RESEARCH ARTICLE

An examination of determinants for e-wallet adoption in Malaysia: a combined approach [version 1; peer review: 2 not approved]

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Abstract

Background: In this era of innovation in information technology, everything is embedded with technology, and the financial sector is no exception. The term “FinTech” (Financial Services Technology Consortium) attracted the attention of regulators, consumers and investors in 2014. It was initially applied to the back-end systems of financial and banking institutions. However, Fintech has now become more consumer-oriented, as the combination of financial services and information technology. Specifically, it refers to financial services for consumers through technology. The e-wallet is one of the examples of FinTech in payments and infrastructure that can be freely adopted by everyone. However, the penetration of e-wallet usage in Malaysia is still in its early stages compared to other countries.

Methods: The aim of this research is to examine the factors that affect the adoption of e-wallets in Malaysia based on five aspects: perceived ease of use, perceived usefulness, perceived risk, social influence and government support. These variables were adopted from the Technology Acceptance Model (TAM) and Theory of Reasoned Action (TRA). Questionnaires were given to a targeted group of 100 e-wallet users in Malaysia using the convenient sampling method. The contribution of each factor in explaining the adoption of e-wallets was analyzed using multiple regression.

Results: The results show that social influence has a significant relationship with the adoption of e-wallets in Malaysia: the majority of the respondents are at their prime age and their behaviours tend to be influenced by the reference group. The results from this study may encourage more small and medium enterprises (SMEs) in Malaysia to provide e-wallet payment options, transforming their conventional business into a digital business and spurring the growth of the digital economy in Malaysia.

Conclusions: High levels of adoption of e-wallets moves a country towards a cashless society, resulting in better economic growth and environment.

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Any reports and responses or comments on the article can be found at the end of the article.

Keywords

E-wallet, Fintech, digital business, digital economy

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Introduction

In this era of innovation in information technology (IT), everything is embedded with technology, and the financial sector is no exception. The term FinTech, short for “Financial Services Technology Consortium”, originated in the late 19th century. According to [Arner, Barberis, & Buckley \(2015\)](#), “FinTech is a project initiated by Citigroup to facilitate technological cooperation”. It only attracted the focused attention of regulators, consumers and investors from 2014 onwards. Fintech was initially applied at the back-end systems of financial and banking institutions, but has now become more consumer-oriented. It can be defined as the combination of financial services and IT. Specifically, FinTech provides financial services for consumers through technology (e.g. software, algorithms, apps) and covers anything from cryptocurrency to mobile wallet apps.

The evolution of Fintech started in 1886. The first era of FinTech (1886-1967) was focused on infrastructure; the key element is computerization and it remained largely an analogue industry. The development of digital technology in the area of communications and processing of transactions happened from 1967-2008, which was known as FinTech 2.0. This development increasingly transformed finance from an analogue to a digital industry. The launch of ATMs and calculators in 1967 is a strong indicator that marked the beginning of FinTech 2.0 ([Arner, Barberis, & Buckley, 2015](#)).

Throughout the 1980s, financial institutions increased the use of IT and gradually replaced most forms of paper-based mechanisms, as computerization proceeded and risk management technology developed to manage internal risks. Bloomberg terminals is one example of FinTech Innovation. In 1981, Michael Bloomberg started Innovation Market Solutions (IMS) after leaving Solomon Brothers, where he had designed in-house computer systems ([Arner, Barberis, & Buckley, 2015](#)). From that time, usage of Bloomberg systems among financial institutions was in ever-increasing. However, several questions and risks were present. Security issues were major concerns at that time. People were still not familiar with the technology of the finance industry, and risk management techniques were still in the developing and growing stage.

FinTech 3.0 occurs from 2008, up until the present ([Arner, Barberis & Buckley, 2015](#)). The general public has now become the main target audience. According to Gergely (2020), the financial crisis of 2008, which left the global financial system on the brink of systemic collapse, can be viewed as another turning point for the industry. Shortly after the financial crisis of 2008, the Basel Committee on Banking Supervision (BCBS) introduced the Third Basel Accord (Basel III) to mitigate risk within the international banking sector. Due to Basel III, people diverted capital from small and medium enterprises (SMEs) and private individuals, and turned to peer to peer (P2P) lending to fulfil their need for credit. This trend has led to a gradual increase in the P2P industry's revenue from the year 2008 until now. The global P2P lending market generated \$67.9 billion in 2019, and is estimated to reach \$558.9 billion by 2027, registering a compound annual growth rate (CAGR) of 29.7% from 2020 to 2027 ([Utami & Ekaputra, 2021](#)),

Mobile payment is integral to people's life nowadays, especially during the coronavirus disease (COVID-19) pandemic where contactless payment is encouraged. The e-wallet has become an important component for entrepreneurs and small and medium enterprises (SMEs) in digitalizing their payment avenues and connecting better with their consumers. The move towards cashless methods has incentivized businesses to accept digital payments. However, mobile payment is still not being used by everyone in Malaysia, even though technology and payment solutions exist. This study aims to determine the factors that affect the adoption of e-wallets (AEW) in Malaysia. It is vital for e-wallet service providers to understand people's (lack of) acceptance towards mobile payment, as customer participation and usage is the key to success.

Significance of the study

While e-wallets are widely adopted in many countries, a previous study showed that the intention to use e-wallets was quite low in Malaysia ([Mun, Khalid & Nadarajah, 2017](#)). The primary goals of the current research are to investigate the current prevalence of E-wallet use in Malaysia, and the factors that affect AEW. The findings of this study may provide helpful information on user acceptance and the market prospects of e-wallet payment methods in Malaysia today, and help E-wallet providers to modify their business strategy in order to increase user usage and reduce turnover rate. Moreover, companies that are interested in mobile wallet services can use this paper as reference information during the product planning stage.

Importantly, this research may be beneficial to policy-makers and government agencies planning to implement new initiatives. Looking forward to a move to a cashless society, the Malaysian government has launched a few initiatives to promote mobile payment. However, due to people's general reluctance to change, the uptake of mobile payment in the country lags quite far behind by some measurements, and the 2020 timeframe seems unlikely. Thus, it becomes sustainable important to have a clear understanding of the factors that affect people's intention toward mobile payment (e-wallet) adoption ([Chwah, Goh, Lim, Tai & Tan, 2018](#)).

Mobile wallets provide many benefits to Malaysia's citizens, such as time-saving, convenience, and security. However, the intention to use e-wallets was found to be low in Malaysia (Mun, Khalid & Nadarajah, 2017). Even though e-wallet adoption in Malaysia is showing an upward trend, it is still believed to be low compared to other countries such as China. In the current study, AEW would be the dependent variable, whereas the independent variables are: perceived ease of use, perceived usefulness, perceived risk, social influence, and government support.

Literature review

AEW

E-wallets (digital wallets) allow users to make transactions through mobile devices. E-wallet payment is viewed as one of the most important transaction methods for the time being. This is due to the advantages of ease, flexibility and protection when using digital wallet in an electronic transaction (Uddin & Akhi, 2014). It is the latest contactless payment method besides credit cards. The digital wallet is in fact an example of FinTech. According to Osakwe and Okeke (2016), e-wallets are also known for their innovative advantages such as customization and instantaneous communication. By using e-wallets, the purchase process can be done easily and quickly with Near-Field Communications (NFC) supported devices. In addition to buyers, the traders/sellers also benefit from this method of payment. A high speed transaction process, effective cash management and less labor charges are the advantages for sellers (Hayashi & Bradford, 2014). E-wallets can be utilised in physical stores by using NFC-enabled devices (e.g. mobile phones) to scan the quick response (QR) code provided by traders (Lu, 2018). As the country is currently moving towards a cashless nation, mobile payments (e-wallets) have been adopted at retail stores, supermarkets, food-courts and even food kiosks along the roadside.

AEW has seen a sharp uptake in Malaysia in 2020 during the COVID-19 pandemic, where contactless payment methods are encouraged by the World Health Organization (WHO) and Kementerian Kesihatan Malaysia (KKM). Malaysians have become markedly responsive towards going cashless with a more favorable reception to the idea, since such a payment method is not only expedient, but can also prevent the spread of the virus. Maybank also reported a sharp increase in the usage of the Maybank e-wallet. The policy-maker (bank) has temporarily relinquished transaction fees to boost and promote contactless payments. Moreover, GrabPay Malaysia also announced that, since the Malaysia movement control order (MCO) in 2020, the adoption of the GrabPay e-wallet has increased 1.7 times.

Perceived ease of use (PEU)

Perceived ease of use is an important factor that influences users in adopting information systems, especially in the technology industry. The Technology Acceptance Model (TAM), developed by Fred Davis in 1989, is one of the most popular research models used to predict the use and acceptance of information systems and technology by individual users. According to Davis (1989), perceived ease of use is defined as "the degree to which a person believes that using the system would be free of effort". Venkatesh (2003) listed PEU under an effort expectancy category, which refers to the perceived difficulty in using a system.

Based on the Theory of Reasoned Action (TRA), PEU is associated with availability, and influenced by external factors such as users' attitude, use instruction, system attributes, training, and user consultants. Although TRA does not state the functioning viewpoints for a specific behaviour, it is however the prior theory, and TAM is an influential extension of TRA. The intention to use technology is positively and significantly influenced by perceived ease of use (Jackson, Chow & Leitch, 1997). Therefore, it can be argued that PEU influences user adoption of IT.

Kim *et al.* (2016) suggested that perceived ease of use significantly influences the consumer's acceptance of IT, and this is supported by various studies. Rigopoulos and Askounis (2007) showed that PEU has a significant indirect positive relationship with electronic payment. However, Cao (2016) reported that PEU is more appropriately considered as a factor in the early adoption stage of a technology or system. Meanwhile, Al-Marroof and Al-Emran (2018) showed that undergraduate students perceive technology (e.g. e-learning) as user-friendly. In sum, PEU has a positive influence on perceived usefulness and behavioral intention.

Perceived usefulness (PU)

According to Davis (1989), PU refers to the degree to which a person believes that using a particular system will enhance job performance. In previous studies, some scholars categorized PU as performance expectancy: the extent in which an individual believes that the system is beneficial to them and increases job performance (Venkatesh, 2003).

The TAM proposed that PU is the main factor that greatly influences the acceptance of new technologies. PU is hypothesized to have a direct relationship with behavioral intention in using technology (Park *et al.*, 2014). Specifically,

prior studies found that there is a positive relationship between PU and people's intention to use e-wallets (Nag and Gilitwala, 2019), e-books (Baker-Eveleth and Stone, 2015), and e-learning platforms (Lin and Wang, 2012). The PU of e-wallets can be described as the efficiency, effectiveness and usefulness of e-wallet as perceived by users. When the system (e.g. e-wallets) is useful and effective to use, people's intention towards adopting it will increase. Compared to carrying a lot of cash or payment cards, e-wallet users just need to carry a phone and the payment process can be done in a few seconds without physical contact. With e-wallets, users can conduct payment processes in the shortest time by just scanning QR codes. This convenience and usefulness encourage its adoption (Cao, 2016). Although a range of studies found that PU is associated with technology adoption, there are contradictory findings: Wang (2008) proposed that PU is not a significant contribution towards the intention to adopt online payment.

Perceived risk (PR)

In the process of accepting new technologies or virtual services (e.g. mobile payment services), a main consideration is risk. People are always concerned about security issues in technology-related services, especially involving finance, and this is termed "perceived risk" (Zhou, 2011). Bauer (1960) described perceived risk as uncertainty and the opposed outcome derives from using the new technology, which contradicts the consumers' expectations. It reflects the user's insight about ambiguous outcomes relating mainly to searching product- or services-related information before making any purchasing decision (Cox, 1967). PR could also refer to uncertainty about potential negative outcomes associated with adopting or purchasing financial technology products (Thakur & Srivastava, 2014). In addition, PR may also refer to privacy and financial concerns related to the adoption of FinTech services (e.g. e-wallets).

Financial risk is a type of danger that can result in the loss of capital for interested parties. For example, people worry if it is safe for them to put money in their e-wallet. What if the money in the e-wallet is lost? Moreover, privacy risk concerns the disclosure of transaction data, personal data (e.g. phone numbers, home address, identification numbers) and other private information. FinTech services comprise of technologies such as big data, the internet of things, and cloud computing. Receiving and using such services all involve risks. Specifically, when users register to use e-wallets or adopt any FinTech services, they need to provide their personal information to complete the registration process.

According to Thakur and Srivastava (2014), there is a negative relationship between PR and adoption of mobile payment services, a finding supported by various other studies (Shin, 2010; Lu et al., 2011; Yang et al., 2012; Liébana-Cabanillas et al., 2015; Slade, Dwivedi, Piercy and Williams, 2015). Perceived risk is believed to be a major factor that brings a negative impact to the adoption of technology-related services (Khedmatgozar and Shahnazi, 2018).

Users are often worried about the possibility of misuse or exposure of their private information when they talk about adoption of technologies (e.g. e-commerce, e-wallets, and mobile banking), which could lead to serious consequences (e.g. cybercrime). These considerations significantly affect the user's willingness to accept and adopt e-wallets (Bansal et al., 2010).

Social influence (SI)

SI is another important factor affecting the adoption of FinTech services such as E-wallet. According to Venkatesh, Morris, Davis and Davis (2003), social influence refers to the degree in which an individual believes that "important others" think that he/she should adopt a new technology. In this new digital and social media era, people rely heavily on social communication. People can easily get feedback and comments from friends or even strangers through social media. People can easily observe behaviors of others, and thereby influencing each other. Indeed, friends or people in the user's surroundings influence users' decisions in adopting a new technology such as e-wallets (Nysveen et al., 2005b).

Every individual has someone around influencing their buying decisions. Key social factors include reference groups, family, role and status (Perreau, 2014). The reference group allows consumers to compare their behavior, lifestyle or habits. Reference groups comprise of anybody from close friends, family, neighbors, work groups; to other people that the consumers are attached with. People's intention towards AEW (Yang, Lu, Gupta, Cao & Zhang, 2012; Lee, Murphy, & Swilley, 2009; Lu, Liu, Yu, & Wang, 2008; Miao & Jayakar 2016) and e-payments (Slade, Williams, Dwivedi & Piercy, 2015) are both affected by social influences.

Government support (GS)

In Malaysia, government support is one of the main determinants for FinTech acceptance. The government can act as a guarantee and can increase the credibility of products and services. The government, acting as the regulator, has a key

responsibility in mitigating any possible undesirable outcomes encountered by its people. According to Kiwanuka (2015), government support positively affects technological adoption and continuous-use intention. Government support is important to the confidence towards FinTech services, especially mobile payment services in Malaysia (Marakarkandy, Yajnik & Dasgupta, 2017).

Governments can show their support by providing network infrastructure, guarantees in electronic payment, data access and digital incentives (allowance). Malaysia and the rest of the world is currently facing the COVID-19 pandemic. The WHO has advised the public to adopt cashless transactions (e.g. e-wallet) to minimize physical interaction. Thus, the encouragement from the government in using e-wallet for payment transactions is useful in the fight against SARS-Cov2 transmission. Such government advisory may motivate people in the country to use e-wallet (Aji, Berakon & Husin, 2020). In Malaysia, governments show their support directly by increasing the publicity for e-wallet applications, and by providing digital incentives to the public, hoping that users of e-wallets can reach 15 million. A positive relationship is expected between government support and intention to use e-wallets.

Methods

Based on the literature review, the theoretical framework (as shown in Figure 1) and the hypotheses have been formulated as follows:

Hypothesis

- H1:** There is a significant positive relationship between perceived ease of use and adoption of e-wallets.
- H2:** There is a significant positive relationship between perceived usefulness and adoption of e-wallets.
- H3:** There is a significant negative relationship between perceived risk and adoption of e-wallets.
- H4:** There is a significant positive relationship between social influence and adoption of e-wallets.
- H5:** There is a significant positive relationship between government support and adoption of e-wallets.

Research design respondent's profile

The current research aims to assess users' perception of mobile payment methods (e-wallets) and the factors that affect users' AEW. The research design utilised convenient sampling: a non-probabilistic sampling technique that collects market research data from a conveniently available pool of respondents. The questionnaires were created via Google Forms to measure "The factors that affect the adoption of E-wallet in Malaysia". The survey was open to all Malaysian citizens or residents, and not limited to students or employees (Siew Bee, 2021a). The questionnaire consists of two parts: Section A collects the respondent's demographic and E-wallet usage information, and allows us to identify the most popular e-wallet among the respondents, whereas Section B consists of questions relating to AEW. The current research is a correlational study, examining the relationship between the independent variables (perceived ease of use, perceived usefulness, perceived risk, government support and social influence) and the dependent variable (AEW in Malaysia). The independent variables such as perceived ease of use, perceived usefulness and perceived risk are based on the technology context which was adopted from TAM and TRA, while social influence and government support are based on personal context. The extent of researcher interference was at a minimal level, since the study did not affect the respondent's normal flow of work. The unit of analysis is the individual: users of e-wallets in Malaysia. The time horizon of the study is cross-sectional. The data was successfully gathered within 2 weeks of the development of the questionnaires

Figure 1. Conceptual model.

(17th January 2021-30th January 2021). This research uses a quantitative approach as the main approach, in which the framework is predetermined from previous works of literature.

Data collection method

The questionnaire was presented virtually through Google Forms. The Google Forms link was distributed to respondents predominantly via Whatsapp, in addition to Facebook messenger and Wechat. Data collection was completed in 2 weeks, when the number of respondents hit the target of 100. Participation was voluntary, and the survey took only between 5 to 10 minutes to complete. Implied, informed consent was obtained from respondents, as the cover page of the questionnaire stated the objective and the usage of the data from this survey, and responding to the survey was on a voluntary basis.

Sampling design

The sample population consists of e-wallet users in Malaysia (who use at least one e-wallet application) above the age of 18. A cross-sectional research design was used, where a total targeted sample of 100 were drawn from the population. A non-probabilistic sampling procedure was used for this study (convenient sampling), due to the short project time frame. Respondents filled in the questionnaire after informed consent was obtained.

Data analysis methods

The data analysis methods used to test the hypotheses are as followed: descriptive analysis, reliability analysis and Pearson correlation analysis. All these analyses have been run using SPSS version 28. The dependent variable is adoption of e-wallet (AEW). The independent variables comprise of five (5) which are Perceived ease of use (PEU), Perceived usefulness (PU), Perceived risk (PR), Social influence (SI) and Government support (GS). The contributions of each independent variables towards the dependent variable have been examined using the Pearson correlation analysis. Detailed of the results from this analysis are presented in the following sections.

Ethical approval

This article received ethical approval from Multimedia University (EA1052021).

Results

Table 1 shows a practically balanced number of male respondents (51%) versus female respondents (49%) (Siew Bee, 2021b).

Table 2 shows that an age of 18-25 years old is the most common among the respondents at 36%, followed by the age of 26-35 years old at 33%, the age of 36-45 years old at 14%, the age of 46-55 years old at 11%, and the age of above 55 years old at 6%.

As shown in **Table 3**, race is classified into four categories: Chinese, Malay, Indian and Others. Based on the above data, the majority of respondents are Chinese at 44%, followed by Malay at 29%, Indian at 26% and Others at 1%.

As shown in **Table 4**, most of the respondents are bachelor's degree holders at 53%, followed by 15% with a diploma, 13% with a SPM/O-level, 9% with a master's degree, 6% with STPM/A-level and 4% with a PhD Degree.

Table 5 shows that the majority of the respondents are employees of private companies (41%) followed by students at 35%, civil servants at 13%, and self-employed at 10%, with only 1% of the respondents classified as other (retired).

Table 6 shows 36% of the respondents earned less than RM 2,000 per month; 28% have income ranging from RM 4,001 to RM 8,000; 20% have income ranging from RM 2,001 to RM 4,000; 10% of the respondents have a monthly income more than RM 10,000; and 6% have income ranging from RM 8,001 to RM 10,000.

Table 1. Respondent's profile: gender

	Gender	Frequency	Percent	Valid percent	Cumulative percent
Valid	Male	51	51	51	51
	Female	49	49	49	100
	Total	100	100	100	

Table 2. Respondent's profile: age.

	Age	Frequency	Percent	Valid percent	Cumulative percent
Valid	18-25	36	36	36	36
	26-35	33	33	33	69
	36-45	14	14	14	83
	46-55	11	11	11	94
	Above 55	6	6	6	100
	Total	100	100	100	

Table 3. Respondent's profile: race.

	Race	Frequency	Percent	Valid percent	Cumulative percent
Valid	Malay	29	29	29	29
	Chinese	44	44	44	73
	Indian	26	26	26	99
	Other	1	1	1	100
	Total	100	100	100	

Table 4. Respondent's profile: education Level.

	Education level	Frequency	Percent	Valid percent	Cumulative percent
Valid	SPM/O-Level	13	13	13	13
	STPM/A-Level/Foundation	6	6	6	19
	Diploma	15	15	15	34
	Bachelor's degree	53	53	53	87
	Master's degree	9	9	9	96
	PhD degree	4	4	4	100
	Professional certificate	100	100	100	
	Total				

Table 5. Respondent's profile: employment.

	Employment	Frequency	Percent	Valid percent	Cumulative percent
Valid	Student	35	35	35	35
	Civil servant	13	13	13	48
	Employee	41	41	41	89
	Self-employed	10	10	10	99
	other	1	1	1	100
	Total	100	100	100	

Table 6. Respondent's profile: income level.

	Income level	Frequency	Percent	Valid percent	Cumulative percent
Valid	Less than RM 2,000	36	36	36	36
	RM 2,001 - RM 4,000	20	20	20	56
	RM 4,001 - RM 8,000	28	28	28	84
	RM 8,001 - RM 10,000	6	6	6	90
	More than RM 10,000	10	10	10	100
	Total	100	100	100	

Figure 2 shows that the major E-wallet applications available in Malaysia are Touch'n Go, GrabPay, Boost, Wechat Pay MY, BigPay and TransferWise. Overall, 88% of respondents are currently using Touch'n Go, which is the most widely used. GrabPay is the second highest at 55%. Grab services are experiencing an increased demand in Malaysia especially during this COVID-19 pandemic. Meanwhile, Boost usage is at 31%, followed by TransferWise at 13%, and Wechat Pay MY and BigPay both at 7%.

Figure 2. Type of e-wallet used.**Mean (Independent Variables)** **Figure 3. Mean.**

All mean and standard deviation were generated by using SPSS, where “1 = Strongly Disagree”, “2 = Disagree”, “3 = Neutral”, “4 = Agree”, “5 = Strongly Agree”.

Based on [Figure 3](#) and [Table 7](#), among all the independent variables being analyzed it was found that PEU has the highest mean of 4.362 which shows the greatest influence on intention to adopt e-wallets. This is followed by PU (mean= 4.2425), GS (mean= 4.0425), SI (mean= 3.9775) and PR (mean= 2.196). Meanwhile, the AEW score has a mean of 2.45.

Based on [Figure 4](#), PEU has the lowest standard deviation of 0.7248, followed by SI (S.D.=0.82325), GS (S.D.= 0.82925), PU (S.D.= 0.901) and PR (S.D.= 1.0716).

Data analysis methods reliability analysis

[Table 8](#) shows the results of the reliability test. The aim of Cronbach’s alpha is to test the internal consistency for dependent and independent variables. For independent variables, PEU has the highest consistency with Cronbach’s alpha of 0.892, followed by PU with 0.884, PR with 0.836, SI with 0.767 and GS with 0.746. The overall Cronbach’s alpha for all variables is 0.897, showing that the model is reliable and there’s a “good” consistency of the results among all variables.

Table 7. Descriptive statistics.

Variable	Item	Mean	Standard deviation
Perceived ease of use (PEU)	PEU1	4.42	0.699
	PEU2	4.31	0.720
	PEU3	4.36	0.732
	PEU4	4.32	0.777
	PEU5	4.40	0.696
Overall		4.362	0.7248
Perceived usefulness (PU)	PU1	4.20	0.953
	PU2	4.23	0.973
	PU3	4.27	0.839
	PU4	4.27	0.839
Overall		4.2425	0.901
Perceived risk (PR)	PR1	2.48	1.251
	PR2	2.02	0.995
	PR3	2.22	0.970
	PR4	2.41	1.065
	PR5	1.85	1.077
Overall		2.196	1.0716
Social influence (SI)	SI1	4.32	0.839
	SI2	3.80	0.853
	SI3	3.80	0.778
	SI4	3.99	0.823
Overall		3.9775	0.82325
Government support (GS)	GS1	4.03	0.870
	GS2	3.76	0.889
	GS3	3.97	0.846
	GS4	4.41	0.712
Overall		4.0425	0.82925
Adoption of e-wallets		2.45	0.702

Standard Deviation (Independent Variable)

Figure 4. Standard deviation.

Table 8. Cronbach's alpha reliability statistics.

Variables	Cronbach's alpha
Perceived ease of use (PEU)	0.892
Perceived usefulness (PU)	0.884
Perceived risk (PR)	0.836
Social influence (SI)	0.767
Government support (GS)	0.746
Overall	0.897

Correlation analysis

Pearson correlation analysis was conducted to identify the correlations between the dependent variable and independent variables (Siew Bee, 2021c).

Table 9 shows the results of Pearson correlation after the analysis was conducted. The results indicate that only SI significantly affects the AEW at $p = .012$, with a positive correlation of 0.251. This is followed by GS which shows a nonsignificant positive linear relationship of 0.157; PU which shows a nonsignificant positive correlation of 0.066; PEU has a 0.045 nonsignificant positive relation with AEW. On the other hand, the value of Pearson correlation for AEW with PR is -0.055 , which is a nonsignificant negative linear relationship.

As shown in Table 9, the highest correlation value is 0.251 for SI which is below .9, implying that the effect of multicollinearity is nonsignificant in the regression variate.

Multiple regression analysis

A Multiple regression analysis was performed. Table 10 shows that the effect size is rather small at $R^2 = 0.081$. In other words, 8.1% of variance in the AEW can be explained by the five independent variables: PEU, PU, PR, SI and GS. The standard error of the model, 0.690, is also relatively high which indicates that the model's spread is high, and the sample mean is not close to the population mean.

In addition, Table 11 indicates that the overall model exhibits a weak fit to data because F-statistic = 1.666 (p = value = 0.151) is not significant at the $\alpha=1\%$, 5%, 10% level.

The variance inflation factor (VIF) measures the impact of collinearity among the variables in a regression model. A VIF closer or equal to 1 means the independent variable is not correlated to the remaining ones, thus there is no

Table 9. Pearson correlation.

		GMPEU	GMPU	GMSI	GMPR	GMGS	AEW
GMPEU	Pearson Correlation	1	.815**	.458**	0.154	.342**	0.045
	Sig (2-tailed)		<.001	<.001	0.127	<.001	0.645
	N	100	100	100	100	100	100
GMPU	Pearson Correlation	.815**	1	.528**	.283**	.512**	0.066
	Sig (2-tailed)	<.001		<.001	0.004	<.001	0.512
	N	100	100	100	100	100	100
GMSI	Pearson Correlation	.458**	.528**	1	1.98*	.600**	.251*
	Sig (2-tailed)	<.001	<.001		0.049	<.001	0.012
	N	100	100	100	100	100	100
GMPR	Pearson Correlation	0.154	.283**		1	.311**	−0.55
	Sig (2-tailed)	0.127	0.004	1.98*		0.002	0.584
	N	100	100	0.049	100	100	100
GMGS	Pearson Correlation	.342**	.512**	100	.311**	1	1.57
	Sig (2-tailed)	<.001	<.001	<.001	0.002		0.119
	N	100	100	100	100	100	100
AEW	Pearson Correlation	0.045	0.066	.251*	−0.55	1.57	1
	Sig (2-tailed)	0.654	0.512	0.012	0.584	0.119	
	N	100	100	100	100	100	100

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Table 10. Model summary.

Model	R	R square	Adjusted R square	Std. error of the estimate
1	0.285*	0.081	0.033	0.69

Table 11. Analysis of variance (ANOVA).

Model		Sum of squares	df	Mean squares	F	Sig
1	Regression	3.967	5	0.793	1.666	0.151*
	Residual	44.783	94	0.476		
	Total	48.75	99			
	Dependent variable: adoption of e-wallets (AEW)					

*= Predictors: (constant), GMGS, GMPR, GMPEU, GMSI, GMPU.

multicollinearity existing in the model. Table 12 shows that the VIF for all 5 variables range between 1-5, indicating that all of them are moderately correlated. Therefore, there is a chance multicollinearity exists in the regression model.

Furthermore, the results of multiple regression analysis show that only SI is significant at $\alpha = 5\%$ with beta coefficient = 0.282 and p-value of 0.035: a positive relationship with AEW. Therefore, hypothesis H4 is statistically supported while H1, H2, H3 and H5 are rejected.

Discussion

In this research, PEU and PU were found to have a nonsignificant relationship with AEW in Malaysia, contrary to the assertion of TAM. Moreover, our result contradicts Shankar and Datta (2018), who suggested that PEU and PU have significant influences on mobile payment adoption. In that study, users adopt mobile payment only when they find it easy

Table 12. Coefficients.

Coefficients								
		Unstandardized coefficients		Standardized coefficients			Collinearity statistics	
Model		B	Std. error	Beta	t	Sig.	Tolerance	Variance inflation factor (VIF)
1	(Constant)	1.571	0.628		2.5	0.014		
	GMPEU	−0.72	0.203	−0.062	−0.352	0.726	0.317	3.154
	GMPU	−0.28	0.174	−0.031	−0.16	0.873	0.262	3.813
	GMSI	−0.94	0.089	−0.111	−1.052	0.295	0.871	1.147
	GMPR	0.313	0.146	0.282	2.138	0.035	0.562	1.779
	GMGS	0.066	0.15	0.059	0.444	0.658	0.546	1.83

Dependent variable: adoption of e-wallets (AEW).

in comparison with other traditional methods of financial transaction. If the payment process is perceived as uncertain or non-user-friendly for consumers, then the adoption goal will be reduced.

PEU was found to be a nonsignificant contributor to AEW in the current study. This result is similar to [Aw, Khalil, Emad and Janejira \(2009\)](#). One possible explanation is that all respondents have a minimum education level of SPM/O level and the majority of them are millennials, which are believed to be highly tech-savvy. [Wu and Wang \(2005\)](#) proposed that PEU is relevant only when potential users have little or no direct experiences with recent innovations.

PU was found to be nonsignificant in influencing AEW in Malaysia. This finding is supported by [Aw, Khalil, Emad and Janejira \(2009\)](#) and [Wang \(2008\)](#). The relative advantage provided by e-wallet apps may not be prevailing enough to increase the consumer's intention to use them for their payments. E-wallet payment options are still not widely adopted by shops and stalls in Malaysia. Therefore, the perceived usefulness has less contribution to AEW.

We found that PR has a negative but nonsignificant relationship with e-wallet adoption. This result contradicts [Thakur and Srivastava \(2014\)](#), but is similar to [Teoh, Hoo & Lee \(2020\)](#) and [Kapoor, Dwivedi, and Williams \(2014\)](#). The majority of the respondents are millennials who tend to try new technology in order to enjoy the benefits of advanced technology, for instance more convenient and efficient methods of paying. Risks associated with the adoption of e-wallets are not taken into consideration when youngsters adopt new technology as convenience is the main key for them.

This study found that SI has a significant relationship with AEW in Malaysia, which is consistent with the study by [Kalafatis *et al.* \(1999\)](#). According to the study of [Kalafatis *et al.* \(1999\)](#), social acts bring internally generated feelings of self-respect or pride, while failure to act in a particular way may invoke the feelings of shame or self-reproach. Indeed, the majority of respondents are in the prime age where their behaviors tend to be affected by reference groups ([Slade, Williams, Dwivedi and Piercy, 2015](#); [George, 2004](#)).

Respondents believed that e-wallet providers will act in their best interest, as there is a strong sense of trust towards e-wallets under [the backing of the Malaysian government](#) in recent years. However, GS is shown to have a nonsignificant impact on e-wallet adoption in the current study. This contradicts [Marakarkandy, Yajnik and Dasgupta \(2017\)](#), where government support was found to be important in the level of confidence felt towards FinTech services, especially mobile payment services in Malaysia. Despite efforts by the Malaysian government to promote e-wallet applications, government support may still be at an “infancy” stage. Indeed, the e-Tunai Rakyat initiative, which aimed to increase e-wallet use, was only launched rather recently in 2020. More incentives and initiatives by the government may be needed.

Future direction

A longitudinal study may be beneficial in outlining the changes in consumer's behaviors and attitudes through time as consumer behaviour may change from time to time and their response might be affected by the pandemic. In addition, respondents in the current study consist only of e-wallet users. Factors such as PEU, PU, PR and GS may have more explanatory power on the *non-adoption* of e-wallets. Future research may therefore assess attitudes towards these factors among non-E-wallet users.

Conclusions

E-wallets are increasingly gaining traction among consumers. During the COVID-19 pandemic, in particular, **contactless payment is being encouraged by the WHO** as the virus can potentially spread through physical banknotes. The current study found that SI significantly influenced AEW in Malaysia. Service providers may therefore capitalize on this factor. Rewarding users for referring others to use the e-wallet apps, is a tactic widely adopted by many e-wallet providers. Importantly, service providers should beware of the word-of-mouth marketing power. They should provide high service quality and efficient customer services to warrant a positive word-of-mouth, specifically among the youth, or risk consumers switching to competitors' e-wallet apps. The results of the study provide a detailed and clearer way for the banking and government sector to boost the number of users who adopt e-wallets, and helps the government in implementing and moving towards a cashless economy. In addition, the findings from this study may encourage more SMEs in Malaysia to provide e-wallet payment options, transforming their conventional businesses into digital businesses and ultimately spurring the growth of the overall digital economy in Malaysia.

Data availability

Underlying data

Figshare: Database for E-Wallet Adoption in Malaysia. <https://doi.org/10.6084/m9.figshare.15167982> (Siew Bee, 2021b).

This project contains the following underlying data:

- database for ewallet adoption in malaysia.xlsx (raw data of respondents' feedback on adoption of e-wallets in Malaysia).

Figshare: An Examination of Determinants for E-Wallet Adoption In Malaysia. <https://doi.org/10.6084/m9.figshare.15168033> (Siew Bee, 2021c)

This project contains the following underlying data:

- Results of Analysis.xlsx (the final result of the analysis based on the dataset that was collected through the online questionnaire).

Extended data

Figshare: Adoption of E-wallet in Malaysia (Questionnaire). <https://doi.org/10.6084/m9.figshare.15167934> (Siew Bee, 2021a)

This project contains the following extended data:

- Adoption of E-wallet in Malaysia (Questionnaire).pdf (a questionnaire that relates to the adoption of e-wallets)

Data are available under the terms of the **Creative Commons Zero "No rights reserved" data waiver** (CC0 1.0 Public domain dedication).

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Norman Shaw

Ted Rogers School of Management, Toronto Metropolitan University, Toronto, Ontario, Canada

The study examines the use of e-wallets in Malaysia.

The introduction has too much information about the history of the term 'FinTech'. This could be covered in one short paragraph. Instead, there should be more information about mobile wallets and their use around the world, in various developed countries and in countries similar to Malaysia. This would provide context for the study, which is the specific use of mobile wallets in Malaysia.

The first section of the literature review has the heading "AEW" – this should be written out in full, "Adoption of E-Wallets". This first section should provide justification for the selection of the theoretical foundations of TAM and TRA. The authors should explain why they did not consider UTAUT or UTAUT2, which is a synthesis of 8 theories of adoption, including TAM and TRA. UTAUT is focussed on consumer usage, whereas TAM typically refers to use in a business setting, where adoption is mandatory.

PEU: many studies have found that PEU has no significance. This is especially so for use of mobile applications, the majority of which have intuitive interfaces. Such studies should be referenced.

PU: meta-studies have found that PU is the most significant factor for technology adoption. If the innovation is not useful, it will not be used. Such studies should be referenced.

Perceived risk is associated with financial risk and privacy risk. These constructs should be treated separately. Having only one construct confounds these two risks.

Government support is analogous to Facilitating Conditions, which is a construct used in many theories of adoption. Such a comment should be made.

Methodology: more details are required with respect to the sample. What were the filters? Age group, education level, income? How were the participants recruited? Why only 100?

Statistical analysis: a high mean does not indicate that the construct has the highest influence. More details should be provided showing how the constructs are measured with converging indicators. There should also be discriminant analysis indicating that the variables are measuring different constructs. More details should be given showing the statistical analysis: the path coefficients, the path significance, the coefficient of determination.

The sample size of 100 is too small to measure significance.

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

Yes

If applicable, is the statistical analysis and its interpretation appropriate?

No

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Technology adoption; PLS analysis; digital wallet adoption

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 09 August 2022

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Elaheh Yadegaridehkordi

Center for Software Technology and Management, Faculty of Information Science and Technology,

Universiti Kebangsaan Malaysia (UKM), Selangor, Malaysia

1. The abstract is too long. A lot of information is not necessary in this section.
2. Information provided in the introduction section needs to be moved to the literature review section. It is a history of finance and banking.
3. What are the gaps and what other studies have been done so far should be highlighted in the introduction section.
4. References are too old. Use the latest references from 2021 and 2022.
5. Why the adoption of e-wallet is important and why its usage in Malaysia is too slow?
6. What is the theoretical foundation of this study? Why have such factors been selected?
7. Who were the respondents and how data was collected from them?
8. A sample of questionnaire needs to be provided with references of questions.
9. Is a sample of 100 respondents enough?
10. Contributions need to be presented in a separate section after conclusions

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

No

Are sufficient details of methods and analysis provided to allow replication by others?

No

If applicable, is the statistical analysis and its interpretation appropriate?

Partly

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Technology adoption, Information systems

I confirm that I have read this submission and believe that I have an appropriate level of

expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

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