent construct (Mueller & Hancock, 2018; Hair et al., 2017; Malhotra et al., 2006).

Figure 3 shows the structural path model for the technology acceptance of e-wallets. All of the factor loadings are higher than 0.701 demonstrating the unidimensionality of the construct (Segars, 1997). Unidimensionality can be defined as the existence of one latent trait or construct underlying a set of measures (Anderson et al., 1987).

R-Squared (R^2) is a statistical measure used to determine the proportion of variance in a dependent variable that can be predicted or explained by an independent variable (Chicco et al., 2021). R-squared is a statistical measure of how close the data are to the fitted regression line. R-Squared (R^2 or the coefficient of determination) is a statistical measure in a regression model that determines the proportion of variance in the dependent variable that can be explained by the independent variables (Cameron & Windmeijer, 1997). Figure 3 shows the value of R-squared is 0.86. Therefore, the independent variables explain 86% of the variation in the dependent variable. High R-squared values suggest a better fit between actual data and model.

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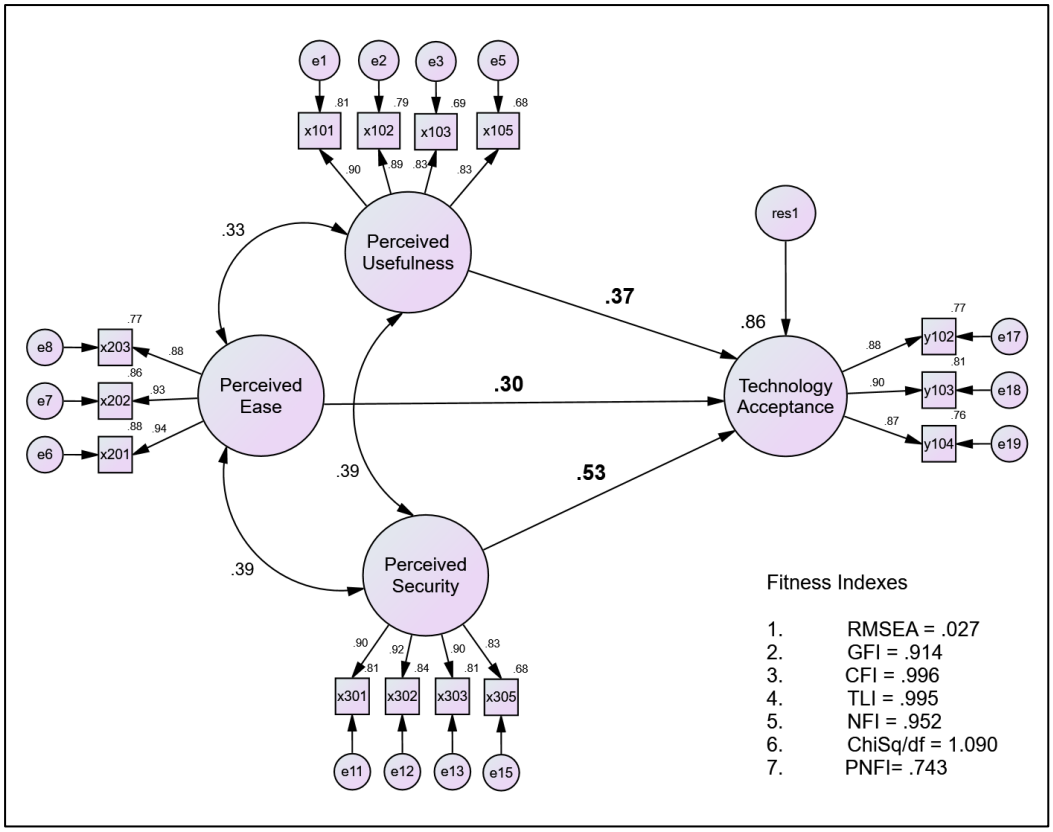


Figure 3: Structural path model

4.4 Path Model Assessments

This section describes the reliability assessment for the structural model. Reliability is the degree to which the measure of a construct is consistent or dependable. The Cronbach alpha coefficient, created by Lee Cronbach in 1951, is used to assess the internal consistency of a test or scale. It is quantified as a numerical value ranging from 0 to 1. Internal consistency refers to the degree to which all the items in a test assess the same notion or construct and is therefore related to the interconnectedness of the items inside the test (Tavakol & Dennick, 2011). Table 4 shows the value of Cronbach Alpha for each of construct in is larger than requirement level of 0.7. Therefore, all constructs show internal consistency that meet the requirement level. Cronbach alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability.

Next, this study calculated the construct reliability. Construct reliability is a measure of internal consistency in scale items. Reliability refers to the consistency and accuracy of a scale when it relates to another. Construct validity is the degree to which a measure accurately reflects the construct it is supposed to represent. A construct has good reliability if the value of Construct Reliability (CR) is 0.60 (Cheung et al., 2023). Table 4 shows all constructs exhibit values larger than 0.6, which indicates all constructs show internal consistency of scale items.

The average variance extracted (AVE) is a measure of the amount of variance that is captured by a construct to the amount of variance due to measurement error (Shrestha, 2021). The AVE should not be lower than 0.5 to demonstrate an acceptable level of convergent validity, meaning that the latent construct explains no less than 50% of the indicator variance (Fornell & Larcker, 1981). Table 4 shows all constructs meet the requirement level to prove that all constructs are exhibits convergent validity.

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Table 4: Reliability assessment

Construct	Item	Factor loading (>0.701)	Cronbach Alpha (>0.7)	Construct Reliability (CR) (>0.6)	Average Variance Extracted (AVE) (>0.5)
IV1: Perceived Usefulness (PU)	x101	0.90	0.919	0.921	0.745
	x102	0.89			
	x103	0.83			
	x105	0.83			
IV2: Perceived Ease of Use (PEOU)	x201	0.94	0.934	0.941	0.841
	x202	0.93			
	x203	0.88			
IV3: Perceived Security (PS)	x301	0.90	0.935	0.937	0.789
	x302	0.92			
	x303	0.90			
	x305	0.83			
DV: Technology Acceptance (TA)	y102	0.88	0.911	0.914	0.780
	y103	0.90			
	y104	0.87			

Next, this study evaluated the discriminant validity. Discriminant validity ensures that a construct is distinct from other constructs by empirical standards (Hill & Hughes, 2007). Table 5 shows the discriminant validity of this study. The discriminant validity is achieved when a diagonal value in bold is higher than the values in its row and column (Campbell & Fiske, 1959). Table 5 shows the discriminant validity is achieved because the diagonal value exhibits larger value tan corresponding column.

Table 5: Discriminant validity assessment

Construct	PU	PEOU	PS	TA
PU	**0.863**			
PEOU	0.327	**0.917**		
PS	0.388	0.392	**0.888**	
TA	0.675	0.634	0.793	**0.883**

Next, this study performed hypothesis testing using multiple regression (Hair et al., 2014). Structural equation models (SEMs) describe relationships between variables. Multiple regression is a statistical procedure that allows one to analyze the relationships of multiple variables (referred to as independent or exogenous variables) to an outcome variable (known as a dependent or endogenous variable). Exogenous variables are those that attempt to predict the outcome variables. Endogenous variables are those that are predicted (Harris & Gleason, 2022).

Table 6 shows the hypothesis testing for three independent variables toward the dependent variable. The first hypothesis, the p-value is 0.000 which is less than 0.05 that indicates there is a positive and significant influence of Perceived Usefulness (PU) towards Technology Acceptance (TA) of e-wallets. The second hypothesis, the p-value is 0.000 which is less than 0.05 that indicates there is a positive and significant influence of Perceived Ease of Use (PEOU) towards Technology Acceptance (TA) of e-wallets. The third hypothesis, the p-value is 0.000 which is less than 0.05 that indicates there is a positive and significant influence of Perceived Security (PS) towards Technology Acceptance (TA) of e-wallets.

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Table 6: Regression weight

Direction	Actual beta	Standard Error (S.E.)	Critical Ratio (C.R.)	P-value	Hypothesis
PU > TA	0.352	0.057	6.227	0.000	Supported
PEOU > TA	0.262	0.049	5.362	0.000	Supported
PS > TA	0.438	0.053	8.205	0.000	Supported

5. Conclusion

The objective of this paper research is to evaluate the acceptance towards usage of e-wallets among Malaysians. The main findings of this project are:

(a) This study supported there is a positive and significant influence of Perceived Usefulness (PU) towards Technology Acceptance (TA) of e-wallets.
(b) This study confirmed there is a positive and significant influence of Perceived Ease of Use (PEOU) towards Technology Acceptance (TA) of e-wallets.
(c) This study decided there is a positive and significant influence of Perceived Security (PS) towards Technology Acceptance (TA) of e-wallets.

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