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The Digital Shift: COVID-19 as a Catalyst for Mobile Payment Adoption in Malaysia

Rushaizzad Abdul Rahim [1], **Jaizah Othman**[2]*

Graduate School of Management, Management and Science University, Selangor, Malaysia[1]
Department of Banking and Finance, College of Business Administration, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia[2]*
* Corresponding author

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Abstract

Purpose: This study aims to investigate the underlying factors influencing the behavioural intention of Malaysians to adopt mobile payment during the COVID-19 pandemic, focusing specifically on the effect of both technological and situational variables, namely perceived usefulness, perceived ease of use, subjective norms, and perceived COVID-19 risk.
Design/Methodology/Approach: A quantitative research design was employed using a structured online survey to gather data from 393 Malaysian respondents. The study extends the Technology Acceptance Model (TAM) by integrating constructs from the Theory of Reasoned Action (TRA) and situational risk factors related to COVID-19. Multiple regression analysis was used to test the influence of each variable on the behavioural intention to adopt mobile payment.
Findings: The results show that all four variables- perceived usefulness, perceived ease of use, subjective norms, and perceived COVID-19 risk - significantly influence the behavioural intention to adopt mobile payment. Among these, perceived usefulness exhibited the strongest effect. These findings suggest that Malaysians' adoption of mobile payment is driven more by functional utility and ease of use, with situational awareness of health risk also contributing positively.
Practical Implications: The findings imply that banks and e-wallet providers should focus on enhancing the perceived usefulness and ease of use of their platforms while also highlighting the health and safety benefits of cashless transactions. Policymakers and stakeholders may also use these insights to promote broader digital payment adoption as part of national financial inclusion and health safety agendas.
Originality/Value: This study contributes to the field by including situational risk variable, perceived COVID-19 risk, into the extended TAM framework. It offers timely insights into consumer technology adoption behaviour under public health crises, specifically within the Malaysian context.
Keywords: Mobile payment; Technology Acceptance Model; Perceived usefulness; Perceived COVID-19 risk; Subjective norms; Malaysia; Digital finance; Behavioural intention
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* Address Correspondence:
E-mail: rush7@live.com [1]
jothman@iau.edu.sa[2]

INTRODUCTION

Throughout the year 2020, the COVID-19 pandemic had caused countries worldwide to implement lockdowns to contain the virus which the International Monetary Fund called the Great Lockdown. This lockdown has caused an economic slump globally with businesses restricted from operating their brick-and-mortar setups. However, this has also caused for a shift in consumer behaviour where consumers are more accepting of digital technology and online transactions. The growth of digital technologies did not start due to the COVID-19 pandemic considering the existence and use of various innovative technologies such as the auto-teller machines or ATM, cheques, debit and credit cards, QR payments and online payments. With the advent of COVID-19 however, the adoption of mobile payment technologies was essential for Malaysia to navigate through the COVID-19 pandemic where the government of Malaysia had used designated e-wallet services to disseminate helicopter money and generate income for the people as an effort to boost the economy (Malay Mail 2020). With a move by the Malaysian government to support e-wallet services, this may potentially affect the banking industry as well in which banks may be forced to provide better mobile payment services to customers.

The mobile payment services in Malaysia are offered by banks and e-wallet players which is being overseen and mandated by Bank Negara Malaysia, BNM, to use a shared payment infrastructure as part of the Interoperable Credit Transfer Framework, ICTF, (Bank Negara Malaysia 2019) which is provided by Payments Network Malaysia Sdn Bhd, PayNet. PayNet provides banks and e-wallets access to use the Retail Payments Platform and the Shared ATM Network to provide services such as DuitNow Transfer, DuitNow QR, Interbank GIRO, JomPAY and Financial Processing Exchange. Banks and e-wallets have emphasized on mobile payments which had caused Malaysia to see a higher number of cashless payments as compared to other countries within Southeast Asia as reported by MasterCard (Bernama 2020). MasterCard had also reported that the use of cash by Malaysians declined by 64% while the uptake of credit and debit cards saw an increase by 22% and 26% respectively. Despite the COVID-19 pandemic and the movement control orders issued by the government of Malaysia, cash is still the main medium used for payment, though declining with consumers shifting to cashless payment options such as debit card, credit card, and QR payments (Bank Negara Malaysia 2021).

The COVID-19 that has plagued people across the globe is an infectious disease which threatens not just the health and lives of humans but also adversely affecting the global economy (Tang et al. 2020; Popkova 2021, Rahman et al. 2022, Faramarzi et al. 2024). Due to the dangers posed by COVID-19, the Malaysian government had enacted the Movement Control Order, MCO, on March 18, 2020 as a measure to control the spread of COVID-19 in the community by conducting a complete lockdown of the economy with limited operations allowed only for essential services and restrict the movement of people to confine them within their home vicinity (New Straits Times 2020). Aside from the MCO, several other efforts were performed such as social distancing measures, mandatory wearing of face masks in public areas, online education and banning gatherings. This perceived risk of contracting COVID-19 had caused for a shift in consumer behaviour where consumers are leaning towards digital channels as their preferred channels for shopping, payments and even banking services (Deloitte 2022). The MCO imposed by the Malaysian government may cause for the shift in consumer behaviour in Malaysia.

E-wallets would require for a e-money license issued by BNM to operate in Malaysia. To date, there are 47 non-bank e-money issuers (Bank Negara Malaysia n.d.) in Malaysia, however, the growth of cashless payment is still being widely regarded to be low (Hajazi et al. 2021; Norulhuda et al. 2020). On the adoption of online banking and mobile banking, there has been various researches being conducted with most of these researches had adopted the Technology Acceptance Model, or TAM, as the main theoretical model where perceived usefulness, PU, and perceived ease of use, PEOU are considered as part of the study (Davis 1989) or an extended version of it where various other theories were integrated with TAM to form an extended TAM model. These studies had extended the variables to cover perceived trust (Ahmad Adzri et al. 2019), perceived self-efficacy and amount of information (Ahmad Iqbal and Mohd Shahrulnizam 2018), perceived risk (Lim et al. 2019; Owais 2020; Syed et al. 2018; Zahoor and Fazal 2020), customer attitude (Owais 2020; Syed et al. 2018), compatibility, trialability, trust (Kusumawati and Rinaldi 2020; Nguyen 2020) perceived behaviour control and social norms (Syed et al. 2018), social influence, rewards, personal innovativeness (Hajazi et al. 2021), hedonic motivation and perceived credibility (Syuhaili and Tan 2020).

Over the years, there has been various research that has been presented on the topic of mobile payments which includes the adoption of mobile payment services from the perspective of consumers. Similar to the research on online banking and mobile banking, this research had mainly utilized TAM as the main theoretical model and various other theories were integrated with TAM to form an extended TAM model (Yeow et al.

2017; Natarajan et al. 2018; Balakrishnan and Nor Liyana 2021). These extended models would include other variables such as perceived credibility and social influence (Yeow et al. 2017), perceived risk and perceived motivation (Natarajan et al. 2018), as well as optimism, innovativeness, lack of awareness, cashless readiness, risk, intrinsic motivation and adoption (Balakrishnan and Nor Liyana 2021). There were also studies conducted on the adoption of mobile payments from the perspective of age categories or generations where millennials or Gen Y would have a stronger affinity in adopting mobile payments (Yeow et al. 2017; Natarajan et al. 2018).

The current literature on mobile payment has been focused on approaching the areas of study from a consumer perspective specifically in the areas of TAM. However, despite the decades of scholarly research conducted, there have been limited studies found on the adoption of mobile payments with a market situation driver being used. As consumer behaviour has shifted because of the COVID-19 pandemic, the perceived risk of COVID-19 would be a market situation driver that can be studied.

Considering the above, the problem of this research is the lack of study on the behavioural intention to adopt mobile payment with the market situation driver being used as a variable. The study on the behavioural intention to adopt mobile payment will involve Malaysians only to provide a Malaysian context to the study with surveys being conducted in an online setting specifically to Malaysian individuals. These respondents will provide the Malaysian perspective and whether perceived COVID-19 risk which was used as the market situation driver could be used for this study.

The overall objective of the research is to study the factors influencing the behavioural intention to adopt mobile payment with the presence of COVID-19 in Malaysia. This objective is supported by several other objectives formulated to support this research which are as follows:

a. To investigate as to whether subjective norms affect the behavioural intention to adopt mobile payment.
b. To investigate as to whether perceived usefulness affects the behavioural intention to adopt mobile payment.
c. To investigate as to whether perceived ease of use affects the behavioural intention to adopt mobile payment.
d. To investigate as to whether perceived COVID-19 risk affects the behavioural intention to adopt mobile payment.

The research questions were formulated to address the overall aim of the study which are as follows:

a. Do subjective norms affect the behavioural intention to adopt mobile payment?
b. Does perceived usefulness affect the behavioural intention to adopt mobile payment?
c. Does perceived ease of use affect the behavioural intention to adopt mobile payment?
d. Does perceived COVID-19 risk affect the behavioural intention to adopt mobile payment?

To achieve these objectives, this study employs a quantitative research design utilizing primary data collected from Malaysian respondents through an online survey. The remainder of the paper is organized as follows: Section 2 provides a comprehensive review of the relevant literature and introduces the conceptual framework and research hypotheses. Section 3 details the research methodology, including the sampling strategy and analytical techniques. Section 4 presents empirical findings and analysis. Finally, Section 5 concludes the study with key policy implications and suggestions for future research directions.

LITERATURE REVIEW

Development of the E-Wallet and Mobile Payment Industry in Malaysia

The Malaysian mobile payment landscape is serviced by banks and e-wallets. Malaysia has 47 non-bank e-money issuers (Bank Negara Malaysia n.d.a) where these e-money issuers provide either an e-wallet service via their mobile application or via a prepaid card where the card functions as a store of value. Since BNM incorporated all payment players through ICTF in 2018 which is an extension to the Financial Sector Blueprint 2021-2020 published by BNM to further transform the Malaysian financial and banking industry towards incorporating technologies that can increase the financial sectors' efficiency (Mohamad and Kassim 2017; Norulhuda et al. 2020), e-wallets are able to provide a more robust ecosystem by payment services similar to how banks would be able to provide coupled complementary services such as food ordering which can be seen via the Grab mobile application.

A large number of banks and non-bank participants in the Malaysian payment systems have contributed to the growth of the payment market. In 2020, the Malaysian total usage of e-payment services increased by

14.5% to 5.5 billion transactions as compared to 2019. Cashless payment specific growth based on the number of transactions specifically, increases by 32.4% while cash withdrawal from ATM decreases by 12% in the same period (Bank Negara Malaysia 2021) which provide an early indication to our research that consumers are shifting from heavy usage of cash to cashless payments and specifically, shifting consumers behaviour to wider acceptance and usage of e-payments in their daily activities.

Despite the Malaysian e-Wallet industry was further catapulted by Maybank in 2016 when it introduced its payment services via its mobile banking application that allows customers to make card-based payments using mobile phones, the growth of cashless payment is still being widely regarded to be low when compared to the country's mobile telecommunications proliferation (Norulhuda et al. 2020). In another research, Ishak (2020) argued that the measurement of cashless adoption on the national level can be performed using 5 criteria which are (i) number of Near Field Communication (NFC) enabled cards being offered, (ii) average growth of cashless payment, (iii) volume of cashless payment transactions, (iv) number of card-based products holdings per capita and (v) mobile payment awareness. In the case of Malaysia, its cashless payment industry has a direct impact to 2.6% of its GDP which is the second lowest among developing Asian countries (Ishak 2020). However, the utilization of mobile payment would be reliant on the hardware used to perform such payment and this would include the use of an online and mobile banking application or an e-wallet. The method of making a payment via a mobile banking application and an e-wallet would be very much the same as both would require the use of QR code or the use of NFC technology. The online purchase would also need to be taken into consideration with the very mention of mobile payment as online purchases are also made via mobile. Thus, studies on consumer adoption of online and mobile banking as well as e-wallets will need to be taken into consideration for consumers to adopt mobile payment.

Consumer Adoption of Online and Mobile Banking

Looking at the various studies conducted on online banking and mobile banking applications in Malaysia, most of which had the tendency to adopt the Technology Acceptance (TAM) model (Davis, 1989) where PEOU and PU are used as independent variables. These studies had extended the model to incorporate other variables such as perceived trust (Ahmad Adzri et al. 2019), perceived self-efficacy and amount of information (Ahmad Iqbal and Mohd Shahrulnizam 2018), perceived risk (Lim et al. 2019; Owais 2020; Syed et al. 2018; Zahoor and Fazal 2020), customer attitude (Owais 2020; Syed et al. 2018), compatibility, trialability, perceived behaviour control and social norms (Syed et al. 2018) as well as social influence, hedonic motivation and perceived credibility (Syuhaili and Tan 2020).

Internet banking and mobile banking are constructs where banking services are provided without requiring consumers from visiting bank branches using a web browser or mobile application respectively. Ahmad Iqbal and Mohd Shahrulnizam (2018) had studied on the factors that would influence Gen Y in Malaysia to adopt mobile banking using TAM where four variables were studied which are PEOU, PU, perceived self-efficacy, and amount of information. The results can be deemed as astonishing considering that only the PEOU and the amount of information have been identified as the influencing variables. Zahoor and Fazal (2020), who had studied Gen Y as well had found differing results where PU, PEOU and perceived risks which were introduced as an extended variable would have an impact on consumers' behavioural intention to adopt mobile banking. Owais (2020) had added perceived risk and customer attitude variables in a similar study but on internet banking and found that PEOU and customer attitude to have influential power on the adoption of internet banking while the PU was found to not have any significant correlation On the contrary, studies conducted by Lim, Fakhrorazi and Rabiul (2019), Syed et al. (2018), Syuhaili and Tan (2020), and Zahoor and Fazal (2020) found PU as one of the influencing variables. Lim, Fakhrorazi and Rabiul (2019) had also found that perceived risk as one of the influencing factors and PEOU to be the most influential variable that would determine consumer adoption of internet banking.

Syed et al. (2018) had extended the TAM construct where it is fused with the Theory of Planned Behaviour or TPB, and the theory of Diffusion of Innovation or DOI (Rogers 1995). In the study conducted by Syed et al. (2018), it was found that PEOU, relative advantage, which is similar to PU, compatibility, trialability, attitude, perceived behaviour control, social norms and perceived risks to have influence on consumers' adoption of mobile banking. Syuhaili and Tan (2020) supports the variables of social influence and attitude in their study while adding in hedonic motivation and perceived credibility which is another way to indicate perceived risk as part of the extension to TAM in their study. Their study found that all variables had influences over the students' behavioural intention to adopt and use mobile banking applications. Ahmad Adzri et al. (2019) instead, had studied the use of TAM in a real world setting by performing a self-administered questionnaire on RHB Mobile Banking users. The findings are consistent with previous studies where PU and PEOU are deemed to be

important variables for users to adopt mobile banking along with perceived trust which was added as an extended key construct to TAM in their study.

Aside from online and mobile banking, digital banks are expected to incur extreme levels of pressure and competition within the financial services industry where recent studies conducted in Vietnam (Nguyen 2020) and Indonesia (Kusumawati and Rinaldi 2020) found that the adoption of digital banking by consumers are driven among others by the PU and trust of the digital banking application. In Malaysia, a similar study was conducted prior to the issuance of the digital bank license by BNM where it was found that PEOU is the main influencing factor towards the adoption of digital bank in Malaysia (Tiong 2020). These two factors will help build the foundation for a potential customer's interest in using the application and set a certain expectancy on the performance and benefits. PU, on the other hand, may be driven by the fact that digital banks are mostly formed either through a consortium of multiple businesses which is seen from the Grab-Singtel partnership in Singapore.

Consumer Adoption of E-Wallets and Mobile Payment

There has been various research conducted which examined the acceptance of e-wallets, focusing on demographics specifically in Asia which could have similarities to Malaysia. Trivedi (2016) and Phuong et al. (2020) studied on factors which affected the acceptance of e-wallets among Gen Y in India and Vietnam respectively with both studies found that PEOU and PU to be the most critical factors towards e-wallet acceptance. In addition, Phuong et al. (2020) had highlighted the use of advertisements, quality of the mobile application and the underlying security to be key factors to be considered as well. A good mobile application will increase PEOU, while security builds trust in customers towards the e-wallet service. The security component was also found to be a contributing variable based on a study conducted in Thailand (Intarot and Beokhaimook 2018).

In Malaysia, several studies have been conducted on the adoption of e-wallets with mostly opting for TAM as the common model used to provide a better understanding of a user's intention of using the new technology. One of the studies in Malaysia (Teoh et al. 2020) found that perceived expectation, effort expectation and social influence to be the determinants to customers' intention of using an e-wallet. However, the study also found that the frequency and transaction of usage is relatively low which would point to the fact that users are not adopting e-wallets as their main method of making payment despite having used e-wallets before. Another study conducted (Karim et al. 2020) was specifically studying the young adult group on their adoption of e-wallets which identified PU, PEOU, privacy and security as influencing variables. Norulhuda et al. (2020) had studied the factors that influence user acceptance towards cashless society and angled the study to scope it to public universities. It was found in the study that performance expectancy, social influence, facilitating condition and trust are strong factors that would influence e-wallet acceptance.

On the adoption of mobile payments in Malaysia, studies on the factors that would influence their adoption of mobile payment services were conducted (Yeow et al. 2017; Natarajan et al. 2018) which had used the extended TAM model. It was found that PU, PEOU which made up the TAM model as well as perceived credibility, social influence (Yeow et al. 2017), perceive risk, perceived enjoyment and satisfaction (Natarajan et al. 2018) to influence the adoption of mobile payment services.

Balakrishnan and Nor Liyana (2021) had approached the study of cashless adoption in a different manner where instead of using TAM, they had used the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and the Technology Readiness Index 2.0 as the main theories for their study. The construct would still be similar to TAM where PEOU and PU are included in the study but other variables such as optimism, innovativeness, lack of awareness, cashless readiness, risk, intrinsic motivation and adoption are also considered. In their study, it was found that PEOU, PU, innovativeness, optimism and lack of awareness are key influences on the adoption of cashless payment.

Recent Malaysian evidence supports persistent post-pandemic uptake of digital payments. Tian and Chan (2024) report that perceived usefulness, perceived ease of use, and perceived quality drive behavioral intention, and trust strengthens the intention–use link in an extended TAM model. Balakrishnan (2023) finds that Malaysians' readiness and intention to adopt mobile payments reflect strong roles for usefulness, ease, and trust. Merchant-side evidence also points to durability of use, with continuance intention shaped by expectation confirmation, service, and network effects in Malaysia (Mohd Reza et al. 2024). Complementary results from a national Gen Z sample show convenience, security, innovativeness, and social influence as significant predictors of digital payment adoption (Al-Qudah et al. 2024). Together, these studies indicate that utility, ease, quality, and trust remain central in Malaysia's post-COVID context, which supports integrating situational health-risk perceptions, such as perceived COVID-19 risk, into an extended TAM to explain variation in intention under

crisis conditions (Tian and Chan 2024).

Hypothesis Development

There have been various studies conducted using several theoretical models in the factors influencing the adoption of technology which include the Innovation Diffusion Theory (Rogers 1995), TAM (Davis 1989), TPB (Ajzen 1991), and Theory of Reasoned Action or TRA (Hill 1977). Davis (1989) had not included any other predictors aside from PEOU and PU in TAM, however, Ventakesh and Davis (2000) had included SN taken from Hill's TRA (1977). The same variables were included together with several studies related to COVID-19 such as by Daragmeh et al. (2021) in Hungary, Baber (2021) who studied the acceptance of e-learning during the pandemic of COVID-19 in South Korea, Sukendro et al. (2020) who attempted to understand students' use of e-learning in Indonesia during the COVID-19 pandemic. Interestingly, only Daragmeh et al. (2021) had studied the perceived risk of COVID-19 and integrated it into their research framework. This study adopted TAM and extended this model to include a part of TRA which is on subjective norms or SN. TAM has mainly been accepted by researchers as a viable model to evaluate the acceptance of consumers on mobile payments, mobile banking and technology in general based on the amount of research utilizing the model and this has mainly been used to assess the adoption by individual consumers (Ajibade 2019; Zhang et al. 2018).

The inclusion of perceived COVID-19 risk extends the Technology Acceptance Model (TAM) by incorporating a situational factor that captures external health threats capable of altering perceived usefulness and ease of use. Unlike conventional risk constructs such as security or privacy, perceived COVID-19 risk represents a temporary yet powerful behavioral trigger under crisis conditions. This variable explains how individuals' health safety concerns translate into higher perceived utility and reduced resistance toward cashless technology. Similar extensions were used by Daragmeh et al. (2021), who confirmed that perceived COVID-19 risk significantly affects digital payment intention during the pandemic, and by Baber (2021), who found comparable effects in technology adoption under health emergencies. Integrating this situational risk enriches TAM with a socio-environmental dimension relevant to public health contexts.

Perceived Usefulness and Perceived Ease of Use and Adoption of Mobile Payment

Perceived Usefulness (PU) would refer to the perception of consumers on whether the technology would be useful to them in terms of increase in productivity whereas PEOU would refer to the perception of consumers on the comfortability and confidence of consumers in adopting technology as they are learning and using them (Davis 1989). Various studies were conducted over the years on the adoption of mobile banking, mobile payment and cashless acceptance in which all of it had found that both PU and PEOU contributes to the overall adoption of mobile banking, mobile payment and cashless acceptance respectively based on the studies conducted (Ahmad Adzri et al. 2019; Ahmad Iqbal and Mohd Shahrulnizam 2018; Balakrishnan and Nor Liyana 2021; Lew et al. 2020; Lim et al. 2019; Natarajan et al. 2018; Owais 2020; Syed et al. 2018; Syuhaili and Tan 2020; Yeow et al. 2017; Zahoor and Fazal 2020). Thus, based on the previous literature, the two variables which are PU and PEOU would be relevant to be included for this study.

Subjective Norms and Adoption of Mobile Payment

Subjective Norms (SN) would refer to the extent of which a consumer is influenced by their social environment such as through their family, friends, experts and celebrities in the adoption of technology (Flavián et al. 2020). While the original TAM had ignored SN in totality where only the PU and PEOU are considered, Ventakesh and Davis (2000) had included SN as a predictor that would affect the intention of consumers in adopting technology. SN has been used in both TPB (Ajzen 1991), and TRA (Hill 1977) in which various research has used as an extension to TAM. Flavián et al. (2020), Daragmeh et al. (2020) and Ramos De Luna et al. (2023) had conducted their studies on mobile payment adoption and had used SN as part of their theoretical construct. In both studies, SN were found to have significant influence on the intention of consumers to accept and adopt mobile payments. Based on the previous literature, SN would thus be relevant to be included in this study. Building on prior work by Daragmeh et al. (2021) and Baber (2021), this study integrates perceived COVID-19 risk as a situational construct that complements perceived usefulness, perceived ease of use, and subjective norms in explaining behavioral intention to adopt mobile payment services.

Perceived COVID-19 Risk and Adoption of Mobile Payment

Bauer (1960) had introduced the concept of perceived risk having an influence on consumer behaviour. In this study, the perceived risk is tied to a situational element which is on COVID-19 and study its impact on the adoption of mobile payment by consumers. However, there have been limited studies conducted which

utilizes the perceived risk of COVID-19 on the use of mobile payments. Since there has been a study conducted that there is a risk of being infected by COVID-19 due to the use of cash, coins and banknotes as COVID-19 can last on common surfaces such as glass, stainless steel and banknotes for up to 28 days (Riddell et al. 2020), the World Economic Forum (2020) had suggested for countries to adopt digital payment to help countries cope with COVID-19. Daragmeh et al. (2021) had included the study of perceived risk in their study on COVID-19 and e-wallet usage intention and had found a positive correlation between the two variables. Based on the previous literature and current market situation, the perceived COVID-19 risk would thus be relevant to be included for this study.

METHODS

Theoretical Framework

Some of the identified variables include PU, PEOU, SN and risk perceived that COVID-19 presents, all of which would enhance the proposed overall objective of this research that is on influencing the adoption of mobile payment where the inferring factor is the presence of COVID-19 in Malaysia.

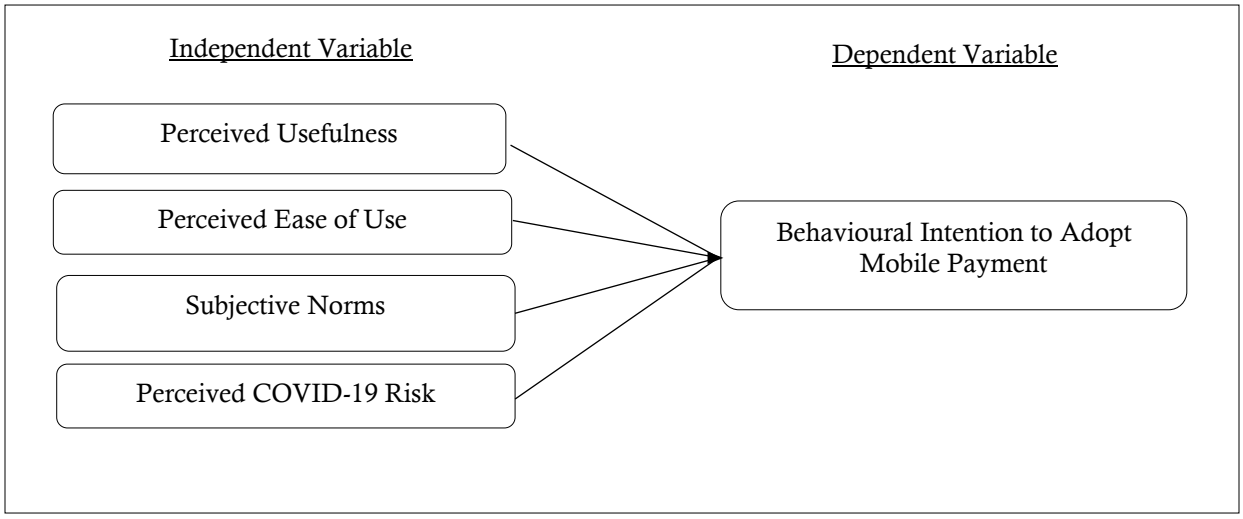

Figure 1. Theoretical Framework of the Study

According to what has been stated, a theoretical framework of the study was established as illustrated in figure 1 above. In the figure it can be observed that the Dependent Variable (DV), which is on the variable of adoption of mobile payment, is influenced by four Independent Variables (IV) PU, PEOU, SN and the perceived risk of taking COVID- 19.

Research Hypotheses

From the theoretical framework structured in Figure 1 and the hypotheses development set out in the literature section, a set of hypotheses could be formed which are as follows:

H1: Subjective norms would affect the behavioural intention to adopt mobile payment
H2: Perceived usefulness would affect the behavioural intention to adopt mobile payment
H3: Perceived ease of use would affect the behavioural intention to adopt mobile payment
H4: Perceived COVID-19 risk would affect the behavioural intention to adopt mobile payment

Data Collection

The population of the study would involve Malaysians aged 18 years old, and above which falls within above the age of minority who otherwise would not have the ability and capacity to contract (AGC 2006). The population of the study is 23.6 million (World Population Review, 2021). The sampling size, however, is taken from the population of study based on a confidence level of 95% along with a 5% margin of error is used in this study where the relationship between the sample size and total population has a diminishing relationship and remains relatively constant at slightly above a quantity of 380. The table included in the study by Krejcie and

Morgan (1970) states that for a total population of 1 million people and above, only 384 respondents are required as the sample size.

The study used a probability sampling method in which all Malaysians aged 18 and above have a probabilistic chance of being selected as sample subjects. Probabilistic sampling design is the most logical approach to be used as the study would require wider generalization to provide a better representation of the population. There were 400 responses gathered by use of an online questionnaire of which 393 were analysed after excluding the invalid responses. The 7 omitted responses failed to fit the expected age-bracket. The analysis of the data was carried out based on the data that has already been coded by utilizing Statistical Package for Social Sciences, or SPSS, Version 26. The data analysis procedure that was carried out and categorized under statistical method entailed carrying out a descriptive analysis of the demographics, a reliability test, correlation test, and a multiple regression analysis.

RESULTS AND DISCUSSION

Descriptive Statistics

Four questions were asked with regards to demographics involving gender, age, education level and employment status. These demographics were analysed and presented as per Table 1.

Table 1. Demographic Profile

	Demographics	***Frequency***	***Percentage (%)***
Gender	Male	156	40
	Female	237	60
Age	18-29 Years Old	98	25
	30-39 Years Old	85	22
	40-49 Years Old	172	44
	50-59 Years Old	33	8
	60 Years Old and Above	5	1
Education Level	MCE/SPM	29	8
	Diploma / Foundation / Matriculation	76	19
	Bachelor's Degree / Professional Degree	216	55
	Postgraduate Degree	72	18
Employment Level	Employee	273	69
	Self-Employed	62	16
	Unemployed	58	15

Source: Compiled by authors.

The demographic profile of the study has been summarized in Table 1 above as a tabulation of the gender, age, level of education and their employment status of the respondents. The table shows a gender breakdown of the respondents whereby out of the 393 total respondents 237 respondents, a majority of the sample population or 60 percent are the females, and the 156 respondents or 40 percent are male. In addition, out of the total respondents, about 90% of the respondents are below the age of 50, with 47% between 18 to 39 years old and 44% between 40 to 49 years old. It is interesting to note that the age group mix would have an almost even distribution between those aged between 18 to 39 years old who are assumed to be more technologically adapted and with those aged between 40 to 49 years old. 73% of the respondents have a bachelor's degree (55%) or higher (19%) with 69% of the total respondents are employed. A higher level of education and employment may indicate better capability, openness and exposure to adopting newer technologies such as mobile payment which may provide relevant data for this study.

Reliability Analysis

Reliability analysis is a decision tool to provide a scale of measurement to evaluate the consistency over time or stability over a variety of conditions (Drost 2011). Cronbach's Alpha is used to determine the internal consistency based on the alpha value (George and Mallery 2003).

Table 2: Reliability Statistics

	Cronbach's Alpha	N of Items
SN	0.886	4
PEOU	0.860	3
PU	0.879	4
Perceived COVID-19 Risk	0.922	3

Source: Compiled by authors.

Table 2 indicates that the value of Cronbach Alpha of SN (Independent Variable) is 0.886 or 88.6 percent. According to George and Mallery (2003), this alpha indicates good internal consistency. The four questions in SN section are termed to be consistent and reliable. The Cronbach Alpha value of PEOU (Independent variable) is 0.860 or 86 percent. Referring to the same scale, the 0.86 alpha value is considered good which can qualify the three items in PEOU as consistent and reliable. The 4 items revolving around PU (Independent Variable) obtained 0.879 or 87.9% alpha value which is considered as good. Thus, the 4 items are qualified as consistent and reliable. The final variable in this study is the "Perceived COVID-19 Risk' which has an excellent alpha value of 0.922 or 92.2%. Thus, the 3 questions used for this independent variable are consistent and reliable in this study.

Correlation Analysis

Table 3. Correlation Analysis of Research Variables

		Behavioural Intention	**SN**	**PEOU**	**PU**	**Perceived COVID-19 Risk**
Behavioural Intention	Pearson Correlation	1	0.401***	0.610***	0.746**	0.385***
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
	N	393	393	393	393	393
SN	Pearson Correlation	0.401***	1	0.362***	0.386***	0.350***
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
	N	393	393	393	393	393
PEOU	Pearson Correlation	0.610***	0.362***	1	0.670***	0.244***
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
	N	393	393	393	393	393
PU	Pearson Correlation	0.746***	0.386***	0.670***	1	0.312***
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
	N	393	393	393	393	393
Perceived COVID-19 Risk	Pearson Correlation	0.385***	0.350***	0.244***	0.312***	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
	N	393	393	393	393	393

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

Source: Compiled by authors.

Correlation analysis of each variable in the research is presented in Table 3 with a significant value determined in the 393 respondents. The correlational strength between dependent variable and independent variables in terms of Pearson Correlation (r-value) is determined in the above table to determine the proximity of two variables in terms of the value of correlation coefficient which ranges between -1 and +1 (Pearson 1895). This gives the finding that the four independent variables SN, PEOU, PU, and Perceived COVID-19 Risk show positive correlation relationship with the dependent variable of Behavioural Intention. It implies that, by raising the value of independent variables, it would be at the expense of rising the value of dependent variable. Perceived COVID-19 Risk has weak positive correlation with the dependent variable whereas SN and PEOU have moderate positive relationship with the dependent variable. The highest positive correlation (r = 0.746) between the dependent variable and a variable in this research is PU. Independent variables used in the analysis have its p-value of 0.000 as depicted in Table 3 as Sig. (2-tailed). It shows that the correlation or r-value is to be extremely significant. Hence, null hypotheses are rejected for each independent variable.

Regression Analysis

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.778[a]	0.606	0.602	0.45410

a. Predictors: (Constant), SN, PEOU, PU, Perceived COVID-19 Risk
Source: Compiled by authors.

Table 4 depicts the model summary of the regression process. R Square- or R2 is the percentage of the variance of the dependent variable that can be explained by the four independent variables in this behavioural research project: SN, PEOU, PU and Perceived COVID-19 Risk. It is worth noting that R2 is 0.606 or 60.6 percent. The R2 value shows that 60.6 percent of the dependent variable variance can be estimated using the independent ones. That is, the transformation of the four independent variables can explain 60.6 percent of the dependent variable in this study. Nonetheless, 39.4 percent was not affected by the differences in the independent variable.

Table 5. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	123.067	4	30.767	149.207	0.000[b]
	Residual	80.007	388	0.206		
	Total	203.074	392			

a. Dependent Variable: Behavioural Intention
b. Predictors: (Constant), SN, PEOU, PU, Perceived COVID-19 Risk
Source: Compiled by authors.

Analysis of variance is used to obtain the probability that there is a relationship between none of the independent variables in the regression model and the dependent variable that is more than what would be expected as a result of chance alone because of a sampling error. As per the Table 5, significance statistics of the regression model reveals, F-test points to the fact that there is virtually no possibility that the correlation between the four independent variables and the dependent variable can be the result of random sampling error.

Table 6. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	0.088	0.179		0.494	0.622	-0.264	0.441
	SN	0.061	0.030	0.073	2.012	0.045	0.001	0.120
	PEOU	0.188	0.046	0.178	4.097	0.000	0.098	0.278
	PU	0.631	0.051	0.554	12.454	0.000	0.531	0.730
	Perceived COVID-19 Risk	0.098	0.024	0.144	4.136	0.000	0.051	0.144

Source: Compiled by authors.

Table 6 gives regression coefficients of partial regression, each of the independent variables in regression model and tests of significance of each statistic. The amount of SN change, 1 unit increase (in a 5 point-Likert Scale), is correlated with a 0.061 unit change in the outcome variable at the same time other attributes will hold constant. Therefore, this model postulates that a one unit increase in the SN answers will boost the behavioural intention of the respondent in terms of adoption of mobile payment with a unit of 0.061. If the values of PEOU, PU and Perceived COVID-19 Risk are raised by one unit each holding others constant, it will have an impact of raising the dependent variable by 0.188, 0.631 and 0.098 units respectively.

The standardized coefficient in the 'Beta' column of Table 6 reports the effects of each independent variable on the dependent variable based on standard deviations. The 'Beta' section would hence be interpreted as: for a one standard deviation increase in SN, a 0.073 standard deviation increase in the dependent variable

would be expected. A similar case for PEOU, PU and Perceived COVID-19 Risk can be seen as well. Thus, among the four independent variables, PU is reported to be the most important and strongest influence on the dependent variable with a standardized beta of 0.554 followed by PEOU, Perceived COVID-19 Risk and SN.

The tests of significance for each predictor or independent variables have been assessed and the results yield that the partial correlation between the independent variables PEOU, PU and Perceived COVID-19 Risk against the dependent variable is not due to chance, which is sampling error (Sig. = 0.000). However, for SN, there is a 4.5% chance that the variable is correlated due to sampling error.

Summary of Hypotheses Analysis

Table 7. Summary of Hypotheses Analysis

Hypothesis Alternative	Result
H1 Subjective norms would affect the adoption of mobile payment	Significant
H2 Perceived usefulness would affect the adoption of mobile payment	Significant
H3 Perceived ease of use would affect the adoption of mobile payment	Significant
H4 Perceived COVID-19 risk would affect the adoption of mobile payment	Significant

Source: Compiled by authors.

Based on Table 7 above, all hypotheses are accepted based on the four independent variables of SN, PEOU, PU and Perceived COVID-19 Risk. The result of the regression analysis with the dependent variable has confirmed that the four independent variables would highly influence the behavioural intention of Malaysians to adopt mobile payments. Thus, the null hypotheses for all four independent variables are rejected since the significant value for all variables is 0.000. With this, all the research objectives in this study are met and concluded effectively.

There is substance to the researcher's theoretical framework based on the research questions and hypothesis results. An extended TAM model which fuses the concepts proposed in TPB and TRA were used to include PU, PEOU, SN and Perceived COVID-19 Risk. According to the findings of this study, the four independent variables were found to be statistically significant in its influence users' intentions to accept and use mobile payments.

CONCLUSION

The purpose of this empirical study was to study the factors influencing the behavioural intention to adopt mobile payment with the presence of COVID-19 in Malaysia. The effects of the independent variables which consist of SN, PEOU, PU and perceived COVID-19 risk have been analysed based on their influence on the behavioural intention of Malaysians to use mobile payments from the 393 responses collected. Majority of the respondents are female with the biggest age group are those aged between 40-49 years old. Most of the respondents hold a bachelor's degree or a professional degree and based on their employment status, most of respondents are currently employed. Based on the regression analysis, it was found that all variables had a significant effect on Malaysians' behavioural intention to use mobile payments during the COVID-19 pandemic with PU having the highest degree of influence for Malaysians to adopt mobile payment. After testing and analysing the data obtained using reliability, correlation, and multiple regression, it was found that all variable in the theoretical framework is significantly related to the hypothesis testing result and the research questions which on Malaysians' behavioural intention to use mobile payments during the COVID-19 pandemic. This study has thus contributed by providing insights and input into the future development of the mobile payment industry where PU was seen as the biggest influencer to the behavioural intention to adopt mobile payment. The inclusion of perceived COVID-19 risk as part of the market considerations within TAM provides a theoretical and practical contribution to the studies expanding the theory. This would therefore open up for other researchers to include market considerations as part of their study to assess the behavioural intention of people to adopt technology.

The findings highlight the need to sustain fintech innovation and trust-driven adoption beyond the pandemic. In Malaysia, recent evidence shows that user trust remains a necessary condition for continued use of mobile payments, confirming its central role in shaping digital financial behavior (Mohd Reza et al. 2024; Tan et al. 2024). This aligns with Bank Negara Malaysia's Financial Sector Blueprint 2022–2026, which emphasizes digital inclusion and a secure cashless ecosystem (Bank Negara Malaysia 2022). In Indonesia, studies reveal that micro, small, and medium enterprises (MSMEs) increasingly adopt QR-based mobile payments, with perceived ease of use, trust, and merchant readiness emerging as key determinants (Irianto and

Chanvarasuth 2025). Similarly, in Vietnam, institutional support, perceived convenience, and trust drive mobile money adoption, reflecting the growing maturity of the fintech ecosystem (Nguyen et al. 2025). These patterns suggest that across ASEAN, digital payment adoption is reinforced by trust, usability, and supportive regulatory environments. Policymakers should continue promoting financial literacy and equitable access to digital finance, while industry practitioners strengthen risk communication and service quality to sustain consumer confidence in the post-pandemic period.

One of the recommendations that can be provided is for e-wallet and banks to angle marketing activities on mobile payments based on PU as the main criteria. Given that this study had found that the PU would play the most influential role for users to adopt mobile payments, banks and e-wallets can angle their marketing activities based on the multitude of benefits and functions that are included as part of their mobile payment ecosystem. The perceived COVID-19 risk, despite not having the highest degree of influence, would still contribute to the overall adoption of mobile payment. Thus, banks and e-wallets can also angle their marketing efforts on the safety and security of using mobile payment while hindering the risk of COVID-19. As the COVID-19 pandemic continue to shift consumer behaviour, BNM as the central bank of Malaysia, can take this opportunity to reinforce and focus its efforts in driving cashless payments. This would see BNM to be able to assess the country's cash in circulation to a better degree. In addition, the adoption of mobile payment by Malaysians would also prepare the country for greater financial inclusion and potentially adopt a central bank digital currency if BNM considers adopting it.

This study focused on the perceived COVID-19 risk without consideration of other risks such as security and privacy risks, or even other market conditions such as inflation rate and consumer price index. In addition, this study did not examine the different perspectives of the various actors involved in mobile payments which include the mobile payment providers such as banks and e-wallets, as well as the merchants who will be the ones accepting mobile payments. The adoption of mobile payments may potentially be impacted depending on the degree to which merchants adopt and accept mobile payments which were not included in this study. Another consideration for future research should include the moderating influence of demographics such as income level and residential level. Researchers can also consider performing a time series analysis to study whether there have been significant changes in the adoption of mobile payments before, during and after the COVID-19 pandemic. This integration suggests that the predictive strength of TAM increases when contextual factors such as perceived pandemic risk are incorporated, offering a dynamic interpretation of technology adoption under crisis-driven behavior.

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