

Proposed Research Model for Mobile Digital Wallet Adoption Among Rural Area Consumers in Malaysia

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Abstract

Digital wallets are considered as a game changer because they allow digital financial inclusion among various levels of society. However, the use of digital wallet among Malaysians is low compared to other countries. A pre-liminary study was conducted to identify the issue related to digital wallets in rural areas. Besides, a literature review was conducted to determine the factors and barriers that may influence behavioral intention of consumers in Malaysia to adopt digital wallet. Findings from the pre-liminary study were discussed and a conceptual model that consisted of some constructs from the Unified Theory of Acceptance and Use of Technology 2, and Innovation Resistance Theory and Trust was proposed to examine the drivers and barriers towards the adoption of digital wallet. Expected results from this study would provide insights on the perception on digital wallet among Malaysians in rural and urban areas.

Keywords: digital wallet, e-wallet, QR-pay, mobile payment, adoption, resistance

1. Introduction

The growth of digital technology has brought changes to the behavior of consumers around the world. Many countries have started their journey towards being a cashless society. In time, the use of cash will be replaced by its digital equivalent. In other words, legal tenders or virtual money will exist, recorded, and exchanged only in electronic digital form [1]. Being a cashless society does not mean that there will no longer be any cash transaction available, but the use of cash will be greatly minimized [2]. People will be carrying less physical money in their wallet, preferring to use debit cards, credit cards or digital wallet through their mobile devices instead.

Study shows that the use of cash in a society takes up around 1.5% of a nation's Gross Domestic Product (GDP). Conversely, the use of cashless payment has been shown to accelerate financial inclusion and boost economic growth [3]. Cashless payment also reduces cost, lowers crime, strengthens fiscal stability and convenience among others [1]. Therefore, it is important to develop Malaysia into

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a cashless society, among others by optimizing the use of digital wallet as it is one of the more important components in a digital payment ecosystem.

Digital wallets, mobile wallets, or electronic wallets (e-wallets) are one form of cashless technology that is increasingly gaining adoption, especially among millennials [4]. Their study shows that 64.7% of millennials keep track of their spending and paying bills and are concerned with money management. Apart from payment capabilities, digital wallets incorporate loyalty cards, coupons, cashbacks, identity cards, event tickets, alerts, notifications and more, integrating various mobile payment features to ease users in engaging merchants for products and services [5].

The adoption of digital wallets brings about a lot of benefits to consumers. It simplifies purchasing and selling transactions using smartphone apps, allowing for quick and seamless online shopping [6]. Besides, it allows consumers to keep track of their spending and benefit from loyalty-based offerings [4]. In addition, digital wallets offer convenience and speed, reduce crime, money laundering, and increase personal safety as people hold less money while they shop [1, 7]. Digital wallets are also a form of contactless payment, which help curb the spreading of Covid-19 as suggested by the World Health Organization (WHO) [8].

Driven by the Covid-19 pandemic, the use of digital wallet as a payment method shows an increasing trend in many countries, including Malaysia [9]. The number of digital wallet transactions in Malaysia reached 1.7 billion in 2022 [10], an increase of 55% compared to 1.1 billion transactions in 2021. To further encourage the use of digital wallet, Government of Malaysia introduced several initiatives such as ePenjana (2021), e-Pemula (2022) and eBeliaRahmah (2023) in the form of monetary assistance to students and youths through e-wallet credit [11, 12, 13].

According to [9], awareness about digital wallet among Malaysians are at 89% with interest to use reaching 73%. However, actual use of digital wallet among consumers in Malaysia are only at 25%, which is considerably low compared to Thailand (52%), Indonesia (50%) and Southeast Asia (SEA) with the average of 38%. In fact, Malaysia recorded the lowest use of digital wallet among the seven countries involved in the study. Despite being a nation with high percentage of smart phone users and mobile internet access [14], the adoption of digital wallet payment in Malaysia has been at the lowest among SEA countries.

Earlier literatures indicated Malaysians would use a technology if they saw it as useful, secure, user friendly, socially well accepted, cheap plus several other factors. However, there still exist barriers that lead to Malaysians resisting this technology. This barrier may come from the aspects of functional and psychology as Malaysia is a land of tradition and culture. While most of the research done on this topic was taken from the aspect of adoption, there is also a need to look at the factors that lead to resistance in coping better with the problem. Furthermore, not much of the research in this area has captured the input from people of the rural or less urban areas [15, 16]. Therefore, the purpose of this study is to: (i) determine the factors and barriers that may influence behavioral intention of Malaysian consumers to adopt digital wallet payment, (ii) propose a research model for adoption of digital wallet among Malaysian consumers.

This paper is structured into several sections. Section 2 shall provide a summary of Malaysia's digital wallet transaction services, together with theoretical ramifications and hypothesis. Section 3 provides the explanations on the methodology employed, Section 4 presents the findings and discussion, and Section 5 provides the conclusion and limitation of this study.

2. Literature Review

In gaining a more comprehensive scenario and better understanding of the highlights of this study, a literature review was conducted. These highlights are digital wallet, cashless, mobile payment, digital wallet adoption and resistance.

2.1 Digital Wallet

Digital wallet refers to a software, an electronic device or an online service that allows a person or business to perform online transactions [17]. It is a technology that transforms the features of a physical wallet into an electronic form [18]. It allows users to perform various kinds of electronic payments using payment methods such as credit cards, debit cards and bank accounts. Like a physical wallet, a digital wallet stores owner's information, e-money, billing details, gift coupons, vehicle information and other data that allows users to make transactions in multiple settings [6, 19, 20]. There are four types of digital wallets:

- a. Open wallets: Issued by banks or institutions partnered with banks. It provides customers with additional facilities like saving account, cash withdrawal and financial services. It can be used for transactions with semi-open wallets and semi-closed wallets. An example of an open wallet is MAE.
- b. Semi-open wallets: Allow customers to deal with contractual merchants with a specific service provider. Examples are Touch'nGo, Boost and GrabPay.
- c. Semi-closed wallets: Facilitate some selected services such as the purchase of goods and pay for services, including financial services. Does not allow withdrawal or cash redemption. Examples are Settle and FlexiParking.
- d. Closed wallets: Developed by company selling products or services. They allow customers to purchase goods and services from a particular merchant and different transactions such as refunds can also be done, but only by the same merchant. However, withdrawal or cash redemption is not allowed. Examples are AEON Wallet and Petron FleetCard.

Digital wallet in Malaysia imitates how Alipay and WeChat Pay in China operate, [18] which integrate two common technologies that are digital wallet and Quick Response (QR) Code [19]. This kind of digital wallet stores some funds in digital forms to be deducted upon spending by customers. It may or may not be linked to personal bank account of users, depending on the types of digital wallets [21]. This technology is different compared to mobile wallet technology used in apps such as Apple Pay or Samsung Pay that substitutes a physical card to a virtual card and uses near-field communication (NFC) technology to communicate between devices [17, 19].

Individuals with a digital wallet will be assigned a unique QR code that links them to their account. Transactions begin whenever a party, be it the payee or the merchant, scan the QR code of another party. They then input the amount to be paid

and the system will deduct the amount from the payee's account. This system does not require any card-reading terminals that are needed in card transactions, effectively increasing the speed of transaction, and reduces cost for business [19]. The ability to enable cashless transactions anytime and anywhere with internet connectivity puts this technology ahead compared to using cards and it is seamless compared to online banking and transfers.

The competition in digital wallet market segment is growing healthy and vibrant with various service providers joining the industry [18]. There are currently 48 registered digital wallet service providers in Malaysia, among them are Touch'n Go, Boost, FavePay, GrabPay, ShoppeePay and Razer Pay. This shows a growing healthy environment but is also causing confusion among customers as the digital wallet service they use may not be compatible with the one used by merchants. There are many platforms available, and they do not communicate with one another [22]. Efforts should be made to encourage cross platform services, and this is a great step towards improving the digital wallet service to customers. For this purpose, the government through Bank Negara Malaysia (BNM) established DuitNow QR as the national's QR standard under the BNM's Interoperable Credit Transfer Framework (ICTF) which allows interoperability between participating banks and digital wallets. Through DuitNow QR, merchants only need to display one QR code to be used by all participating banks and digital wallets, reducing confusion among consumers. There are currently 36 banks and digital wallet providers participating in DuitNow QR code [23].

Going forward, digital wallet will play a key role in cross-border payments and money transfers, allowing Malaysians abroad to scan a local QR code using Malaysian mobile banking or digital wallets to make payments. For example, a Malaysian in Thailand would be able to scan a Thailand PromptQR code using a Malaysian digital wallet app to make payment. As of 2021, cross-border payments have already been established between Malaysia, Thailand and Indonesia while similar arrangement is in progress with Singapore [24]. Therefore, this activity allows customers and merchants to make and receive payments instantly in real-time, with currency exchange happens directly between the currencies of the two nations (Malaysian Ringgit and Thailand Bath).

2.2 Existing Studies on Digital Wallet

The Technology Acceptance Model (TAM), created by [26] is a popular model which posits two factors, whether a computer system will be accepted by its potential users: (i) perceived usefulness, and (ii) perceived ease of use. Previous study by [25] used TAM as basis for his cross-cultural study to analyze the consumer-perceived value regarding mobile payment. The study aims to discover and examine relevant antecedents as well as their correlative impacts on consumer value perception. Findings show that there is a correlation between the cultural background of consumers and their primary usage intention of mobile payments. It means that in addition to developing more advanced mobile payment systems, service providers should also design their system to fit the value proposition of different markets with distinctive cultures.

Previous study using TAM in digital wallet during the Covid-19 situation is important. Driven by the Covid-19 pandemic, governments encourage people to adopt the use of digital payments to reduce physical contact that happens during cash transactions. [27] did a multigroup study between Malaysia and Indonesia using a modified TAM research model, to examine the effect of perceived Covid-19 risk, government support, and perceived usefulness on the intention of Malaysians and Indonesians to use e-wallet during the pandemic. The study shows that perceived Covid-19 risk, and perceived usefulness have significant effect towards intention to use digital wallet. The mediation role of perceived usefulness is supported for both perceived Covid-19 and government support. The direct effect of government support towards intention to use e-Wallet is not supported. However, the multigroup analysis between Indonesia and Malaysia shows different result on government support and intention to use digital wallet where government support was found to have significant effect towards intention to use digital wallet in Malaysia. It meant that people in Malaysia felt the presence of its government in the forms of various initiatives during pandemic such as Penjana e-Wallet and the free internet access during Movement Control Order (MCO) period.

Besides the two basic factors or construct from the original TAM, trust is another construct that influences behavioral intention. A study among millennials in India uses extended TAM with trust as additional construct [28]. Trust was hypothesized to have influence towards behavioral intention and use behavior. The study found that perceived ease of use and trust had a significant influence towards behavioral intention. Trust also had significant direct influence on use behavior. However, the relationship between perceived usefulness and behavioral intention was found to be insignificant.

Unified Theory of Acceptance and Use of Technology (UTAUT) [29] has been used as basis in the study to examine the factors that influence user acceptance of NFC mobile wallet in the United States of America (USA) and Korea [30]. The UTAUT model was modified with credibility and service smartness in addition to performance expectancy, effort expectancy, social influence and habit. The study showed that all UTAUT factors, except for social influence had significant positive relationship with behavioral intention. The new constructs, credibility and service smartness also significantly affected behavioral intentions for adoption of NCR mobile wallet in the USA and Korea.

Within the context of Malaysia, [21] in their study proposed a modified TAM model by adding perceived risk to have moderating effect on the relation between attitude and intention to switch to mobile wallet. The study showed that perceived usefulness and perceived ease of use had a significant effect towards consumers' attitude to switch. Attitude towards switching had significant effect towards intention to switch, but the level is negatively affected by perceived risk.

Previous study which extended UTAUT with two additional constructs which were security and trust [18]. The result showed that performance expectancy, facilitating condition, social influence and trust had a significant effect towards behavioral intention to use digital wallet while effort expectancy and security were the insignificant factors.

[31] in her thesis uses examines the determinants that influence consumers among generation X in Malaysia to continue using e-wallet. She uses Expectation Confirmation Model (ECM) introduced by [32]. The model was extended with three additional constructs - perceived security and privacy, trust and self-efficacy. The study shows that confirmation significantly affects perceived usefulness, perceived security and privacy and satisfaction. Both perceived security and privacy and perceived usefulness have significant effects on trust and satisfaction. Finally, satisfaction and self-efficacy show significant effect towards continuation of e-wallet usage among Malaysian generation X. However, the relationship between trust and continuance to use e-wallet was not supported.

One of the most recent studies about digital wallet adoption among Malaysian was done in 2022 [33]. The research framework was refined from UTAUT with compatibility and perceived trust added as independent variables while education, household and living area were expected to have moderating effect on the relationship between all independent variables and intention to use digital wallet. The result shows that perceived usefulness, perceived ease of use, facilitating conditions, compatibility, and perceived trust have significant positive effect on both the intention to use and the adoption of digital wallet. Intention to use digital wallet was found to mediate all independent variables with the adoption of digital wallet. Additionally, household income was found to significantly moderate the relationship between compatibility and intention to use digital wallet while the result for education and living area were not significant.

2.3 Existing Studies on Digital Wallet Barriers

[34] examine the gap between adoption of mobile payment systems between Italy and China using a combination of UTAUT2 and Innovation Resistance Theory (IRT) [35]. The study shows that performance expectancy and social influence have significant effects for both countries. Facilitating conditions was found to be significant for Italy, but not for China. The fact that Italy lags China in terms of mobile payment adoption explains this result. On the other hand, price value is significant in China but not in Italy due to Italian having the late adopter mindset which are usually less price sensitive. Meanwhile, traditional barrier was the only barrier found to be significant.

In the context of Malaysia, [36] investigate the factors that contributed to mobile wallet resistance among Malaysian using IRT, extending it with age, education, income and perceived novelty. The study shows that in terms of demography, such as age has no significance. For education it reduces resistance to mobile wallet, while income significantly influences the resistance to it. All the IRT barriers show positive results with usage barrier found to be the strongest barrier that influence resistance to mobile wallet, followed by tradition barrier, risk barrier, image barrier and value barrier. Perceived novelty was proven to have negative influence towards resistance, showing that people would be less likely to resist using mobile wallet if they find the technology to be new, fresh and a cutting edge.

3. Methodology

This study adopts quantitative design. A pre-liminary study was done in Kuala Berang on October 30th, 2021 to gain understanding on the use and the feeling about digital wallets and cashless.

3.1 Participants

A convenience sampling was chosen to identify the respondents. This was done through interviews involving 14 respondents (9 male and 5 female) aged between 18 and 62 years old who attended the Retail Digitalization Initiative (ReDI) program held by the Ministry of Domestic Trade and Cost of Living (MDTC).

3.2 Research Instrument

An instrument was developed and involved six questions for participants. The questions were:

- a. Have you ever used cashless transactions in your daily activities?
- b. Why did you use / didn't you use cashless transaction?
- c. What kind of cashless transaction are you used to?
- d. Are you aware of the benefits of using an e-wallet?
- e. Do you intend to use e-wallets in the future?
- f. In your opinion, what is the main factor that influences you to use / not use e-wallet?

3.3 Research Procedure

Details of the research procedure are:

- a. Start with a warm welcome and introduction.
- b. Explain the purpose or objective of interview to the respondents.
- c. Respondents answer the questions according to sub section 3.2. If an answer is vague, ask for concrete examples or details.
- d. Record detailed feedback on each candidate.

For the proposed model, several constructs were identified and proposed into the model for adoption of digital wallet in Malaysia.

4. Findings and Discussion

Findings are divided into two sub sections which are the pre-liminary study and the proposed model.

4.1 Pre-liminary Study

Nine of the respondents (64%) have experience of using digital wallet at least once. It was interesting to note that four of the respondents registered for the ePenjana initiative, bought some miscellaneous items, but none of them turned digital wallet into a habit. Meanwhile, two of the respondents were frequent users of digital wallet when they worked in Selangor but stopped using digital wallet once they moved back to stay in Kuala Berang during MCO because there were few retail outlets there providing digital wallet payment. The preliminary study also showed

that lack of awareness on digital wallets and lack of merchant with digital wallet payment were mentioned frequently as the hindering factors. Some respondents also proposed for government to play a bigger role by using digital wallet in most of its activities as this would set an example to be followed by merchants and consumers. Summary of the pre-liminary study findings is shown in Figure 1.

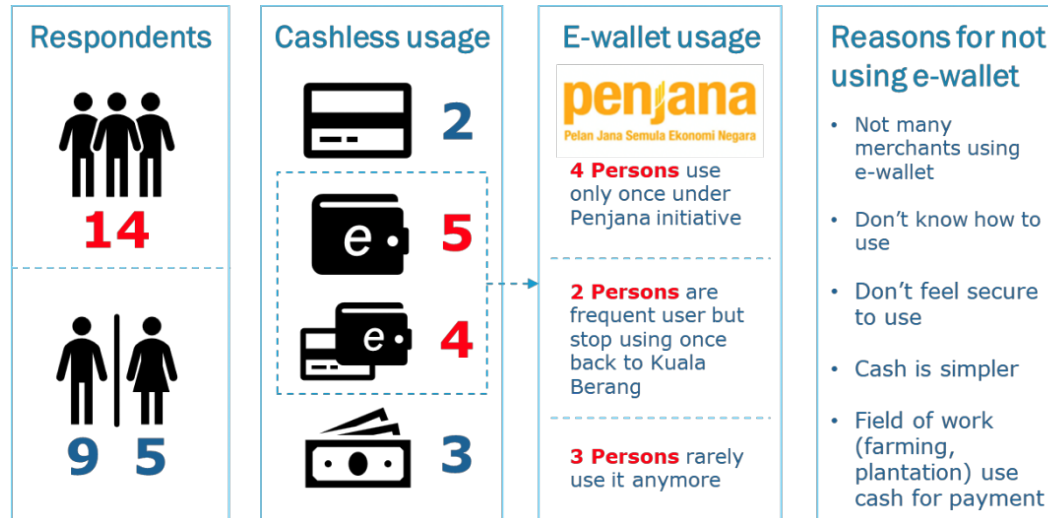


Figure 1. Findings of Pre-liminary Study in Kuala Berang

4.2 Proposed Model

Through comprehensive literature review and pre-liminary study, a conceptual model for adoption of digital wallet in Malaysia was developed in accordance with the second objective. For the study to reflect better on consumers, The unified theory of acceptance and use of technology (UTAUT2) was taken as basis for this study as it was built and evaluated to explain technology acceptance behavior in the context of consumer [37]. UTAUT2 explained 74% of the variance in customers' behavioral intention to use technology and 52% of the variance in consumers' actual use of technology [38] and is widely used either as: (1) general citation, (2) UTAUT application, (3) UTAUT Integration, or (4) UTAUT Extensions. The proposed model is a UTAUT integration with Innovation Resistance Theory (IRT) to measure the factors that lead towards adoption as well as resistance of digital wallet. There seemed to be a reason for high resistance among Malaysian consumers towards digital wallet. Therefore, this model will incorporate some elements from the IRT to measure the relationship between the IRT barriers and the adoption of digital wallet. There are two types of barriers, functional barrier (usage barrier, value barrier and risk barrier) and psychological barriers (tradition barrier and image barrier).

The model will exclude two constructs of UTAUT2 - hedonic motivation and price value. Hedonic motivation was excluded from the model as it was not related to mobile payment technology. This point was supported by [34] and [39] in which hedonic motivation had no considerable influence in utilitarian technology such as digital wallet. Price value was not considered as 97.3% of Malaysian had access to smart phones and 95.5% had access to mobile internet [14]. This translated into the

majority of Malaysian already had the means to adopt digital wallet technology. Therefore, this variable was not taken into consideration.

In addition to UTAUT2 and IRT, two additional variables which are trust and location have been included in the model. Trust is taken as an additional barrier towards adoption of digital wallet. On the other hand, location is included as moderating variable as consumers in urban or less urban and rural areas will probably have differences in their opinions regarding digital wallet. This may provide wider understanding on digital wallet adoption among different segments of Malaysians. The proposed research model for this study is depicted in Figure 2.

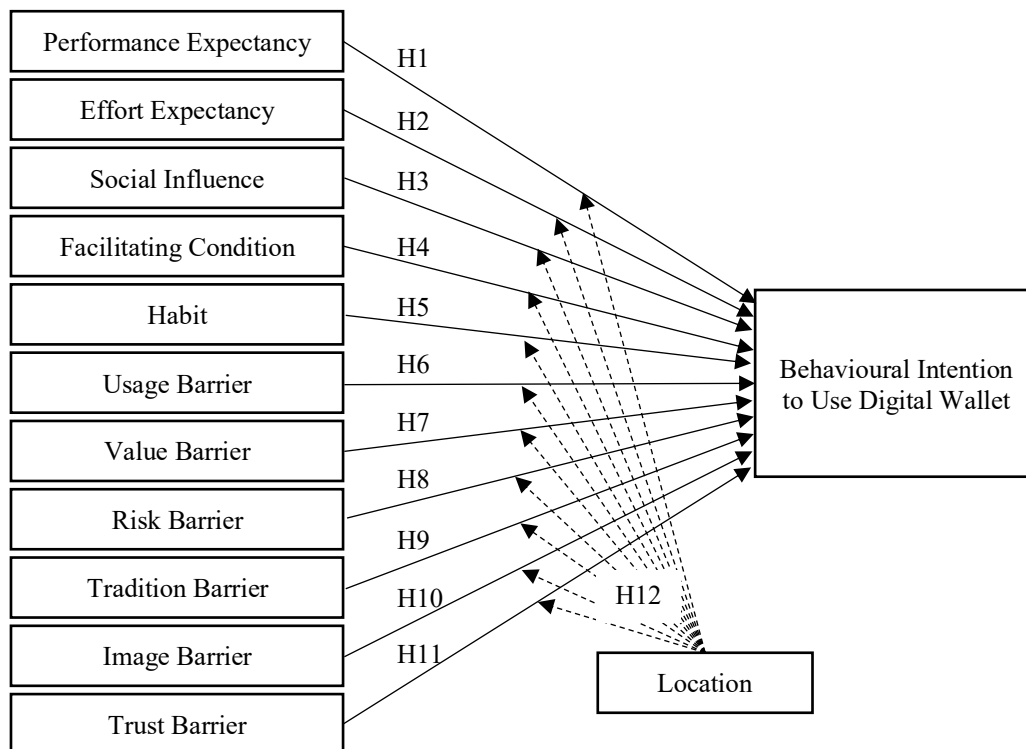


Figure 2. Proposed Research Model

According to Figure 2, there are 11 constructs involved and one construct is considered as the moderating factor. Explanations about the constructs are provided in the below paragraphs.

a. Performance Expectancy

Performance expectancy (PE) has been defined as the degree to which an individual believes that using the system will help him or her to attain benefits in job performance [29]. It refers to the extent to which consumers can improve their performance quality by using technology, in this case digital wallet payment. In other words, the question is whether mobile payment as a means can meet the goals of consumers [25]. This is one of the most crucial factors in influencing people into using technology. Thus, it is hypothesized:

H1: Performance Expectancy has a significant effect towards the behavioral intention to use digital wallet.

b. Effort Expectancy

Effort expectancy (EE) is the degree of ease associated with the use of the system [29]. According to recent studies, simplicity of use has a substantial impact on users' intentions to use mobile wallet services [28]. The ease with which a technology can be applied will make it the preferred payment option for consumers [6]. Thus, it is hypothesized:

H2: Effort Expectancy has a significant effect towards the behavioral intention to use digital wallet.

c. Social Influence

Social influence (SI) is the degree of which an individual perceives important that others believe he or she should use the system [29]. Social influence occurs when other people affect an individual's thoughts, feelings, and actions. It can be in the form of compliance to social norm, while keeping our view to ourselves, or identification by conforming to someone respected such as the community leader or favorite idol, or internalization, where the conforming of belief or behavior and conforming both publicly and privately. As of now, Malaysians perceived from their surrounding that people are not accepting digital wallet as a novel technology, resulting in a weak effect of social influence [33]. Thus, it is hypothesized:

H3: Social Influence has a significant effect towards the behavioral intention to use digital wallet.

d. Facilitating Condition

Facilitating condition (FC) is defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system [29]. Previous studies have shown that facilitating condition is one of the most significant contributors towards cashless and digital wallet adoption [7, 18, 40]. As one of the nations with highest percentage of internet penetration and mobile phones, Malaysia is perceived to have good environment to facilitate the use of digital wallet. This can be seen in the use of MySejahtera apps to track close contacts of Covid-19.

At the same time, the number of retailers that provided options for digital wallets as payment method option for customers is still considerably low, especially in the less urban areas. During the preliminary study in Kuala Berang, respondents claimed that there are less than 10 premises in the district that provided digital wallet options, which inhibits them from adopting digital wallet. Thus, it is hypothesized:

H4: Facilitating condition has a significant effect towards the behavioral intention to use digital wallet.

e. Habit

Habit (HT) has been defined as the extent to which people tend to perform behaviors automatically because of learning [29]. Habit is a behaviour that happens automatically when is triggered by something and can be nurtured after the passage of time with constant interaction and exposure to a technology. One example of habit is someone opening the WhatsApp application to check his messages whenever he is free from any task. The behavior (checking

WhatsApp) is automatic while being free from any task is the trigger that leads to that habit.

HT can be a strong influence towards adoption of digital wallets, as proven by [30] in their study in the adoption of NCR based mobile wallets in the USA and Korea. This is due to the people in both countries having used to the habit of making payment using their mobile phones for specific services such as paying for a booking of transportation or buying coffee at Starbucks. Thus, it is hypothesized:

H5: Habit has a significant effect towards the behavioral intention to use digital wallet.

f. Usage Barrier

Usage barrier (UB) is the most common resistance towards technology. Usage barrier involves changes to customers routine and may not be suitable with the current practice or habits [35]. People are required to change their daily routine, according to how they usually do things, and this requires time and effort on the part of consumers. Some people might think that using cash and debit cards as an easier method of payment than digital wallet, resulting in resistance towards it. The inability of people to accept changes, which challenge the status quo or push them out of their comfort zone is a barrier that negatively impacts the adoption towards digital wallet. Thus, it is hypothesized:

H6: Usage Barrier has a significant negative effect towards the behavioral intention to use digital wallet.

g. Value Barrier

People need to be able to see stronger value barrier (VB) of (performance-to-price) that a technology brings compared to the current existing substitutes. This works as a kind of incentive for customers to change [35].

Concerning digital wallet, the service providers in Malaysia offers a much less charges for use compares to debit and credit cards. The technology can also be used without the need for merchants to rent sales terminal such as the requirement for cards that. It offers the best of benefit for traders, which makes it a popular means of payment in China [19].

Within the perimeter of consumers, digital wallet services need to offer more services and benefits that generate strong performance-to-price value to consumers compared to using cards or cash. Otherwise, there will be no incentive for consumers to change to digital wallet which will negatively influence the adoption of digital wallet. Thus, it is hypothesized:

H7: Value Barrier has a significant negative effect towards the behavioral intention to use digital wallet.

h. Risk Barrier

Risk barrier (RB) is a certain amount of uncertainty and unpredicted negative repercussions are present in all innovations. As a result, customers frequently delay adoption until they are given more information [35]. There are four types of risk that are associated with innovations. They are physical risks, economic risks, functional risks and social risks. Innovation products may contain any

one or more of these inherent risks. The more people perceive a technology to be risky, the more likely it is for them to build resistance to it. Thus, it is hypothesized:

H8: Risk Barrier has a significant negative effect towards the behavioral intention to use digital wallet.

i. Tradition Barrier

Tradition barrier (TB) exists when a technology requires a consumer to deviate from their established tradition or social norms [35]. For instance, it has been the norm at some rural areas of Malaysia that payment for agricultural or fisheries produces to be done in cash. People in the villages are more likely to prefer to trade in cash since it takes a lot of effort on their part, as well as costly for them to travel to the banks and back. Although digital wallets offer better solutions for them, it is not a familiar method of trade and it is against their well-established norms. The study by [34] supported this when they found that tradition barriers significantly affected the resistance to mobile payment adoption in Italy where the use of cash remains strong. After all, the more changes that would happen against the norm, the greater the resistance would be. Thus, it is hypothesized:

H9: Tradition Barrier has a significant negative effect towards the behavioral intention to use digital wallet.

j. Image Barrier

Image barrier (IB) involve innovations frequently develop specific stereotypes that may cause customer reluctance. This might be associated with the nation of origin, the product category, or even the industry that they are a part of [35]. People might relate digital wallet industry with the image of frauds and privacy breach that is usually related with the banking industry or questioning the credibility of local digital wallet provider with international players such as Samsung Pay and Apple Pay. These are some image barriers that may become resistant to adoption. These images are the results of stereotyped thinking and make it difficult for people to accept an innovation. Thus, it is hypothesized:

H10: Image Barrier has a significant negative effect towards the behavioral intention to use digital wallet.

k. Trust Barrier

Trust barrier (TR) is defined as the state of willingness to be vulnerable to others. Trust is multidimensional and categorised into cognitive-based trust and affect-based trust [41]. Affect-based trust is related to emotional and mood experiences that are either unique to a given relationship or more generalised, incidence that affect trust in that relationship [42]. According to [41], affect-based trust is supported by emotional ties and expectations of interpersonal care and concern.

On the other hand, cognitive-based trust is based on any type of cognition such as perceptions and evaluations of the traits of the other party, the strength of the bond between the parties, and the social context in which interactions occur [42]. It has been grounded on assessments of another's dependability, competency, and reliability, all of which offer a justification for trust [41].

Since personal data is saved on mobile devices, concerns about protection and privacy issues seem to be more significant when it comes to money transfers [43]. Users are still concerned about the confidentiality and protection of the data stored on their own devices. In Malaysia, this is worsened when a lot of people were reported to lose their savings from their personal bank account back in 2022 [44]. This incident is associated with weakness in mobile banking application [45]. The credibility of Malaysian Banking industry was also questioned when five major banks in Malaysia were identified by Malaysian Anti-Corruption Commission (MACC) to involve in international frauds [46, 47]. Although the crux of the issue is unrelated to digital wallet, it still affected the sense of trust that people have towards the monetary institution. Therefore, trust is a crucial component that must be present for consumers to feel content and encouraged to use digital payment such as digital wallets. Low level of trust over the overall digital wallet systems and services may become a cause for resistance among consumers. Thus, it is hypothesized:

H11: Trust barrier has a significant negative effect towards the behavioural intention to use digital wallet.

1. Location

Location is a moderating factor which people from the urban areas are perceived to be more educated and have more confidence to use cashless payment [15]. People in the urban areas are more exposed to technology, have better facilitating conditions and social influence. User perspective varies based on their respective dwelling area as those residing in urban areas have a different lifestyle than rural dwellers [48, 49]. The reliance towards cash is extremely high in the rural areas, and the people there would have lower digital financial literacy compared to the cities [7]. There is a need to understand how people from this area perceived digital wallet technology and the use of cashless in general. Since cashless payment requires various kinds of facilities, consumers from rural areas might have different perceptions on the use of digital wallet might have significant moderating effect towards some of the constructs [16]. Thus, it is hypothesized:

H12: Location moderate the relationship of PE, EE, SI, FC, HT, UB, VB, RB, TB, IB and TR with the Behavioural Intention to use digital wallet.

5. Conclusion and Limitations

This study contributes to the body of knowledge of Information System by providing insights into the adoption of digital wallet technology among rural Malaysians. The inclusion of adoption and resistance would allow for better understanding of consumers' perceptions on digital wallet technology. This will be useful in planning the measures and future initiatives to inculcate the use of digital wallet among Malaysians and propel Malaysia towards digital community. This would bridge the gap that existed from the previous study on cashless and digital wallet adoption in Malaysia.

However, the proposed model for this study does not differentiate between the four types of digital wallet. Therefore, it would not be able to gauge the preference of consumers, especially between the open wallets and semi-open wallets. Secondly, since the study focuses on the use of QR-based digital wallets, the use of other digital wallet technology such as NFC used by ApplePay or SamsungPay will not be captured. As this kind of digital wallet has some appeal to certain groups of people, future study could investigate the adoption between the two digital wallet technologies. These are perhaps, the limitations that future study could investigate to gain more understanding of digital wallet use in Malaysia.

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References

- [1] Fabris, N. (2019) 'Cashless Society - The Future of Money or a Utopia?', *Journal of Central Banking Theory and Practice*, 8(1), pp. 53–66.
- [2] Layne-farrar, A. (2016) 'JOINT The Economics of a Cashless Society : An Analysis of the Costs and Benefits of Payment Instruments The Economics of a Cashless Society : An Analysis of the Costs and Benefits of Payment Instruments', (January 2006).
- [3] Thomas, H., Jain, A. and Angus, M. (2013) 'The Global Journey From Cash to Cashless', *Advancing Insights, Advancing Commerce*, 1(3rd), p. 15.
- [4] Spataro, T. and Nguyen, D. (2016) *Millennials & Mobile Wallets*.
- [5] Insider Intelligence. (2016). Mobile Wallets Are Striking a Chord With Millennials. <https://www.businessinsider.com/mobile-wallets-are-striking-a-chord-with-millennials-2016-8>
- [6] Yang, M., Al Mamun, A., Mohiuddin, M., Nawi, N. C. and Zainol, N. R. (2021) 'Cashless Transactions: A Study on Intention and Adoption of e-Wallets', *Sustainability (Switzerland)*, 13(2), pp. 1–18.
- [7] Rahman, M., Ismail, I. and Bahri, S. (2020) 'Analysing consumer adoption of cashless payment in Malaysia', *Digital Business*. The Authors, 1(1), p. 100004.
- [8] Brown, D. (2020) *Coronavirus concerns: Do you need to avoid cash, use digital payments?*, *USA Today*, March 6, 2020.
- [9] Visa (2022) *Visa Consumer Payment Attitudes Study 2022 - Navigating A New Era In Payments*.
- [10] BNM. (2023). *BNM Annual Report 2022 - Bank Negara Malaysia*. <https://www.bnm.gov.my/publications/ar2022>
- [11] Hazwan Faizal Mohamad. (2020). *Rakyat boleh tebus RM50 kredit ePenjana mulai esok*. BH Online. <https://www.bharian.com.my/berita/nasional/2020/07/716449/rakyat-boleh-tebus-rm50-kredit-epenjana-mulai-esok>
- [12] MOF. (2022). *ePemula*. <https://budget.mof.gov.my/manfaat/en/faq/epemula.html>
- [13] MOF. (2023). *eBeliaRahmah*. <https://budget.mof.gov.my/manfaat/faq/ebeliarahmah.html>
- [14] DOSM. (2023). *DOSM - ICT Use and Access By Individuals and Households Survey Report, Malaysia, 2022*.
- [15] Balakrishnan, V. and Shuib, N. L. M. (2021) 'Drivers and inhibitors for digital payment adoption using the Cashless Society Readiness-Adoption model in Malaysia', *Technology in Society*. Elsevier Ltd, 65(June 2020), p. 101554.
- [16] Ariffin, S. K., Abd Rahman, M. F. R., Muhammad, A. M. and Zhang, Q. (2021) 'Understanding the consumer's intention to use the e-wallet services', *Spanish Journal of Marketing - ESIC*, 25(3), pp. 446–461.
- [17] Corporate Finance Institute (no date a) *Digital Wallet - Overview, Significance, Examples, Types*.
- [18] Abdullah, N., Redzuan, F. and Daud, N. A. (2020) 'E-wallet: Factors influencing user acceptance towards cashless society in Malaysia among public universities', *Indonesian Journal of Electrical Engineering and Computer Science*, 20(1), pp. 67–74.
- [19] Klein, A. (2020) 'China's Digital Payments Revolution', *Global China*, (April), pp. 1–15.
- [20] Rahadi, R. A., Nainggolan, Y. A., Afgani, K. F., Yusoff, Y. M., Muhammad, Z., Angelina, C. and Farooq, K. (2020) 'Conceptual Model for Cashless Society: A Literature Synthesis', *European Journal of Business and Management Research*, 5(3), pp. 1–7.
- [21] Alaeddin, O., Rana, A., Zainudin, Z. and Kamarudin, F. (2018) 'From physical to digital: Investigating consumer behaviour of switching to mobile wallet', *Polish Journal of Management Studies*, 17(2), pp. 18–30.
- [22] Narasimhaiah, N. and Sam, R. P. (2015) 'Emerging Rails and Cashless Payments', pp. 66–76.
- [23] DuitNow (2021) *DuitNow QR | Customer*.
- [24] BNM. (2022). *Bank Negara Malaysia Annual Report 2021*. <https://www.bnm.gov.my/publications/ar2021>
- [25] Zhao, Z. (2019) 'Cashless Society: Consumer Perceived Value Propositions Of Mobile Payment', *Tampere University*, (May), p. 105.
- [26] Davis, F. D. (1989) 'Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology',

- MIS Quarterly*, 13(3), pp. 319–340.
- [27] Aji, H. M., Berakon, I. and Md Husin, M. (2020) ‘COVID-19 and e-wallet usage intention: A multigroup analysis between Indonesia and Malaysia’, *Cogent Business and Management*, *Cogent*, 7(1).
- [28] Sarmah, R., Dhiman, N. and Kanojia, H. (2020) ‘Understanding intentions and actual use of mobile wallets by millennial: an extended TAM model perspective’, *Journal of Indian Business Research*, 13(3), pp. 361–381.
- [29] Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003) ‘User Acceptance of Information Technology: Toward a Unified View’, *MIS Quarterly*. Management Information Systems Research Center, University of Minnesota, 27(3), pp. 425–478.
- [30] Shin, S., & Lee, W. J. (2021). Factors affecting user acceptance for NFC mobile wallets in the U.S. and Korea. *Innovation and Management Review*, 18(4), 417–433. <https://doi.org/10.1108/INMR-02-2020-0018>
- [31] Choo Pei Shan. (2021). Determinants Of Continuance Intention To Use E-Wallet Among Generation X In Malaysia. *Universiti Teknologi Malaysia*.
- [32] Bhattacherjee, A. (2001). Understanding Information Systems Continuance: An Expectation-Confirmation Model Author(s): Anol Bhattacherjee Source. In *MIS Quarterly* (Vol. 25, Issue 3).
- [33] Che Nawi, N., Mamun, A. Al, Hayat, N. and Seduram, L. (2022) ‘Promoting Sustainable Financial Services Through the Adoption of eWallet Among Malaysian Working Adults’, *SAGE Open*, 12(1), p. 215824402110711.
- [34] Migliore, G., Wagner, R., Cechella, F. S., & Liébana-Cabanillas, F. (2022). Antecedents to the Adoption of Mobile Payment in China and Italy: an Integration of UTAUT2 and Innovation Resistance Theory. *Information Systems Frontiers*. <https://doi.org/10.1007/s10796-021-10237-2>
- [35] Ram, S., & Sheth, J. N. (1989). Consumer resistance to innovations: The marketing problem and its solutions. *Journal of Consumer Marketing*, 6(2), 5. <https://doi.org/10.1108/EUM0000000002542>
- [36] Leong, L. Y., Hew, T. S., Ooi, K. B., & Wei, J. (2020). Predicting mobile wallet resistance: A two-staged structural equation modeling-artificial neural network approach. *International Journal of Information Management*, 51(November 2019), 102047. <https://doi.org/10.1016/j.ijinfomgt.2019.102047>
- [37] Venkatesh, V., Thong, J. Y. L. and Xu, X. (2012) ‘Consumer Acceptance And Use Of Information Technology: Extending The Unified Theory Of Acceptance And Use Of Technology’, *MIS Quarterly*, 36(1), pp. 157–178.
- [38] Venkatesh, V., Xu, X. and Thong, J. (2016) ‘Journal of the AIS Association for Information Systems Unified Theory of Acceptance and Use of Technology: A Syn...’, *Journal of the association for information systems*, 17(5), pp. 328–376.
- [39] Tamilmani, K., Rana, N. P., Prakasam, N., & Dwivedi, Y. K. (2019). The battle of Brain vs. Heart: A literature review and meta-analysis of “hedonic motivation” use in UTAUT2. *International Journal of Information Management*, 46, 222–235.
- [40] Pey, L. U. M. and Kosim, Z. (2021) ‘Factors Affecting Consumers’ Cashless Payment Behaviours Admst the COVID-19 Pandemic’, *MEDIA MATTERS VOL. 4*, pp. 13–26.
- [41] Mcallister, D. J. (1995). Affect- And Cognition-Based Trust As Foundations For Interpersonal Cooperation In Organizations. In *Academy of Management Journal* (Vol. 38, Issue 1).
- [42] Legood, A., van der Werff, L., Lee, A., den Hartog, D., & van Knippenberg, D. (2022). A Critical Review of the Conceptualization, Operationalization, and Empirical Literature on Cognition-Based and Affect-Based Trust. *Journal of Management Studies*. <https://doi.org/10.1111/joms.12811>
- [43] Sharma, S. K., & Sharma, M. (2019). Examining the role of trust and quality dimensions in the actual usage of mobile banking services: An empirical investigation. *International Journal of Information Management*, 44, 65–75. <https://doi.org/10.1016/j.ijinfomgt.2018.09.013>
- [44] Astro Awani. (2022). Kes Kehilangan Wang Dari Akaun Bank. Retrieved March 16, 2023, from <https://www.astroawani.com/video-malaysia/jenayah-kes-kehilangan-wang-dari-akaun-bank-1984372>
- [45] Omar Zin (2022). Kelemahan aplikasi bank didakwa punca wang hilang. Retrieved March 16, 2023, from <https://www.utusan.com.my/berita/2022/08/kelemahan-aplikasi-bank-didakwa-punca-wang-hilang/>
- [46] Aliza Shah. (2023). MACC: 5 banks used by international scammers to dupe victims of millions of ringgit. <https://www.nst.com.my/news/crime-courts/2023/03/889627/macc-5-banks-used-international-scammers-dupe-victims-millions>
- [47] Maszureen Hadzman. (2023). Lima bank utama transit wang haram dalam ‘radar’ SPRM. <https://www.utusan.com.my/nasional/2023/03/lima-bank-utama-transit-wang-haram-dalam-radar-sprm/>
- [48] Lai, P. C. (2018) ‘Single Platform E-Payment System Consumers’ Intention to Use’, *Journal of Information Technology Management*, 29(2), pp. 22–28.
- [49] Senyo, P. K. and Osabutey, E. L. C. (2020) ‘Unearthing antecedents to financial inclusion through FinTech innovations’, *Technovation*. Elsevier Ltd, 98(June), p. 102155.
- [50] Kumar, R. (2011). *Research Methodology : a step-by-step guide for beginners* (3rd Editio). SAGE Publication Ltd. www.sagepublications.com
- [51] DOSM (2020b) ‘The key findings: Income, poverty, inequality, expenditure, basic amenities 2019’, *Department of Statistics Malaysia*, pp. 1–159.
- [52] Krejcie, R. V and Morgan, D. W. (1970) ‘Determining sample size for research activities’, *Educational and psychological measurement*. Sage publications Sage CA: Los Angeles, CA, 30(3), pp. 607–610.