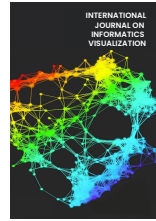




INTERNATIONAL JOURNAL ON INFORMATICS VISUALIZATION

journal homepage : www.joiv.org/index.php/joiv



The Resilience of e-Wallet Adoption among Millennials in Malaysia

Farha Zafira Agos Lokman ^{a,*}, Isfahan Mohamed Ahmed ^b, Natalia Hakimi ^c, Nurkhalida Makmor ^d,
Noor Ashikin Binti Mohd Rom ^a, Febyolla Presilawati ^e

^a Faculty of Management, Multimedia University, Cyberjaya, Malaysia

^b Faculty of Business, Accounting, Finance, Law and Humanity, MAHSA University, Selangor, Malaysia

^c School of Business and Economics, Universiti Putra Malaysia, Selangor, Malaysia

^d Faculty of Business and Management, OUM, Malaysia

^e Universitas Muhammadiyah Aceh, Indonesia

Corresponding author: *farhazafira@mmu.edu.my

Abstract—As smartphones dominate our daily lives and mobile apps soar in popularity, a wave of innovative e-wallets is transforming and has become an essential tool for many, particularly among younger generations. In this context, understanding what influences the acceptance of e-wallets is essential, as it offers insights into the future of financial technology. This study concentrated on three important factors: perceived security (PS), perceived ease of use (PEU), and social influence (SI) to determine their relationship towards e-Wallet adoption (EWA) among millennials in Malaysia, with four hypotheses were formulated. The Unified Theory of Acceptance and Use of Technology (UTAUT) was employed. 390 data were collected via purposive sampling and a survey questionnaire, and analyzed using Smart PLS (Partial Least Squares). The findings revealed that both PS and PEU have a significant influence on EWA. However, the research found that SI has no moderating effect on the relationship between PEU and PS toward EWA at the 5% significance level, with p-values of 0.122 and 0.692, respectively. This concludes that PEU and PS catapulted e-wallet adoption in Malaysia to a whole new level regardless of SI. Future studies could investigate why SI is not significant in this situation and examine additional moderators or mediators. This could raise public awareness and offer unique perspectives on e-wallet adoption trends, laying the groundwork for further research in the rapidly evolving field of digital money.

Keywords—E-Wallet adoption; perceived security; perceived ease of use; social influence; UTAUT; millennials; Malaysia.

Manuscript received 11 Apr. 2025; revised 21 Sep. 2025; accepted 2 Dec. 2025. Date of publication 31 Jan. 2026.

International Journal on Informatics Visualization is licensed under a Creative Commons Attribution-Share Alike 4.0 International License.



I. INTRODUCTION

E-wallets operate through technology-based platforms that reserve and shield a user's financial credentials and authentication information. E-wallets have emerged as a leading digital payment method in developing countries [1]. An e-wallet is the most common type of electronic payment. An e-wallet is a next-generation payment technology that presents a more suitable option for daily transactions. E-Wallet is a fascinating payment tool that converts offline transactions to online ones, making it one of the fastest methods for in-store transactions. e-wallet payments enhance efficiency by reducing time and costs compared to traditional banking systems. It enables contactless payment via phone tap or QR code scan.

The adoption of e-wallets has been enabled by advances in digital technology, which have given consumers faster and more reliable internet access [2]. With the rise of e-payment systems, consumers are transitioning from cash to cashless transactions [3]. However, shifting to a non-cash economy is challenging, as traditional cash-based trading patterns remain unshakable. Malaysians have shown strong adoption of e-wallets, with 2.9 million adopting one. Malaysia has about 42 licensed e-wallets, with AEON Wallet, Boost, BigPay, GrabPay, WeChat Pay, and Touch 'n Go e-Wallet being the most widely used [4]. These e-Wallets are a vital part of converting the nation into an emerging cashless environment. The growing global significance of e-wallets has spurred extensive research in countries such as Malaysia, India, Indonesia, and China. However, despite these insights, Malaysia's e-wallet adoption rate was just 31.7%, falling short of other Asian countries such as China (83.6%), Japan (73.2%), and South Korea (70.6%), respectively [5]. In

addition, as customers had more payment options while businesses were operating normally, they preferred debit cards (19%) and cash (34%) over digital wallets, which led to a quarterly decline in e-wallet usage to 45% in Q1 2022. E-wallets are still not accepted as a form of payment by some small companies[6].

E-wallets are a key driver in transforming the way in reshaping the cashless payment landscape, driven by the growth of digitization in enterprises[7]. E-wallets enable mobile users to conduct transactions and have become a key payment method due to their flexibility and usability, convenience, and confidentiality it provides [8]. In Malaysia, e-wallets are becoming increasingly popular for their cost-saving benefits, ease of use, and security. Due to the rapid spread of COVID-19, people were forced to cut back on travel and in-person interactions, leading to widespread use of contactless payment methods such as e-wallets. As a result, many countries, including Malaysia, have promoted contactless payment options, such as e-wallets. These systems are appreciated for their flexibility and efficiency. For instance, payments and purchases can be easily and quickly conducted using Near Field Communication (NFC)-enabled mobile devices[9]. The e-wallet service requires a smartphone, an internet connection, merchant platforms, an e-wallet platform and its server, and the user's bank account, as shown in Fig. 1 [10]



Fig 1 The e-wallet service's components

E-wallets play a vital role in today's world by driving global e-commerce growth. Online shopping and electronic financial transactions may be restricted by the lack of e-wallets. Additionally, they make it easier to pay a variety of invoices, including government, restaurant, retail, and business invoices. Any transaction that can be swiftly and simply finished with a few taps and clicks is simple to complete. Furthermore, e-wallets enable users to receive rewards or discounts through their respective applications, and any financial transactions or payments made via them are quicker and less expensive than bank transactions [11]. In contrast, traditional wallets offer significantly lower security compared to e-Wallets. Innovative smart technology apps that put security, privacy, and ease of use first are sought after by younger generations[12]. Technical advancements and globalization have led to a shift in perspectives and attitudes among younger generations. Millennials are members of the so-called Generation Y, who were born between 1980 and 2000 who technologically knowledgeable and astute, as they have an upbringing and lifelong exposure to digital media,

technology, and the internet, which is also known as "digital natives." [13], [14]. Nonetheless, given the growing number of data breaches worldwide, including in Malaysia, information security and privacy remain major concerns.

Technology infrastructure consists of the skills, resources, techniques, and procedures that can speed up information flow and communication [12]. Nonetheless, it is undeniable that e-wallet service providers face several challenges in today's rapidly evolving technological landscape. The adoption of electronic payment systems by consumers has received little attention, even though their use has been gradually increasing [15].

Scant awareness about information protection can permit identity thieves, credit card fraudsters, and cybercriminals to compromise someone's privacy. There is a high possibility of fraud, stealing, and illegally running someone's account, and facilitating financial crimes [6] [16], [17]. These include numerous managerial and technological challenges related to infrastructure, mobile software design, and the usability and interface of mobile devices in using e-Wallets [18]. Thus, this research investigates the determinants of e-Wallet adoption among millennials in a rising economy and emerging market.

II. MATERIALS AND METHOD

The adoption of e-Wallets among Malaysian millennials in this study is examined using Venkatesh et al.'s (2003) Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT focuses on the alignment of information technology and user behavior. The UTAUT model combines eight previously developed models: the Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Social Cognitive Theory (SCT), Model of PC Utilization (MPTU), Motivational Model (MM), Innovation Diffusion Theory (IDT), and the combined TAM and TPB [19].

UTAUT is one of the more established recent technologies to be adopted as paradigms. It will be integrated with additional variables that influence the adoption of e-wallets among millennials in Malaysia, as the theory is recognized for incorporating determinants such as social influence and security concerns[7] [20]. E-wallet adoption in Malaysia in this study is fully explained by this synthesis inside the UTAUT framework, which is enhanced by the incorporation of structural assurance [10]. In general, potential users will be hesitant to embrace new technology due to security and trust concerns. This model examines how millennials adopt new information technologies for digital payments via e-Wallets. The variables used in this study were examined as follows.

A. e-Wallet Adoption

An e-wallet is a payment mechanism that allows users to hold money and conduct payments using a computer or smartphone [21]. According to the study's findings, consumers chose to use digital payment systems during the COVID-19 outbreak because they were equitable and effective [19]. E-wallet adoption in Malaysia has been advantageous, increasing corporate competitiveness, boosting national GDP, and stimulating the expansion of the digital economy. However, the development of the sector has been hampered by studies on e-wallet adoption in Malaysia [6]. Thus, it is crucial to have a thorough understanding of the

factors influencing people's intentions toward mobile payments [22].

1) *Perceived Security:*

People are becoming more and more concerned about security, making them question the level of protection they are guaranteed[23], [24]. Customers' decision to use e-wallets seems to be greatly affected by their perceived level of security [5]. In today's world, security concerns have grown in importance, leading people to question the level of safety they receive. Perceived security in mobile payment systems is determined by how much customers think their financial and personal information is secure during transactions [24], [25]. Customers' perceptions of technology's safety exert a significant influence on their motivation and desire to use it [26]. Security issues are increasingly a worry today, making individuals suspicious of the extent of security assured to them[23]. Privacy issues may result from excessive sharing of private data on mobile devices, such as location, chats, and photos. Additional research demonstrates that when people are in control of, comprehend, and are aware of the technology they have chosen, they feel safer.

The degree of trust that people have in a certain electronic wallet service correlates with their readiness to embrace and use it. Financial information and other personal data may be accessed by unauthorized individuals, and hackers may exploit system flaws to obtain it. Therefore, people naturally take these kinds of security and privacy risks into account before utilizing a new service, such as an e-Wallet [16], [17], [27]. Providing secure user services, transactions, privacy, and data protection is a primary priority for clients in mobile banking. The banking sector invests significantly in customer security features, including multi-factor authentication and transaction encryption. E-wallets have been popular because they make transactions easy.

Despite the advantages of e-wallets, users' lack of awareness and expertise, along with concerns about transaction security, remain major obstacles to adoption. Users' confidence and trust are bolstered when they perceive technology as secure, thereby promoting adoption and continuous use. While strong security features like encryption and multi-factor authentication allay worries about data breaches and transaction fraud, they also encourage broader use of e-wallet services[27], [28]

2) *Perceive Ease of Use:*

In general, potential users avoid new technologies due to security and trust concerns. Perceived ease of use is the extent to which an individual believes that they can utilize a particular system with little difficulty and won't thereafter encounter any problems [29], [30]. It describes the effort an individual exerts to adopt a particular technology. Users' belief that they can accomplish anything with technology without any hindrance [31]. It is described as an individual's degree of trust, believed to facilitate the use of technology[32], [33]. Previous experiences with e-Wallets may influence users' perceptions of their usage, whether directly or indirectly.

According to Chawla and Joshi [25], there are four aspects used in explaining perceived ease of use, which include:

- Simple to learn; where people who believe technology is simple to understand also find it.

- Convenience of understanding; people who understand technology find it simple to use, whereas those who do not comprehend the technology find it difficult to use.
- Effortless: when people think they can effectively complete tasks, they find technology easier to employ. However, individuals who struggle with technology will do the work incorrectly.
- Simple to use. People will feel more assured if they find the technology straightforward to use.

Perceived ease of use refers to the degree to which a user perceives a technological system to be easy to use [34]. The Technology Adoption Model (TAM) includes perceived ease of use as a key element. E-wallets are considered user-friendly, reflecting this aspect of the model, straightforward to use, and they can significantly increase payment efficiency [35]. Users can load their e-wallets via credit or debit cards or at nearby outlets that support e-wallet top-ups, with funds immediately accessible on their devices. Payments can then be made via QR code scanning or contactless interaction with a payment terminal, completing the transaction seamlessly. It is an easy and quick payment experience [36]. Perceived ease of use fosters favorable user perceptions of the service and increases the likelihood that users will recommend it to others.

The service's user-friendly design allows users to set up, manage, use, and operate an e-wallet quickly and easily. This approach requires minimal effort for system setup and configuration, making the process seamless and convenient. The perceived ease of use indicates that a key element in the adoption of the technology is the perceived simplicity of using an e-wallet [37]. The perceived ease of use enhances users' perception of e-wallet payment usefulness [38]. The implementation of financial activities and users' motivation to adopt mobile payments are further enhanced through simplified payment procedures and informative educational features [39]. A higher level of perceived ease of use encourages greater adoption of e-wallets [28], [40], [41]

3) *Social Influence:*

Social influence is among the primary elements that lead people to use an e-wallet app. It refers to the purposeful or unintended behavior modification caused by one individual on another [42]. Social influence is also one of the main elements affecting the uptake and adoption of new technology [34]. People who regularly use cutting-edge devices and services, especially those who pay their bills using an e-wallet, are more likely to adopt them [43]. They will be interested in learning more about e-wallets and will adopt them if they are pleased with their features, benefits, and ease of use. In Malaysia, Touch n Go (TNG) is among the most commonly used e-wallet applications that facilitates digital payments[24], [44].

In addition to standard expenses like food, clothing, and entertainment, TNG can be used to pay for tolls and parking. The majority of millennials require a TNG card to pay tolls because they either already own a car or intend to buy one in the near future. The surroundings and this circumstance have greatly influenced millennials' adaptation, leading them to begin using electronic wallets to pay for tolls and street parking. Social pressure is believed to have a stronger influence on individuals' decisions to use new technology, such as digital wallets. Social influence significantly shapes consumers' intentions to adopt and use an e-wallet [21]. Peers

or relatives who use particular e-Wallet services and force their peers to utilize services they previously did not use can create indirect social pressure. This type of covert social pressure can coerce people. Since their peers use e-wallets, young adults in Malaysia are more likely to use them than any other age group [18].

In light of this, moderating factors are found for the correlation between the intended and actual outcomes of the activity. This is due to the fact that intervening structures have the power to alter the intention-behavior link[45]. Additionally, there has been limited empirical research conducted on users' intentions to adopt digital payments in developing contexts[46]. Hence, social influence is considered the moderating variable for this study. There are a few studies that found that one of the variables that could have the greatest influence on the adoption of electronic payment systems is social influence [5]. Additionally, it was discovered that e-wallet adoption was positively impacted by perceived social influence [9], [41], [47]. A total of four hypotheses were formulated to determine the relationships among the variables and E-Wallet Adoption, as illustrated in Fig. 2.

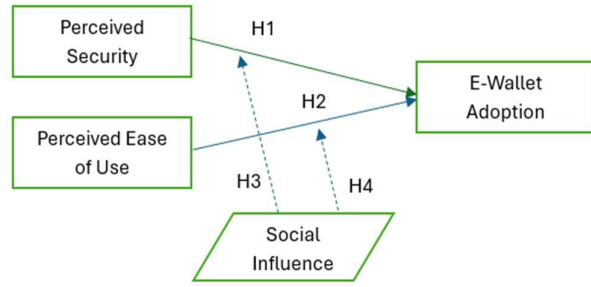


Fig. 2 The proposed research theoretical framework

Based on the theoretical framework in Figure 2, this study proposed the following hypotheses:

- H1: Perceive Security has a relationship with E-Wallet Adoption.
- H2: Perceived Ease of Use has a relationship with E-Wallet Adoption
- H3: Social Influence moderates the relationship between Perceived Security and E-Wallet Adoption.
- H4: Social Influence moderates the relationship between Perceived Ease of Use and E-Wallet Adoption.

B. Method

This study employed a quantitative research method to verify the suggested framework. A quantitative technique is a method for researchers to gather data after distributing a questionnaire and use it to evaluate hypotheses[48]. A total of 390 respondents were usable responses were obtained through non-probability sampling techniques. The study's participants are millennials with the potential to use e-wallets. The data were collected via a Google Survey Form with 4 sections, totaling 23 questions.

TABLE I
ITEMS OF MEASUREMENT

Variables	Measurements items	Factor Loading
	I intend to use an e-wallet for my payments in the future	0.566

Variables	Measurements items	Factor Loading
e-wallet adoption (EWA)	I will always try to use E-wallet payments when purchasing things	0.688
	I will recommend others to use E-wallet payments for purchasing e-wallet payments would be one of my favorite technologies for payment	0.840
	E-wallets can substitute the cash-based payment method	0.741
	Using an e-wallet is interesting	0.711
	Using an e-wallet is beneficial	0.790
Perceived security (PS)	I perceive secure using my credit/debit card information through e-Wallet platforms.	0.864
	I would feel safe providing sensitive information about myself over the e-Wallet platforms	0.839
	I perceive that e-Wallet platforms are secure systems to conduct a transaction	0.877
Perceived ease of use (PEU)	An e-wallet is easy to use	0.660
	An e-wallet is easy to learn.	0.826
	The e-wallet procedure is simple.	0.840
	E-wallet has a user-friendly interface design.	0.718
Social influence (SI)	An e-wallet is easy to master	0.704
	People who are important to me think that I should use an e-Wallet.	0.832
	People who influence my behavior think that I should use an e-Wallet	0.825
	People whose opinions I value prefer that I use an e-Wallet	

Data were collected via an online survey, as indicated by the measurement items. Every item is scored on a 5-point Likert scale, with 5 representing "strongly agree" and 1 representing "strongly disagree." which adopted from previous studies, as shows as Table 1. Table 1 also displays the CFA model's standardized factor loadings, all of which are statistically significant (p -value < 0.05), demonstrating that the objects represent their underlying hidden constructs. This validates the measurement model's convergent validity [4], [49].

III. RESULTS AND DISCUSSION

A. Descriptive Analysis

Descriptive analysis was employed in this study to assess the respondents' general information and demographics. The sample size for this study is 390. The demographic information from the survey participants is presented in Table II. Out of the total number of respondents (203), 51.9% are female, and 47.8% are male respondents (187). Among 220 respondents (56.3%), the majority (31–35 years old) is the largest age group, while the smallest is 20–25 years old, with just 31 respondents (7.9%). Most of the respondents are Indian (35.3%), followed by others (36.1%), Chinese (17.6%), and Malay (10.7%). The majority of the respondents are in the income range of RM3001-RM5K (56.5%). The largest group of

respondents is from the postgraduate education level (38.1%), and the smallest is from the foundation education level (3.3%).

TABLE II
DEMOGRAPHIC TABLE

Demographic Profile	Category	Frequencies	Percentage
Gender	Male	187	47.8
	Female	203	51.9
Age	20-25	31	7.9
	26-30	102	26.1
	31-35	220	56.3
	36-42	37	9.5
Races	Malay	42	10.7
	Chinese	69	17.6
	Indian	138	35.3
	Others	141	36.1
Monthly Income	Less than RM1K	26	6.6
	RM1K -RM3K	74	18.9
	RM3001-RM5K	221	56.5
	RM5K above	69	17.6
Education level	Foundation	13	3.3
	Diploma	148	37.9
	Bachelor	80	20.5
	Postgraduates	149	38.1

The Cronbach's alpha value for each construct is shown in Table 1. All factors' Cronbach's Alpha and CR values exceed the suggested threshold of 0.70.[49]. Therefore, Table III establishes the reliability of the measurement model.

TABLE III
MEASUREMENT MODEL'S RELIABILITY

No.	Variables	Items	Sources	Cronbach Alpha	Likert Scale
1	E-Wallet Adoption	7	Voronenko (2018)	0.853	5 point likert-scale
2	Perceived Security	3	Zhang et al. (2019)	0.810	
3	Perceived Ease of Use	5	Janteng & Dino (2022)	0.824	
4	Social Influence	3	Venkatesh et al. (2012)	0.788	

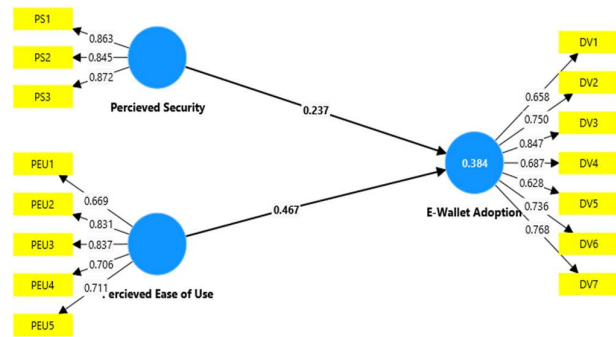


Fig. 2 The direct relationship analysis

1) *H1: There is a relationship between Perceived Security and the adoption of e-Wallet among Millennials in Malaysia.*

The finding shows that perceived security (PS) has a significant relationship with E-Wallet Adoption (EWA), as in Table IV and Figure 2, with a p-value of 0.000, which is significant at the 0.05 level. Thus, a positive relationship

exists between PS and EWA among millennials. This result is in line with earlier research [24], [47], [50]. This could be explained in which Malaysians millennials are concerned on security on the e-Wallet services. It is also explained that perceived security has strong impact in making decision to use e-Wallet services.

2) *H2: There is a relationship between Perceive Ease of Use and adoption of e-Wallet among Millennials in Malaysia*

The finding also found that Perceive Ease of Use (PEOU) also is significantly related to E-Wallet Adoption (EWA) as in Table IV where the p-value is ($p = 0.010$) which lower at the significant level of 0.05. This is consistently as previous studies [12], [34], [37]. Thus, this could be explained as Malaysians' millennials consumers are more concerned with the ease of use of services due to their fast-paced lifestyles. They are interested in goods with quick installation, clear graphical components, and simple methods, allowing them to learn and become skilled with less effort. Individuals expect that utilizing a technology will be very straightforward. Difficulties in using the technology may create the barrier since they are impatient with it [51].

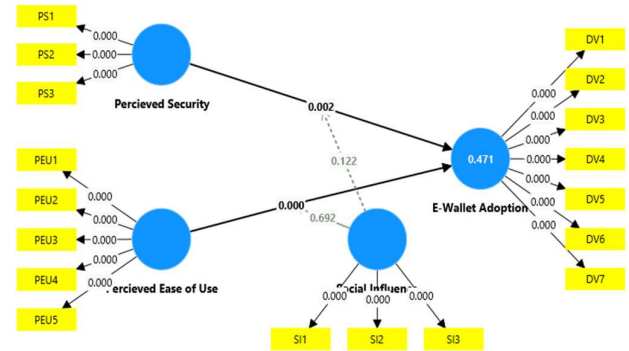


Fig. 3 Moderation analysis

3) *H3: There is a moderating effect of Social Influence on the relationship between Perceive Security and Adoption of e-Wallet among Millennials in Malaysia.*

Figure 3 illustrates the results of the moderating study, which demonstrate that social influence doesn't discernible moderating effect on the association between millennials' perceptions of security and e-wallet adoption in Malaysia ($p=0.692$). This indicates that the relationship between e-wallet adoption and perceived security is not significantly impacted by social influence. Therefore, social influence does not have a discernible impact on millennials' perceptions of security and their decision to use e-wallets. As a result, social influence has no substantial effect on how millennials' perceptions of security influence their decision to use e-Wallet services. This finding suggests that other factors may account for differences in how perceived security relates to e-wallet adoption.

4) *H4: There is a moderating effect of Social Influence on the relationship between Perceived Ease of Use and Adoption of e-Wallet among Millennials in Malaysia.*

The moderating analysis found that the p-value for social influence ($p = 0.122$) is higher than the 0.05 significance level. This indicates that social impact does not moderate the relationship between e-wallet adoption and perceived ease of use. This means that, even if millennials find the e-wallet

simple to use, they are still not confirming that they will actually use it. Specifically, if social influence increases, the effect of perceived ease of use on e-wallet adoption remains unconfirmed. They still have a strong inclination to adopt e-Wallets even though they believe they are simple to use. Table V presents the results of the hypothesis tests.

The hypothesis testing results indicate that both perceived security and perceived ease of use significantly affect the adoption of e-wallets. Specifically, Hypothesis 1 (H1), which posits a relationship between perceived security and e-wallet adoption, is supported by a highly significant p-value of 0.000, highlighting the essential role that security perceptions play in users' willingness to adopt digital wallet technologies. Similarly, Hypothesis 2 (H2), which posits a relationship between perceived ease of use and e-Wallet adoption, is also supported by a significant p-value of 0.002, reinforcing the idea that users generally prefer e-wallets when they perceive them as easy to use, understand, and operate. However, the moderate role of social influence appears to be insignificant in this context. Hypothesis 3 (H3), which tests whether social influence moderates the relationship between perceived security and e-wallet adoption, is not supported, as indicated by a p-value of 0.692. Likewise, Hypothesis 4 (H4), which examines whether social influence moderates the relationship between perceived ease of use and e-wallet adoption, is not supported (p-value = 0.122). These findings suggest that while individual perceptions of security and usability are key drivers of e-wallet adoption, the influence of others, such as peers or social networks, does not significantly alter these relationships, implying that users' decisions to adopt e-wallets are more personally driven rather than socially influenced.

TABLE V
FINDING AND HYPOTHESIS TESTING

No.	Hypothesis	Significant Level	Conclusion
H1	Perceive Security has a relationship with E-Wallet Adoption.	0.000	Supported
H2	Perceived Ease of Use has a relationship with E-Wallet Adoption	0.002	Supported
H3	Social Influence moderates the relationship between Perceived Security and E-Wallet Adoption.	0.692	Not Supported
H4	Social Influence moderates the relationship between Perceived Ease of Use and E-Wallet Adoption.	0.122	Not Supported

IV. CONCLUSION

This research aims to investigate the relationship between perceived security (PS) and perceived ease of use (PEOU) towards e-Wallet adoption (EWA) with the moderating role of social influence (SI) among millennials in Malaysia. The research objectives are met by the results, which demonstrate a positive association with the dependent variable (EWA) and all independent variables (PS and PEOU). However, the results indicate that social influence does not moderate either relationship (PS and EWA) or (PEOU and EWA) among

millennials in Malaysia. Finally, this paper explains the implications and suggests directions for future research.

This research could serve as an initial reference for subsequent research on e-Wallet adoption across all generations, as this system is a crucial platform for today's payment systems. The research's conclusions can help e-Wallet service providers improve their efficiency, especially regarding the system's security and usability in Malaysia. According to this study, millennials in Malaysia are highly impacted by perceived security on e-Wallet adoption. This is proof that security is a key factor in determining both the uptake of and the behavioral intention to use e-wallet services. Users tend to adopt e-wallets when they perceive safe and trustworthy. When individuals trust that their personal and financial data is well-protected, they are more likely to express a strong desire to use the technologies. Perceived ease of use was also found that has impact on e-Wallet adoption, as in this study. If the e-wallet system is user-friendly, with minimal effort required to learn or navigate its capabilities, users are more likely to form the intention to use it in their financial interactions. They are more likely to completely adopt technology if it is viewed as simple, straightforward to learn, and seamlessly integrated into their daily routines.

As for the finding on the moderating effect shows no significant effect, the findings indicate that social influence has no significant impact on the relationship between perceived security and e-wallet adoption. This shows that the effect of perceived security on e-wallet usage remains constant at various social influence levels, and hence we infer that social influence does not moderate this relationship. Future studies could look at this relationship with other potential variables such as trust or speed. This demonstrates that perceived security tends to have a consistent impact on e-wallet adoption, regardless of social influence.

To encourage e-wallet adoption, services provider may focus on improving perceived security while also harnessing social influence. Since perceived security is a major element in e-wallet acceptance, developers should invest in advanced security methods like multi-factor authentication, encryption, and frequent security audits. Highlighting these aspects in marketing might help to reassure and develop confidence with users. The government might also impose security standards and laws to provide a secure environment for digital payments, thereby increasing user confidence. On the other hand, social influence has been found to have no moderating effect on the relationship between perceived ease of use and e-wallet adoption. This underscores that the impact of perceived ease of use on e-Wallet adoption is consistent across social influence levels.

Consequently, the study's findings suggest that social influence does not impose a substantial moderate effect on the relationship between perceived ease of use and e-wallet adoption. Although social influence did not play a substantial role in this study, developers and policymakers could leverage indirect social influences. For example, they may work with influencers or trusted personalities to promote e-wallets, gradually influencing social acceptance without relying solely on peer influence. This research approach could be expanded in future investigations by exploring this factor in different contexts, particularly in relation to continuous usage behavior and recommendation intentions toward e-wallets.

Furthermore, future research might examine the role of digital literacy in shaping e-wallet use, particularly among diverse user groups, such as elderly individuals, low-income earners, and rural communities. Understanding how digital competency affects user confidence and trust in financial technology can provide valuable insights for designing more inclusive digital ecosystems. Developers and government bodies may increase public adoption rates and foster a more inclusive digital payment environment by addressing security and simplicity of use, implementing digital literacy initiatives, and promoting e-wallets through trusted channels.

Moreover, future studies could incorporate additional moderating variables, such as perceived risk, cultural factors, and trust, to enhance understanding of the behavioral dynamics surrounding e-wallet adoption. This research contributes to the literature on e-wallet adoption by highlighting the negligible moderating effect of social influence and emphasizing the importance of user-centric, inclusive strategies. By aligning technological design, public education, and communication strategies, stakeholders can promote sustainable adoption and continued engagement with digital financial platforms. In the long term, such efforts can facilitate the shift toward a cashless society, enhance financial inclusion, and support national digital transformation goals.

ACKNOWLEDGEMENT

We gratefully acknowledge all contributors who supported this study.

REFERENCES

- [1] M. Alsharo, Y. Alnsour, A. Tarhini, and D. A. Eleimat, "The prevalence of mobile wallets in developing countries: A retailers' perspective," *Rev. Int. Bus. Strategy*, pp. 1–26, Nov. 2025, doi:10.1108/RIBS-04-2025-0062.
- [2] I. M. Shaikh and H. Amin, "Technology acceptance determinants and consumer innovativeness influence on ASNAFS' acceptance towards the use of e-wallet," *Int. J. Ethics Syst.*, vol. 41, no. 1, pp. 238–257, Jan. 2025, doi: 10.1108/IJOES-06-2023-0126.
- [3] S. Sumaya, A. Al Masud, M. A. Hossain, and M. M. Hossain, "Moving toward a cashless society via e-payment: An extended technology acceptance model," *South Asian J. Mark.*, vol. 6, no. 2, pp. 104–120, Nov. 2025, doi: 10.1108/SAJM-07-2025-0034.
- [4] M. M. Alam, A. E. Awawdeh, and A. I. B. Muhamad, "Using e-wallet for business process development: Challenges and prospects in Malaysia," *Bus. Process Manag. J.*, vol. 27, no. 4, pp. 1142–1162, 2021, doi: 10.1108/BPMJ-11-2020-0528.
- [5] J. V. Andrew *et al.*, "Security in focus: An empirical examination of perceived security's impact on TAM-based use behaviour of E-wallets," *Int. J. Acad. Res. Bus. Soc. Sci.*, vol. 15, no. 8, pp. 1216–1232, Aug. 2025, doi: 10.6007/IJARBS/v15-i8/26024.
- [6] A. B. Ruhani *et al.*, "Modelling security factors influencing e-wallet adoption in Malaysia," *Iraqi J. Comput. Sci. Math.*, vol. 5, no. 4, pp. 121–136, 2024, doi: 10.52866/2788-7421.1205.
- [7] M. D. S. binti M. Reza, S. H. Tan, L. L. Chong, and H. B. Ong, "Continuance usage intention of e-wallets: Insights from merchants," *Int. J. Inf. Manag. Data Insights*, vol. 4, no. 2, p. 100254, Nov. 2024, doi: 10.1016/j.jjimei.2024.100254.
- [8] N. Che Nawi *et al.*, "The path to sustainability begins with going paperless: Antecedents of intention to use electronic wallet using serial mediation approach," *Heliyon*, vol. 10, no. 2, p. e24127, Jan. 2024, doi: 10.1016/j.heliyon.2024.e24127.
- [9] M. Yang *et al.*, "Cashless transactions: A study on intention and adoption of e-wallets," *Sustainability*, vol. 13, no. 2, p. 831, Jan. 2021, doi: 10.3390/su13020831.
- [10] A. F. M. Shukri *et al.*, "The moderating role of structural assurance in the unified theory of acceptance and use of technology (UTAUT): A study of e-wallet behavioural intention of users and non-users among adults in Malaysia," *Malaysian J. Consum. Family Econ.*, vol. 33, pp. 490–503, Dec. 2024, doi: 10.60016/majcafe.v33.18.
- [11] N. Nurmalsari, N. Afifah, and M. Mustaruddin, "The influence of perceived usefulness and cashback reward program mediated by e-wallet engagement on e-wallet user satisfaction," *Widya Cipta J. Sekretari Manaj.*, vol. 9, no. 2, pp. 132–139, Jul. 2025, doi:10.31294/widyacipta.v9i2.26461.
- [12] C. V. Priporas, N. Stylos, and A. K. Fotiadis, "Generation Z consumers' expectations of interactions in smart retailing: A future agenda," *Comput. Hum. Behav.*, vol. 77, pp. 374–381, Dec. 2017, doi:10.1016/j.chb.2017.01.058.
- [13] C. Calvo-Porral and R. Pesqueira-Sanchez, "Generational differences in technology behaviour: Comparing millennials and Generation X," *Kybernetes*, vol. 49, no. 11, pp. 2755–2772, Oct. 2020, doi:10.1108/K-09-2019-0598.
- [14] F. A. Majid, S. M. S. Mustafa, W. N. E. H. Shahril, and K. Subramaniam, "An investigation on the millennials' use of web technologies in higher education," *Environ.-Behav. Proc. J.*, vol. 4, no. 12, p. 55, Dec. 2019, doi: 10.21834/e-bpj.v4i12.1889.
- [15] B. Usman, H. Rianto, and S. Aujirapongpan, "Digital payment adoption: A revisit on the theory of planned behavior among the young generation," *Int. J. Inf. Manag. Data Insights*, vol. 5, no. 1, p. 100319, Jun. 2025, doi: 10.1016/j.jjimei.2025.100319.
- [16] V. Laxman *et al.*, "Emerging threats in digital payment and financial crime: A bibliometric review," *J. Digit. Econ.*, vol. 3, no. 2, pp. 100–125, Dec. 2024, doi: 10.1016/j.jdec.2025.04.002.
- [17] F. R. Prawira *et al.*, "The influence of information security factors on the continuance use of electronic wallet," *Proc. Comput. Sci.*, vol. 234, pp. 1467–1475, 2024, doi: 10.1016/j.procs.2024.03.147.
- [18] A. A. H. Zaid Kilani *et al.*, "Consumer post-adoption of e-wallet: An extended UTAUT2 perspective with trust," *J. Open Innov. Technol., Market, Complex.*, vol. 9, no. 3, p. 100113, Sep. 2023, doi:10.1016/j.joitmc.2023.100113.
- [19] H. M. Aji, I. Berakon, and M. M. Husin, "COVID-19 and e-wallet usage intention: A multigroup analysis between Indonesia and Malaysia," *Cogent Bus. Manag.*, vol. 7, no. 1, p. 1804181, 2020, doi:10.1080/23311975.2020.1804181.
- [20] N. A. Jamaludin *et al.*, "Towards a sustainable financial future: Exploring the influence of e-wallet adoption among Gen Z in Malaysia," *Inst. Econ.*, vol. 16, no. 4, pp. 113–138, Oct. 2024, doi:10.22452/IJIE.vol16no4.4.
- [21] J. Janteng and N. F. N. Dino, "Investigating the determinants of e-wallet adoption intention in Malaysia: An empirical study," *Int. J. Acad. Res. Bus. Soc. Sci.*, vol. 12, no. 6, pp. 1813–1827, Jun. 2022, doi: 10.6007/IJARBS/v12-i6/13855.
- [22] T. S. Bee and K. Y. Ying, "An examination of determinants for e-wallet adoption in Malaysia: A combined approach," *F1000Research*, vol. 10, p. 1155, Nov. 2021, doi: 10.12688/f1000research.73402.1.
- [23] J. A. Al-Gasawneh *et al.*, "Moderating the role of the perceived security and endorsement on the relationship between perceived risk and intention to use the artificial intelligence in financial services," *Int. J. Data Netw. Sci.*, vol. 6, no. 3, pp. 743–752, Jun. 2022, doi:10.5267/j.jidns.2022.3.007.
- [24] A. Kanaan *et al.*, "The effect of quality, security and privacy factors on trust and intention to use e-government services," *Int. J. Data Netw. Sci.*, vol. 7, no. 1, pp. 185–198, Dec. 2023, doi:10.5267/j.jidns.2022.11.004.
- [25] D. Chawla and H. Joshi, "Consumer attitude and intention to adopt mobile wallet in India—An empirical study," *Int. J. Bank Mark.*, vol. 37, no. 7, pp. 1590–1618, Sep. 2019, doi: 10.1108/IJBM-09-2018-0256.
- [26] E. Semerikova, "Payment instruments choice of Russian consumers: Reasons and pain points," *J. Enterprising Communities*, vol. 14, no. 1, pp. 22–41, Mar. 2020, doi: 10.1108/JEC-09-2019-0089.
- [27] N. Singh, N. Sinha, and F. J. Liébana-Cabanillas, "Determining factors in the adoption and recommendation of mobile wallet services in India: Analysis of the effect of innovativeness, stress to use and social influence," *Int. J. Inf. Manag.*, vol. 50, pp. 191–205, Feb. 2020, doi:10.1016/j.jinfomgt.2019.05.022.
- [28] N. A. Abdul-Halim *et al.*, "Understanding the determinants of e-wallet continuance usage intention in Malaysia," *Qual. Quant.*, vol. 56, no. 5, pp. 3413–3439, Oct. 2022, doi: 10.1007/s11135-021-01276-7.
- [29] T. Kraiwanit, P. Limna, and P. Wattanasin, "Digital wallet dynamics: Perspectives on potential Worldcoin adoption factors in a developing country's FinTech sector," *J. Open Innov. Technol., Market, Complex.*, vol. 10, no. 2, p. 100287, Jun. 2024, doi:10.1016/j.joitmc.2024.100287.
- [30] A. Tahar *et al.*, "Perceived ease of use, perceived usefulness, perceived security and intention to use e-filing: The role of technology

- readiness," *J. Asian Finance, Econ. Bus.*, vol. 7, no. 9, pp. 537–547, 2020, doi: 10.13106/jafeb.2020.vol7.no9.537.
- [31] H. S. Sætra and E. Selinger, "Technological remedies for social problems: Defining and demarcating techno-fixes and techno-solutionism," *Sci. Eng. Ethics*, vol. 30, no. 6, p. 58, Dec. 2024, doi:10.1007/s11948-024-00524-x.
- [32] C. Gómez-Hurtado *et al.*, "Adoption of e-wallets: Trust and perceived risk in Generation Z in Colombia," *Spanish J. Mark. - ESIC*, vol. 29, no. 4, pp. 425–443, Sep. 2025, doi: 10.1108/SJME-01-2024-0017.
- [33] A. N. Ningsih and N. R. Andayani, "Effects of perceived ease of use, security, perceived usefulness, and trust on the use of e-wallet 'DANA' on ZXY Polytechnic students," *J. Appl. Bus. Admin.*, vol. 8, no. 2, pp. 600–611, 2024, doi: 10.30871/jaba.v8i2.7590.
- [34] A. Daragmeh, J. Sági, and Z. Zéman, "Continuous intention to use e-wallet in the context of the COVID-19 pandemic: Integrating the health belief model (HBM) and technology continuous theory (TCT)," *J. Open Innov., Technol., Market, Complex.*, vol. 7, no. 2, p. 132, Jun. 2021, doi: 10.3390/joitmc7020132.
- [35] N. H. Hashim, T. J. Chan, and P. Li, "Factors affecting the adoption of e-wallets to enter cashless society: An integration approach," *Int. J. Data Netw. Sci.*, vol. 7, no. 4, pp. 1849–1860, Sep. 2023, doi:10.5267/j.ijdns.2023.7.007.
- [36] A. Waqas *et al.*, "A secured architecture for transactions in micro e-commerce using QR scan, e-wallet payment applications with adaptation of blockchain," *Int. J. Emerg. Technol.*, vol. 11, no. 5, pp. 611–615, 2020.
- [37] S. C. Teo, P. L. Law, and A. C. Koo, "Factors affecting adoption of e-wallets among youths in Malaysia," *J. Inf. Syst. Technol. Manag.*, vol. 5, no. 19, pp. 39–50, Dec. 2020, doi: 10.35631/IJSTM.519004.
- [38] B. T. Khoa, "The role of mobile skillfulness and user innovation toward electronic wallet acceptance in the digital transformation era," in *Proc. Int. Conf. Inf. Technol. Syst. Innov. (ICITSI)*, Bandung, Indonesia, Oct. 2020, pp. 30–37, doi:10.1109/ICITSI50517.2020.9264967.
- [39] Y. Tian *et al.*, "Moderating role of perceived trust and perceived service quality on consumers' use behavior of Alipay e-wallet system: The perspectives of technology acceptance model and theory of planned behavior," *Hum. Behav. Emerg. Technol.*, vol. 2023, p. 5276406, 2023, doi: 10.1155/2023/5276406.
- [40] S. K. Ariffin *et al.*, "Understanding the consumer's intention to use the e-wallet services," *Spanish J. Mark. - ESIC*, vol. 25, no. 3, pp. 446–461, 2021, doi: 10.1108/SJME-07-2021-0138.
- [41] N. B. Do and H. N. T. Do, "An investigation of Generation Z's intention to use electronic wallet in Vietnam," *J. Distrib. Sci.*, vol. 18, no. 10, pp. 89–99, 2020, doi: 10.4018/JECO.2020010105.
- [42] N. Muzaldin *et al.*, "A study on behavioural intention to use mobile wallet with special reference to citizens in Shah Alam," *J. Econ. Technol. Bus. Admin.*, vol. 2022, pp. 150–165, 2022, doi:10.5171/2022.512221.
- [43] T. N. Phan, T. V. Ho, and P. V. Le-Hoang, "Factors affecting the behavioral intention and behavior of using e-wallets of youth in Vietnam," *J. Asian Finance, Econ. Bus.*, vol. 7, no. 10, pp. 295–302, Oct. 2020, doi: 10.13106/jafeb.2020.vol7.no10.295.
- [44] R. M. Radzi *et al.*, "E-wallet transaction framework in Malaysia: An evaluation of potential Shariah issues," *Int. J. Relig.*, vol. 5, no. 6, pp. 986–996, May 2024, doi: 10.61707/2c0bst96.
- [45] S. U. Rehman *et al.*, "The moderating role of trust and commitment between consumer purchase intention and online shopping behavior in the context of Pakistan," *J. Glob. Entrepreneurship Res.*, vol. 9, no. 1, p. 43, Dec. 2019, doi: 10.1186/s40497-019-0166-2.
- [46] W.-J. Suo *et al.*, "Factors influencing behavioural intention to adopt the QR-code payment," *Int. J. Asian Bus. Inf. Manag.*, vol. 13, no. 2, pp. 1–22, Sep. 2021, doi: 10.4018/IJABIM.20220701.0a8.
- [47] K. L. Y. Ming, M. Jais, and Y. Ming, "Factors affecting the intention to use e-wallets during the COVID-19 pandemic," *Gadiah Mada Int. J. Bus.*, vol. 24, no. 1, pp. 82–100, 2022, doi: 10.22146/gamaijb.64708.
- [48] R. Bougie and U. Sekaran, *Research Methods for Business: A Skill-Building Approach*, 8th ed. Hoboken, NJ, USA: Wiley, 2020.
- [49] J. C. Anderson and D. W. Gerbing, "Structural equation modeling in practice: A review and recommended two-step approach," *Psychol. Bull.*, vol. 103, no. 3, pp. 411–423, 1988, doi: 10.1037/0033-2909.103.3.411.
- [50] F. Nizam, H. J. Hwang, and N. Valaei, "Measuring the effectiveness of e-wallet in Malaysia," in *Computational Intelligence for Business Analytics*, Singapore: Springer, 2019, pp. 59–69, doi: 10.1007/978-3-319-96803-2_5.
- [51] J. Y. Yeh *et al.*, "Exploring the actual implementation of e-wallet application in Malaysia," *Baghdad Sci. J.*, vol. 21, no. 2, pp. 600–608, 2024, doi: 10.21123/bsj.2024.9864.