

Extended Technology Acceptance Model for Digital Wallet Usage

Wan Qi Lee, Ai Chin Thoo

Business Administration, Azman Hashim International Business School, Sultan Ibrahim
Chancellery Building, Jalan Iman, 81310 Skudai, Johor, Malaysia

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Abstract

Omni-present Internet access manipulates the current digital transformation. Digital wallet payment is one of the transformations that has reshaped the traditional payment methods and changed consumer's behaviours in economic exchanges. The digital wallet has accelerated global digital payment volumes. With the situation of COVID-19 pandemic outbreak, the adoption of digital wallets has increased due to most consumers reduce the usage of money in the form of physical coins or banknotes as a medium of exchange for products and services. There is a need to identify the underlying factors that encourage consumers to adopt digital wallets as only few studies have focused on digital wallets adoption in Malaysia. Furthermore, most studies use demographic factors such as age, experience and gender to moderate the relationship between determinants and behavioural intention on the adoption of digital wallets. Still, the findings of digital wallet adoption are inclusive. Since COVID-19 wreaks havoc on both global health and economy, therefore, this study proposes a framework and emphasises on the adoption of digital wallets using COVID-19 risk as the potential moderator to extent the Technology Acceptance Model (TAM). Besides, in this study, the proposed determinants include perceived ease of use, perceived usefulness, attitude and behavioural intention. Questionnaire will be distributed to a total of 140 respondents and converted into Google Form for data collection as it is the best way to reduce the physical contact amid COVID-19 pandemic. The proposed research framework will be analysed using Structural Equation Modelling (SEM). The findings of the study are expected to provide insights and guidelines for government, retailers and future researchers for digital wallet adoption.

Keywords: Digital Wallet Usage, Risk Perception, Perceived COVID-19 Risk, Technology Adoption Model (TAM), Partial Least Squares Structural Equation Modeling (PLS-SEM)

Introduction

COVID-19 pandemic has become a big catalyst for a fundamental 'new normal' since December 2019 (Yang et al., 2021). It has further quickened this trend as digital payment has arisen as one of the few areas in the whole payment industry which has seen a significant impact from the pandemic (Razif et al., 2020; Phan et al., 2020). As highlighted by Lin et al

(2021) on The Straits Times report, the total of worldwide confirmed cases has kept increasing, predicting the world will be living with the coronavirus with constant precautions and measures. For example, maintaining social distancing (Tang et al., 2020) and reducing contact among individuals are highly recommended by World Health Organisation to stop spreading of virus. Against this backdrop, the FinTech industry in general and the digital wallet payments sector can potentially contribute to individuals' physical and mental expectations to support their daily transaction process and have experienced remarkable growth during the pandemic (Zhao and Bacao, 2021).

Zooming into Malaysia, the digital wallet adoption not only helps in reducing the physical contact, preventing of money laundering and corruption, as well as boosting regional economic growth, but the pandemic has technically switched the payment mode and affected businesses generally in Malaysia (Ong, 2020). There is a sudden surge in the digital wallet adoption amongst Malaysians. Part of the reasons is the implementation of lockdown restrictions and the government and non-government financial incentives during COVID-19 pandemic. For instance, Malaysia government has launched a recovery plan, named as Pelan Jana Semula Ekonomi Negara (PENJANA) with 40 different initiatives valued at MYR 35 billion. A total of MYR 750 is allocated to promote the usage of digital wallets among Malaysians (Ong, 2020). In addition, non-governmental bodies, such as Mr. DIY, a home-grown enterprise sponsored MYR 300 to each of University Malaya (UM) undergraduate students who returned to the campus in October 2021 (BOTS Team, 2021). As a result, there was a spike with a total of 131 percent increment in digital wallet transactions from MYR 0.3 billion in 2019 to MYR 0.6 billion in 2020 (Baharuddin and Abu, 2021).

Evidently, Southeast Asia is the world's fastest-growing region for digital wallets, followed by Latin America and Africa and Middle East (Lee, 2021). The rate of digital wallets in use will increase 311 percent from 2020 to roughly 440 million by 2025 across Malaysia, Singapore, Vietnam, Indonesia, Thailand, and Philippines (Lee, 2021; FinTech Singapore, 2021). According to the Mastercard Impact Study 2020, Malaysia had the highest rate in terms of digital wallet adoption at 40 percent, which ahead of the Philippines at 36 percent, Thailand at 27 percent, and Singapore at 26 percent (Nortajuddin, 2020). Though, Malaysia leads ASEAN in digital wallet usage at 40 percent, however, there is still a gap for Malaysia to achieve one in two people (50 percent) to use digital wallets by 2025. In other words, there is another three years from the year 2022 to achieve the ideal results (Tan, 2021a), which Malaysia aims to consolidate the position as a regional leader in digital economy and is projected rise in digital wallet transaction volume of 995 percent by 2025 (The Asian Banker, 2021). Furthermore, in comparison, the rate of digital wallet adoption is considered low when compared to Japan and China, which is at 70.6 percent and 83.6 percent in 2020 respectively (Tan, 2021b). Besides, by 2025, Japan aims to reach 98.6 percent (Tan, 2021; Cision, 2022) while China expects to reach USD 10 trillion annually (Trivedi, 2021). Understanding this potential, even though digital wallets have sprouted up, the wide adoption among consumers is still have a long way to go as digital wallets are newly penetrated to Malaysia financial system (Yang et al., 2021). Thus, it is significant to investigate the factors that can accelerate the digital wallet adoption in Malaysia since digital payment is pivotal to Malaysia' financial services industry. On the other hand, COVID-19 outbreak gave people a real shock, not only in terms of payment methods but psychology (Cao et al., 2020; Gao et al., 2020). The uncertainty and unpredictability of COVID-19 pandemic; the associated lockdowns, isolation, and other

containment strategies; and the resulting economic breakdown could increase the risk of exacerbate health inequalities and mental health problems (e.g., anxiety or depression) (Li et al., 2020). The fear and the anxiety of COVID-19 infection has prompted the growing trend of cashless and contactless payment (Li et al., 2020). The trend of encouraging the use of digital wallet was accelerated once the studies were published by World Health Organisation (2021). The publications discovered contact-based payments as a potential source of infection and recommended that electronic payment systems be adopted instead, it could help to prevent the risk from getting infected, reduce the spread of the virus and its severity (Vinitha, 2021). The credibility of the publications was further proved by Daragmeh et al (2021), Pal and Bhadada (2020) which confirmed that the SARs-CoV-2 virus could survive on surfaces such as physical banknotes for two to four days, even though the use of physical cash is not a significant risk compared with other surfaces like glass, wood, and stainless steel.

COVID-19 health crisis amplified the importance of digital wallets. It accelerated the global digital wallet adoption as it altered the payment behaviour patterns (Sahi et al., 2021). Global digital wallet transactions have grown more than 30 percent since the outbreak of pandemic. Among other findings (Sahi et al., 2021), the studies discovered that digital wallet transaction globally was predicted to hold about 80 percent of the overall e-commerce transaction value and the total user number was forecasted to increase further, with a projection of a 70 percent spike globally by 2025. Zooming into the impact of COVID-19 health crisis on Malaysia, COVID-19 pandemic has resulted in more than 18 percent growth for digital wallet adoption in Malaysia, part of the reason due to the enforcement of the Movement Control Orders (MCO). The enforcement had surged the usage of digital wallet as the situation had pushed people into digital payments with their new payment habits, it had resulted in the overall digital wallets transaction value crossing MYR 20 billion between January and September 2020 (Edeh et al., 2021). Besides, Malaysian even recorded an average of 170 electronic payments in 2020 (Edeh et al., 2021). The statistic has proven the digital wallet volume had soared 89 percent (roughly 468 million) transactions in one year after the outbreak of pandemic (Ojo et al., 2022). Additionally, Malaysia gross transaction value which contributed by digital wallet transactions grew by over 35 percent and the user base increased by over 76 percent within the period of MCO (Ojo et al., 2022). Overall, there is another three years from the year 2022 to achieve the one in two people to adopt digital wallets by 2025 (Ramli et al., 2021). In summary, despite that COVID-19 health crisis has increased the use of digital wallet (Daragmeh et al., 2021), there is a long way to go for Malaysia to close the gap for achieving 50 percent digital wallet adoption in Malaysia. Therefore, with the consideration of the fear of illness and the virus has prompted some consumers second thoughts about reaching for cash and has further accelerated the behaviour from cash to digital wallet payments, the study will be investigating whether the perceived COVID-19 risk has directly and indirectly moderated the relationship between behavioural intention and adoption.

Other than that, from the point of view from theoretical gap, there are limited studies to include COVID-19 in the TAM (Aji et al., 2020; Zhao and Bacao, 2021) even though there were many studies have applied the TAM to examine the digital wallet adoption (Karim et al., 2020; Alshurideh et al., 2021). The inconsistent relationship between behavioural intention and adoption of digital wallet adoption was found in previous studies. Some studies found a positive and significant relationship (Lonare et al., 2018); while some studies found negligible and insignificant impact (Aboelmaged and Gebba, 2013). Hence, it is important to examine

the perceived COVID-19 risk (Al Nawayseh, 2020) as a barrier in the forming of digital wallet adoption with a positive moderating effect on the relationship between behavioural intention and adoption of digital wallets.

Overall, nowhere else has unforeseen and unprecedented growth happened as in the e-commerce and digital sectors, which have boomed amid the COVID-19 crisis (Ramli et al., 2021). In other words, the pandemic has led to a surge in e-commerce and accelerated digital transformation, amid slowing economic activity (Birruntha, 2021). The competition among the digital wallets has become vigorous. For example, the pandemic and the enforcement of Movement Control Order (MCO) have accelerated the digital wallet adoption in Malaysia since 2020 (Ramli et al., 2021). According to Google's e-Economy SEA 2020 report (Google, Temasek and Bain & Company, 2020), Malaysian digital wallet usage exceeds the ASEAN-6 average by 14%. Besides, from the start of the pandemic up until the second quarter of 2021, the nation has seen over 3 million new digital consumers. Meanwhile, there were 98% of Malaysian businesses has opened to accept digital payments to cater to the surge of digital wallet adoption since the pandemic outbreak (UOB, 2022). Moreover, Thailand experienced a 60% jump in digital wallets download in just one week in March 2020 (UNCTAD, 2021). On the other hand, online share of retail sales in China reached 24.6%, increasing from 19.4% between August 2019 and August 2020; while the online share of retail sales in Kazakhstan increased from 5% to 9.4% between 2019 and 2020. Besides, the online marketplace Mercado Libre in Latin America reported a 200% jump in sales in the second quarter of 2020 compared with the same period in 2019. And Jumia, an African e-commerce platform clocked a 50% leap in transactions during the first quarter of 2020 (UNCTAD, 2021). The acceleration of digital wallet adoption has comprehensively created an ideal way to stay on top of finances right in the safety of homes. Last but not least, this study is important to the digital wallet platform providers, end-users, organisations and future scholars. For example, in term of usefulness and ease of use, the research particularly helps digital wallet platform providers in improving the user experience by offering a simpler payment platform for consumers (Aji et al., 2020). Additionally, the future scholars could also apply this study as a guideline to other industries, such as a tool of building knowledge and facilitating payment mode, understanding issues and increasing public awareness to find, gauge, and seize opportunities to improve the features of digital wallets (Zhao and Bacao, 2021). All in all, with the findings from this study, consumers and organisations could understand the importance of digital wallets adoption and the factors (e.g., perceived ease of use, perceived usefulness, attitudes, behavioural intention, and the adoption of digital wallets) that directly and indirectly encourage the adoption of digital wallets during the pandemic.

Literature Review

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) by Davis (1986) in Figure 1 was proposed to forecast or elucidate the factors influencing the use of information technology, it is a theory describing the technology users' perceptions, and the actual system use is likely to occur when an individual's belief in usefulness and ease of use are fostered (Rantung, Tumbuan and Gunawan, 2020; Alshurideh et al., 2021). The TAM was derived from the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975).

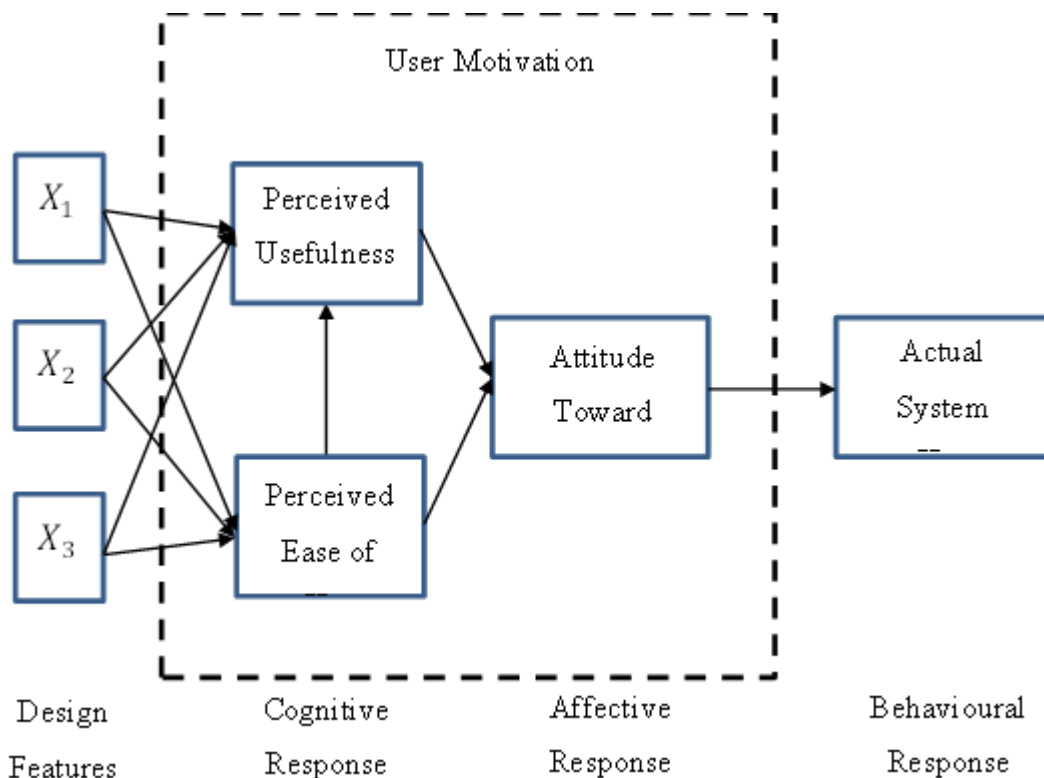


Figure 1 The Technology Acceptance Model (TAM) with arrows representing causal relationships (Davis, 1986, pp. 24).

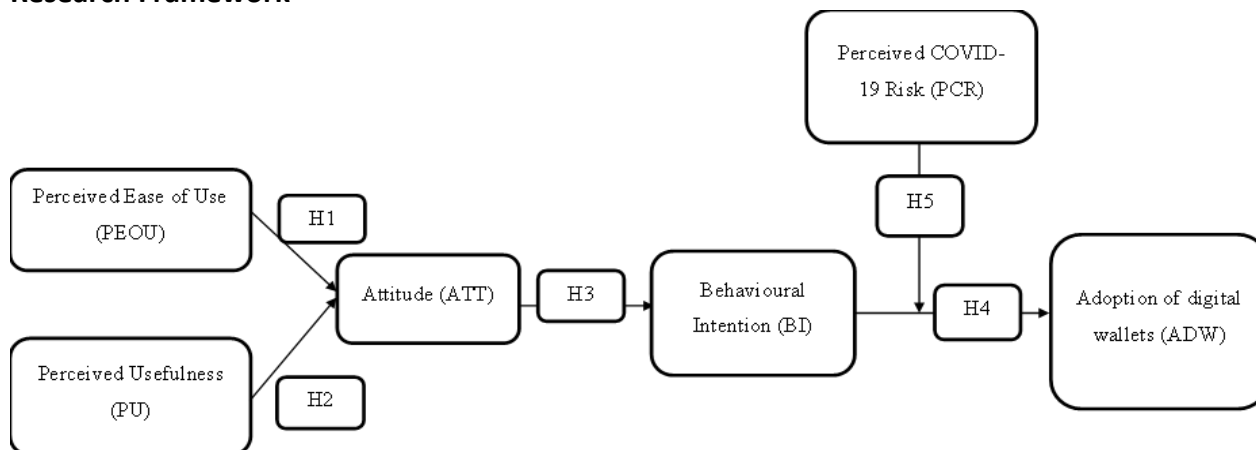
According to the TAM by Davis (1986), design features affected perceived ease of use and perceived usefulness. Design features are not theorised to involve any direct impacts on behaviour or attitude as they are considered external variables within the Fishbein paradigm, which is the Theory of Reasoned Action (TRA) (Davis, 1986). The TAM is the most popular theory which has been most widely applied and cited by many scholars in the past decades, especially in the topic of examining the adoption of digital wallets (AISoufi and Ali, 2014; Haider et al., 2018; Sakala and Phiri, 2019).

The validity of the TAM has been empirically examined in numerous studies (Aji, Berakon and Husin, 2020; Tan et al., 2020; Alshurideh et al., 2021). The relative impact of perceived ease of use and perceived usefulness seems to vary across diffusion stages of technology advancement. Perceived usefulness as domination in countries (e.g., Canada, Europe, and the United States) where technology is widely adopted (Alshurideh et al., 2021); while perceived ease of use is highlighted in countries (e.g., Jordan and Pakistan) where technology adoption is primitive (Zhou et al., 2018). Therefore, the ability of the TAM to examine the technology adoption required to be context particular and be altered to fit in other factors impacts on the behaviour (Alshurideh et al., 2021).

In short, the TAM will be applied in this study context to investigate the factors (i.e., perceived ease of use, perceived usefulness, attitude, and behavioural intention) influencing the adoption of digital wallets during COVID-19 pandemic in Malaysia. The research adds in the behavioural intention to extend the TAM, and therefore to get an in-depth result. The concept of adding "behavioural intention" was supported by several studies (Aji, Berakon and Husin, 2020; Karim et al., 2020; Alshurideh et al., 2021). Last but not least, "perceived COVID-19 risk"

will be added as a moderator in order to examine the how perceived COVID-19 risk affects the relationship between behavioural intention and the actual adoption amidst the pandemic outbreak.

Research Framework



Perceived Ease of Use and Attitude

The digital wallets are gaining popularity in the present era of Industry 4.0 (IR 4.0). Besides, it has emerged and turned into the mainstream mode of digital wallet due to various attractive features, such as ease of use, convenience, reducing unnecessary physical contacts amid of COVID-19 pandemic. It is very crucial for the e- wallet platform providers to understand the core value of gauging users' attitudes towards digital wallets in influencing behavioural outcomes (e.g., retention, intention). Various literature reviews (Chawla and Joshi, 2019; Alswaigh and Aloud, 2021; Daragmeh et al., 2021) applied the TAM to the research and revealed that perceived ease of use has a positive impact on the attitude to adopt the digital wallets. According to their claim, individuals believe that their tasks are completed in more efficient way with an advanced technology which is easier to use. The easier or more convenient that a new technology to use, the more frequent usage of the new technology. In this study context, perceived ease of use means users' belief which adopting digital wallets requires less effort (Alswaigh and Aloud, 2021) amid COVID-19 pandemic. Thus, the hypothesis is formed as:

H1: Perceived ease of use has positive impact on attitude.

Perceived Usefulness and Attitude

Perceived usefulness is a strong predictor in identifying the attitude. According to the TAM and theory mental accounting, perceived usefulness has a positive impact on users' attitudes in the context of digital wallet adoption (Davis, 1989). Perceived usefulness explains cognitive expectation about performance of a system, such as digital wallet (Aji et al., 2020; Yang et al., 2021). Thus, it can be described that people believe which utilizing digital wallet can simply fulfil the desires of financial and lifestyle, and eventually increasing efficiency of the payment process (Yang et al., 2021; Mew and Millan, 2021).

Various studies confirmed a positive relationship between perceived usefulness and the attitude (Flavian et al., 2020; Karim et al., 2020). Pham and Ho (2015) claimed that perceived usefulness is the most important factor which affected the attitude on digital wallet usage.

Besides, perceived usefulness has been evinced to demonstrate a significant impact on the attitude to adopt the digital wallet in an uncertain circumstance (Daragmeh et al., 2021; Yang et al., 2021). The usefulness of a digital wallet can be improved if other services (e.g., rewards and discount vouchers) are added to ensure the enjoyment while adopting digital wallet as an alternative payment mode (Lee et al., 2020), especially during the pandemic period (Daragmeh et al., 2021). Zhao and Bacao (2021) supported the argument as the attractiveness of digital wallet features directly and indirectly affects individuals' attitudes regarding the advantages of utilising digital wallet for daily transaction, which shows that individuals' mental process about digital wallet adoption strongly depended on environmental conditions.

In this study context, perceived usefulness is defined as individual's belief that applying a digital wallet will improve the transaction performance during COVID-19 pandemic. In short, according to the prior literature reviews and findings, the hypothesis is constructed as following:

H2: Perceived usefulness has positive impact on attitude.

Attitude and Behavioural Intention

Davis (1989) discovered that an additional explanatory power of attitude in determining the factors affecting individuals' intention towards the usage of technology. In term of attitude, several studies discussed the relationship between attitude and the behavioural intention. Foroughi, Iranmanesh and Hyun (2019) have proven significant impact of attitude on behavioural intention with the use of the TAM. Rahi et al (2021) supported the point of view with the application of the Technology Continuous Theory (TCT) and explained that attitude is the primary driver of continuous intention, along with perceived usefulness and satisfaction. While in the study context of digital wallet adoption, a significant relationship between attitude and behavioural intention has been widely identified and confirmed with the application of the TAM (Alkhowaiter, 2020; Ladkoom and Thanasopon, 2020; Persada et al., 2021). Daragmeh et al (2021) supported the argument and claimed that attitude positively influenced the behavioural intention of using digital wallet during the outbreak of COVID-19 pandemic. The major reason is the fear of virus spreading via visiting brick-and-mortar stores and cash handling has further accelerated the behaviour from cash to digital payments. Accordingly, the relationship between attitude and behavioural intention is hypothesised as:

H3: Attitude has a positive impact on behavioural intention.

Behavioural Intention and Adoption of Digital Wallet

The TAM has high validity measurement scales and strong theoretical literacy to understand the potential acceptance of technology (Sakala and Phiri, 2019; Rantung, Tumbuan and Gunawan, 2020). According to Ajzen (2002) and George and Sunny (2021), a strong correlation was found between behavioural intention and actual adoption in different contexts, such as electronic health records (Venugopal, Jinka and Priya, 2016), online shopping (Madan and Yadav, 2018) and internet banking (Alalwan et al., 2018; Anouze and Alamro, 2020). Other than that, behavioural intention towards the actual adoption of digital wallet was as well (Sivathanu, 2019; Chresentia and Suharto, 2020; George and Sunny, 2021). Specifically, a positive result of behavioural intention towards the actual adoption was empirically tested

and discovered to be true in the case of digital wallet during the outbreak of the pandemic (Yang et al. 2021). Thus, based on the depiction above, the hypothesis is proposed as below:

H4: Behavioural intention has a positive impact on the adoption of digital wallet.

Moderator Effect of Perceived COVID-19 Risk

The inconsistent relationship was found between behavioural intention and adoption. Some inconsistencies were found between the relationship of behavioural intention and adoption. For instance, some studies discovered a positive and significant relationship between the behavioural intention and the actual use (Lonare et al., 2018; Yang et al., 2021); while some studies proved a negligible and insignificant impact of behavioural intention on the actual use (Aboelmaged and Gebba, 2013; Joshi, 2021). The further explanation and justification claimed that the direction adoption is not always merely affected by behavioural intention, but other factors (e.g., perceived usefulness, perceived ease of use, convenience, pricing, privacy, rewards, perceived risk) without the presence of the behavioural intention (Chua and Ling, 2019; Lee et al., 2020). Besides, some studies even presented the structure with the absence of actual usage, which means, the framework structure was ended with the behavioural intention (Rantung et al., 2020; Tan et al., 2020; Alshurideh et al., 2021). Part of the reason is, either it is not a must for both behavioural intention and adoption concurrently to be appeared in the TAM as they are served as a main dependent variable in the TAM most of the time (Alshurideh et al., 2021), or, the combination of behavioural intention and adoption is majority applied in the research framework, for instance, adoption intention (Rantung et al., 2020; Komba and Razak, 2021).

Further, as earlier mentioned, COVID-19 pandemic amplifies the importance of digital wallet adoption (Undale, Kulkarni and Patil, 2021). Any of the grounds is the fear of infection increase the use of digital wallets. It can be explained in terms of risk perceptions, more generally are challenging to measure, especially for a new disease such as COVID-19. First, risk perceptions are threat-specific most of the time and incorporate various kinds of information through affective, deliberative, and experiential processes (Attema et al., 2021). In case of new disease, there is limited amount of available information and personal experience to be publicised. Second, the range of available ways to elicit risk perception is restricted.

Various recent studies have discovered information on COVID-19 risk perception, and its perceived impact on mental health during the enforcement of lockdown restriction phase due to the pandemic (Attema et al., 2021). These studies have depicted those individuals perceive the effect of COVID-19 on mental health as high (Xiong et al., 2020) and COVID-19 risk perception is correlated with adoption of preventative health behaviours (Dryhurst et al., 2020), however, the level is lower than their concern for the future and for social and economic of COVID-19 pandemic (Attema et al., 2021). Besides, the perception of COVID-19 risk could be lower as the movement restrictions and lockdown have decreased perception of COVID-19 risk, because individuals have the feeling that restrictions and lockdown help control, which in turn decrease risk perceptions (Attema et al., 2021). On the other hand, perception COVID-19 risk will be increased when an individual thinks they are exposed to the risk, such as close contact with the persons ill from COVID-19 and absence of information (e.g., unsure of virus transmission through contaminated surfaces such as physical banknotes and coins while using them to make payment during the period of pandemic outbreak) (Aji,

Berakon and Husin, 2020). In other words, perception of cash as a vehicle for coronavirus has prompted second thoughts about reaching for physical banknotes and coins (Pal and Bhadada, 2020). It can be clearly seen that uncertainty of the transmission of the virus affects decisions about health where most probabilities are ambiguous. Thus, in this study context, perceived COVID-19 risk will be added as a moderator to explain consumers with higher perceived risk will make the relationship stronger if compared to low perceived risk.

H5: Consumers with high-risk perception of COVID-19 strengthen (or heighten) the relationship between behavioural intention and adoption of digital wallet compared to consumers with low-risk perception.

Conclusion

It can be clearly seen that the pandemic switches the payment mode of consumers. The study mainly emphasises to mitigate the gap of the original Technology Acceptance Model (TAM) (Davis, 1989) by adding a moderator, perceived COVID-19 risk. The moderator functions in strengthening the relationship of behavioural intention and the adoption of digital wallet. There was a spike in the digital wallet adoption in Malaysia as it efficiently amplifies the usage of digital wallets during the COVID-19 pandemic, either from the consumer behaviour or business point of view. For examples, maintaining the business operations steadily amidst of pandemic and reducing physical contact. Lastly, under such extreme condition, the fear of COVID-19 virus might manifest in not only fear and socio-occupational stress, but also anxiety related to disease contraction and dying (Arora et al., 2020; Xiang et al., 2020). Besides, the fear triggers a series of behaviours, such as frequent handwashing, contactless payments, social safety measures, etc. are encouraged to prevent spreading of infectious (Xiang et al., 2020). Therefore, with the advancement of technology, which the digital wallets as a part of financial inclusion, adoption of digital wallets becomes an integral part of the life of mankind.

References

- Aboelmegeed, M. G., & Gebba, T. R. (2013). Mobile banking adoption: an examination of Technology Acceptance Model and Theory Planned Behavior. *International Journal of Business Research & Development*, 2(1), 35-50.
- Aji, H. M., Berakon, I., & Husin, M. (2020). COVID-19 and e-wallet usage intention: a multigroup analysis between Indonesia and Malaysia. *Cogent Business & Management*, 7(1), 1-16.
- Ajzen, I. (2002). Residual effects of past on later behavior: habituation and reasoned action perspectives. *Personality & Social Psychology Review*, 6(2), 107-122.
- Al Nawayseh, M. K. (2020). FinTech in COVID-19 and beyond: what factors are affecting customers' choice of FinTech applications?. *Journal of Open Innovation: Technology, Market, & Complexity*, 6(4), 1-15.
- Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., & Algharabat, R. (2018). Examining factors influencing Jordanian customers' intentions and adoption of internet banking: extending UTAUT2 with risk. *Journal of Retailing & Consumer Services*, 40, 125-138.
- Alkhowaiter, W. A. (2020). Digital payment and banking adoption research in Gulf countries: a systematic literature review. *International Journal of Information Management*, 53, 1-17.
- Alshurideh, M. T., Al Kurdi, B., Masa'deh, R., & Salloum, S. A. (2021). The moderation effect of gender on accepting electronic payment technology: a study on United Arab Emirates consumers. *Review of International Business & Strategy*, 31(3), 375-396.

- Alswaigh, N. Y., & Aloud, M. E. (2021). Factors affecting user adoption of e-payment services available in mobile wallets in Saudi Arabia. *IJCSNS International Journal of Computer Science & Network Security*, 21(6), 222-230.
- Anouze, A. L. M., & Alamro, A. S. (2020). Factors affecting intention to use e-banking in Jordan. *International Journal of Bank Marketing*, 38(1), 86-112.
- Arora, A., Jha, A. K., Alat, P., & Das, S. S. (2020). Understanding coronaphobia. *Asian Journal of Psychiatry*, 54, 1-6.
- Attema, A. E., Haridon, O. L., Raude, J., Seror, V., & The Coconel Group (2021). Beliefs and risk perception about COVID-19: evidence from two successive French representative surveys during lockdowns. *Frontiers in Psychology*, 12, 1-16.
- Baharuddin, Z., & Abu, S. N. A. (2020). COVID-19 Pandemic Accelerates Adoption of Cashless Transactions. Retrieved March 03, 2021, from https://www.bernama.com/en/general/news_covid-19.php?id=1869084
- Birruntha, S. (2021). Pandemic Pushes More Than 80% Growth for E-Wallet Players. Retrieved August 16, 2022, from <https://themalaysianreserve.com/2021/10/18/pandemic-pushes-more-than-80-growth-for-e-wallet-players/>
- BOTS Team. (2021). #TECH: Mr DIY Gives RM300 e-Wallet Cash Aid to UM Students. Retrieved October 04, 2021, from <https://www.nst.com.my/lifestyle/bots/2021/09/731633/tech-mr-diy-gives-rm300-ewallet-cash-aid-%C2%A0um-students>
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287, 1-5.
- Chawla, D., & Joshi, H. (2019). Consumer attitude and intention to adopt mobile wallet in India – an empirical study. *International Journal of Bank Marketing*, 37(7), 1590-1618.
- Chresentia, S., & Suharto, Y. (2020). Assessing consumer adoption model on e-wallet: an extended UTAUT2 approach. *International Journal of Economics, Business & Management Research*, 4(06), 232-244.
- Chua, J. J., & Ling, A. W. P. (2019). Acceptance of WeChat Pay among consumers in Malaysia. *INTI Journal*, 6, 1-9.
- Cision. (2022). Asia-Pacific Digital Payment Forecast Report 2022: Over 65% of the Population in China is Forecast to Use Proximity Mobile Payments by 2025. Retrieved March, 18, 2022, from <https://www.prnewswire.com/news-releases/asia-pacific-digital-payment-forecast-report-2022-over-65-of-the-population-in-china-is-forecast-to-use-proximity-mobile-payments-by-2025-301486341.html>
- Daragmeh, A., Lentner, C. & Sagi, J. (2021). FinTech payments in the era of COVID-19: factors influencing behavioral intentions of “Generation X” in Hungary to use mobile payment. *Journal of Behavioral & Experimental Finance*, 32, 1-12.
- Daragmeh, A., Sagi, J., & Zeman, Z. (2021). 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). *Journal of Open Innovation: Technology, Market & Complexity*, 7(132), 1-23.
- Davis, F. D. (1986). Technology Acceptance Model for empirically testing new end-user information systems: theory and results. Retrieved March 2, 2021, from https://www.researchgate.net/publication/35465050_A_Technology_Acceptance_Model_for_Empirically_Testing_New_End-User_Information_Systems
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.

- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Dryhurst, S., Schneider, C. R., Kerr, J., Freeman, A. L. J., Recchia, G., Van der Bles, A. M., Spiegelhalter, D., & Van der Linden, S. (2020). Risk perceptions of COVID-19 around the world. *Journal of Risk Research*, 23, 1-13.
- Edeh, F. O., Aryani, D. N., Subramaniam, T., Kee, D. M. H., Samarth, T., Nair, R. K., Kannappan, T., Tan, Y. S., & Teh, Y. C. (2021). Impact of COVID-19 pandemic on consumer behavior towards the intention to use e-wallet in Malaysia. *International Journal of Accounting Finance in Asia Pacific*, 4(3), 42-59.
- FinTech Singapore. (2021). E-Wallet Adoption in E-Commerce Still Low Despite Growth in Mobile Users. Retrieved January 12, 2022, from <https://fintechnews.sg/58063/e-commerce/e-wallet-adoption-in-e-commerce-still-low-despite-growth-in-mobile-users/>
- Flavian, C., Guinaliu, M., & Lu, Y. (2020). Mobile payments adoption – introducing mindfulness to better understand consumer behavior. *International Journal of Bank Marketing*, 38(7), 1575-1599.
- Foroughi, B., Iranmanesh, M., & Hyun, S. S. (2019). Understanding the determinants of mobile banking continuance usage intention. *Journal of Enterprise Information Management*, 32(6), 1015-1033.
- Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y., Fu, H., & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *PLOS ONE*, 15(4), 1 – 10.
- George, A., & Sunny, P. (2021). Developing a research model for mobile wallet adoption and usage. *IIM Kozhikode Society & Management Review*, 10(1), 82-98.
- Google, Temasek, Bain & Company (2020). E-Conomy SEA 2020: Resilient and Racing Ahead: Southeast Asia at Full Velocity. Retrieved August 16, 2022, from <https://www.bain.com/insights/e-economy-sea-2020/>
- Joshi, H. (2021). Perception and Adoption of Customer Service Chatbots Among Millennials: An Empirical Validation In The Indian Context. In *Proceedings of the 17th International Conference on Web Information Systems & Technologies (WEBIST 2021)*, 197-208.
- Karim, M. W., Haque, A., Ulfy M. A., Hossain, M. A., & Anis, M. Z. (2020). Factors influencing the use of e-wallet as a payment method among Malaysian young adults. *Journal of International Business & Management*, 3(2), 1-11.
- Komba, K. J., & Razak, K. A. (2021). Factors influencing customer retention for electronic wallet services in Malaysia. *International Journal of Social Science & Humanity*, 11(2), 44-47.
- Ladkoom, K., & Thanasopon, B. (2020). FACTORS INFLUENCING REUSE INTENTION OF E-PAYMENT IN THAILAND: A CASE STUDY OF PROMPTPAY. *ICEIS 2020 - Proceedings of the 22nd International Conference on Enterprise Information Systems*, 1, 743-750.
- Lee, Y. (2021). Southeast Asia is World's Fastest-Growing Mobile Wallet Market. Retrieved December 03, 2022, from <https://www.bloomberg.com/news/articles/2021-07-08/southeast-asia-is-world-s-fastest-growing-mobile-wallet-market>
- Lee, Y. M. K., Jais, M., Chia, C. W., & Zaidi, N. S. (2020). Factor affecting adoption of e-wallet in Sarawak. *International Journal of Academic Research in Accounting, Finance & Management Sciences*, 10(2), 244-256.
- Lee, Y. M. K., Jais, M., Chia, C. W., & Zaidi, N. S. (2020). Factor affecting adoption of e-wallet in Sarawak. *International Journal of Academic Research in Accounting, Finance & Management Sciences*, 10(2), 244-256.

- Li, J., Yang, Z., Qiu, H., Wang, Y., Jian, L., Ji, J., & Li, K. (2020). Anxiety and depression among general population in China at the peak of the COVID-19 epidemic. *World Psychiatry*, 19(2), 249-250.
- Lin, A., C. H., Pazos, R. V., Singson, T. C., Lee, P. J., & Thong, Y. J. (2021). How COVID-19 is Spreading Across the World. Retrieved October 05, 2022, from <https://www.straitstimes.com/multimedia/graphics/2020/02/coronavirus-global-numbers/index.html>
- Lonare, A., Yadav, A., & Sindhu, S. (2018). E-wallets: diffusion and adoption in Indian economy. *Indian Journal of Commerce & Management Studies*, 9(2), 9-16.
- Madan, K., & Yadav, R. (2018). Understanding and predicting antecedents of mobile shopping adoption: a developing country perspective. *Asia Pacific Journal of Marketing & Logistics*, 1(30), 139-162.
- Mew, J., & Millan, E. (2021). Mobile wallets: key drivers and deterrents of consumers' intention to adopt. *The International Review of Retail, Distribution & Consumer Research*, 31(2), 182-210.
- Nortajuddin, A. (2020). E-Wallet Adoption on the Rise in ASEAN. Retrieved January 21, 2021, from <https://theaseanpost.com/article/e-wallet-adoption-rise-asean>
- Ojo, A. O., Fawehinmi, O., Ojo, O. T., Arasanmi, C. & Tan, C. N. L. (2022). Consumer usage intention of electronic wallets during the COVID-19 pandemic in Malaysia. *Cogent Business & Management*, 9(10), 1-15.
- Ong, J. (2020). 15 million Malaysians Getting RM50 Each in e-Wallet Funds to Boost Contactless Payments. Retrieved October 04, 2021, from <https://www.malaymail.com/news/malaysia/2020/06/05/15-million-malaysians-getting-rm50-each-in-e-wallet-funds-to-boost-contactl/1872794>
- Pal, R., & Bhadada, S. K. (2020). Cash, currency and COVID-19. *Postgraduate Medical Journal*, 96, 427-428.
- Persada, S. F., Dalimunte, I., Nadlifatin, R., Miraja, B. A., Redi, A. A. N. P., Prasetyo, Y. T., Chin, J., & Lin, S. C. (2021). Revealing the behavior intention of techsavvy Generation Z to use electronic wallet usage: a Theory of Planned Behavior based measurement. *International Journal of Business & Society*, 22(1), 213-226.
- Phan, T. N., Ho, T. V., & Le-Hoang, P. V. (2020). Factors affecting the behavioral intention and behavior of using e-wallets of youth in Vietnam. *Journal of Asian Finance, Economics & Business*, 7(10), 295-302.
- Rahi, S., Khan, M. M., & Alghizzawi, M. (2021). Extension of technology continuance theory (TCT) with task technology fit (TTF) in the context of Internet banking user continuance intention. *International Journal of Quality & Reliability Management*, 38(4), 986-1004.
- Ramli, A. R., Chua, C., & Modhgil, P. (2021). Digital payment: e-wallet. *Research by Kenaga: Thematic Report*, 1-7.
- Rantung, H. M., Tumbuan, W. J. F. A., & Gunawan, E. M. (2020). The determinants influencing behavioral intention to use e-wallet during COVID-19 pandemic in Manado. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis & Akuntansi*, 8(4), 352-360.
- Razif, N. N. M., Misiran, M., Sapiri, H., & Yusof, Z. M. (2020). Perceived risk for acceptance of e-wallet platform in Malaysia among youth: SEM approach. *Management Research Journal*, 9, 1-24.
- Sahi, A. M., Khalid, H., Abbas, A. F., & Khatib, S. F. A. (2021). The evolving research of customer adoption of digital payment: learning from content and statistical analysis of the literature. *Journal of Open Innovation: Technology, Market & Complexity*, 7(230), 1-24.

- Sakala, L., & Phiri, J. (2019). Factors affecting adoption and use of mobile banking services in Zambia based on TAM model. *Journal of Business & Management*, 7(3), 1380-1394.
- Sivathanu, B. (2019). Adoption of digital payment systems in the era of demonetization in India: an empirical study. *Journal of Science & Technology Policy Management*, 10(1), 143-171.
- Tan, J. (2021a). COVID-19 A Game Changer for Digital Payments. Retrieved April 18, 2022, from <https://www.businesstimes.com.sg/asean-business/covid-19-a-game-changer-for-digital-payments%C2%A0>
- Tan, M. (2021b). One in Two People to Use Mobile Wallets by 2025, Led by South-East Asia. Retrieved April 18, 2022, from <https://www.businesstimes.com.sg/global-enterprise/one-in-two-people-to-use-mobile-wallets-by-2025-led-by-south-east-asia>
- Tang, W., Hu, T., Hu, B., Jin, C., Wang, G., Xie, C., Chen, S., & Xu, J. (2020). Prevalence and correlates of PTSD and depressive symptoms one month after the outbreak of the COVID-19 epidemic in a sample of home-quarantined Chinese university students. *Journal of Affective Disorders*, 274, 1-7.
- The Asian Banker. (2021). Mobile Wallets Will Reach 2.6 billion Users in Asia Pacific by 2025. Retrieved April 18, 2022, from <https://www.theasianbanker.com/updates-and-articles/mobile-wallet-will-reach-2.6-billion-users-in-asia-pacific-by-2025>
- Trivedi, V. (2021). Digital Wallets Users to Exceed 4.4B Globally By 2025, Study Finds. Retrieved April 18, 2022, from <https://www.paymentsdive.com/news/digital-wallets-usage-pandemic-juniper/596883/>
- UNCTAD. (2021) How COVID-19 Triggered the Digital and E-Commerce Turning Point. Retrieved August 16, 2022, from <https://unctad.org/news/how-covid-19-triggered-digital-and-e-commerce-turning-point>
- Undale, S., Kulkarni, A., & Patil, H. (2021). Perceived e-wallet security: impact of COVID-19 pandemic. *Vilakshan - XIMB Journal of Management*, 18(1), 89-104.
- UOB. (2022). Shifting Consumer Habits Drive Malaysia FinTech Growth. Retrieved August 16, 2022, from <https://www.uobgroup.com/techecosystem/news-insights-consumer-research-malaysia.html>
- Venugopal, P., Jinka, S., & Priya, S. A. (2016). User acceptance of electronic health records: cross validation of UTAUT Model. *Sona Global Management Review*, 10(3), 42-54.
- Vinitha, K. (2021). A model of behavioural intention on usage of e-wallet amid the pandemic COVID-19. *Natural Volatiles & Essetials Oils*, 8(5), 9909-9919.
- World Health Organisation. (2021). Coronavirus Disease (COVID-19) Advice for the Public. Retrieved June 15, 2021, from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>
- Xiang, Y. T., Yang, Y., Li, W., Zhang, L., Zhang, Q., Cheung, T., & Ng, C. H. (2020). Timely mental health care for 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry*, 1-2.
- Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., Chen, D. L., Lacobucci, M., Ho, R., Majeed, A., & McIntyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *Journal of Affective Disorder*, 1-32.
- Yang, M., Mamun, A. A., Mohiuddin, M., Nawi, N. C., & Zainol, N. R. (2021). Cashless transactions: a study on intention and adoption of e-wallet. *Sustainability*, 13 (831), 1-18.

Zhao, Y., & Bacao, F. (2021). How does the pandemic facilitate mobile payment? an investigation on users' perspective under the COVID-19 pandemic. *International Journal of Environmental Research & Public Health*, 18(3), 1-22.