Exploring Consumer Behaviour Towards Acceptance of Quick Response (QR) Code Mobile Payment Systems (MPS) in Malaysia: Application of Technology of Acceptance Model (TAM)

Muhamad Azrin Nazri[1*], Nur Shuhada Kamarudin[2], Agus Salim HR, SE., MM[3], Nor Asiah Omar[4], Aimi Fadzirul Kamarubahrin[5]

[1]Faculty of Economics & Muamalat, Universiti Sains Islam Malaysia, Malaysia
[2]Faculty of Economics & Muamalat, Universiti Sains Islam Malaysia, Malaysia
[3]Fakultas Ekonomi & Bisnis, Universitas Muhammadiyah Makassar, Indonesia
[4]Faculty of Economics & Management, Universiti Kebangsaan Malaysia, Malaysia
[5]Faculty of Forestry & Environment, Universiti Putra Malaysia, Malaysia
*Corresponding author: *muhdazrin@usim.edu.my*
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Abstract

This study examines factors that influence the adoption of Quick Response code mobile payment systems. There is limited literature on mobile payment systems and their uptake, especially in developing nations, despite the growing interest in this system. This study looks at how consumers' acceptance of the Quick Response code mobile payment system in Malaysia is influenced, primarily focusing on three components of the extended Technology Acceptance Model: perceived compatibility, perceived trust, and subjective norms. 457 questionnaires were analyzed using partial least squares structural equation modeling. It was found that the perceived usefulness, perceived ease of use, subjective norms, and perceived security of the Quick Response code payment have a significant impact on Malaysian consumers' intent to adopt the system. The findings offer insightful information on consumer behavior and beneficial recommendations for professionals and businesses. It also discusses the study's limitations and suggestions for future research.

Keywords: consumer behaviour, mobile payment systems, quick response code, technology acceptance model, Malaysia.

1.0 Introduction

Today, more people adopt cashless financial services by adopting technology-driven payment apps that improve transaction speed, accuracy, and efficiency. These solutions enable customers to complete transactions and shop from mobile devices. Retailers in underdeveloped nations find it challenging to keep up with technological advancements (Alit & Mazouzi, 2018). As smartphone technology has advanced, many services increasingly apply smartphone functions. Wireless techniques and other technologies for instance, Short Message Service (SMS), Near Field Communication (NFC), and Quick Response (QR) code banking, are available for mobile payments (Amarullah et al., 2021).

Mobile payment refers to financial transactions conducted via cellular networks using mobile devices like PDAs and smartphones (Hazarika et al., 2023). Paying with a QR code is the fastest and simplest method, as it can be easily copied and used anywhere. The development of mobile payment studies has been the subject of previous research (Elsotouhy et al., 2023; Hazarika et al., 2023; Nandru & Chendragiri, 2023; C.Türker et al., 2022), particularly in light of the rising annual transaction volume. Grand View Research (2024) projected that, with anticipated development, the global market for mobile payments would be worth USD 52.21 billion in 2023.

According to Bank Negara Malaysia (2023), Malaysian made more e-payment transactions (QR and cashless) in 2023 than in 2022, totalling RM9.5 billion—a 25% increase from RM7.2 billion in 2022. On average, Malaysians made 291 e-payment transactions in 2023. E-wallet transactions also rose to RM1.1 billion in 2022, up 74.4% from 0.6 billion the previous year. This shift indicates a rapid adoption of cashless transactions by businesses and consumers (C.Türker et al., 2022). These advancements were facilitated by the finance and payments industries' promotion of a digital and mobile-first mindset and technological adoption (Hani, 2023; Aman, 2022).

Despite its immense potential, the adoption of this technology has been slower than anticipated (Verkijika, 2020). Several scholars argue that cash remains the predominant mode of payment in many economies, comprising up to 90% of transactions in some developing nations (Liébana-Cabanillas et al., 2015; Ibrahim et al., 2019). This remark is supported by other recent scholars (Hajazi et al., 2021). In Malaysia, adoption rates are also considered slow for various reasons. Although mobile payments are still in their infancy, more non-bank

actors are interested (Rosli et al., 2020). Therefore, understanding the factors affecting people's willingness to use mobile payments is essential.

According to Dahlberg et al. (2015), many scholars worldwide have conducted in-depth studies on mobile payment adoption. Over the past two decades, researchers have examined various aspects of mobile payments, including different systems, stakeholders, and relevant contexts (Behera & Kumra, 2024). However, the primary motivation for studying mobile payments remains largely unexplored. Significant changes in customers' payment habits have been driven by advancements in products and business practices (Kazakov et al., 2024). Additionally, merchants, business organizations, and other service providers are developing more efficient payment mechanisms (Shukur et al., 2022). The study identifies various gaps in the present body of knowledge on mobile payments after analyzing the literature. While QR mobile payments are becoming more popular in Malaysia, particularly in the food service and retail sectors, there is still a dearth of studies on this payment technology (Ibrahim et al., 2019).

Generally, research has examined QR code applications in verifying products and brands (Bala Krishna & Dugar, 2016; Chong et al., 2023), food labelling (Lombardi et al., 2017), advertising (Trivedi et al., 2020), as well as mobile marketing context (Sang Ryu & Murdock, 2013). While QR code adoption is well-studied in advanced countries (Chen et al., 2023; Davies et al., 2023), developing countries like Malaysia are less explored (Abdullah et al., 2023; Sum Ye & Siew-Phaik, 2023). With the help of digital payment efforts, Malaysia is moving closer to being a cashless society (Khalil et al., 2022; Santani, 2023). The Star (2023) reports that 70% of Malaysian consumers use contactless card payments, and according to The EdgeMalaysia.com, Malaysia is a leader in mobile wallet adoption (Qi, 2024). While earlier studies have recognized the possibility for mobile payment systems to expand, they have primarily concentrated on their early adoption and use (Fu et al., 2022; Sinha et al., 2024). C.Türker et al. (2022) draw attention to the lack of research on QR code mobile payment systems in the nation utilizing the Technology Acceptance Model (TAM), suggesting that more investigation is necessary.

Most prior research indicates that individual-level technology adoption studies frequently employ the Technology Acceptance Model (TAM) (Samat et al., 2022). Its application with mobile payment systems, particularly QR codes, is still not understood. According to

Abuhassa et al. (2023), TAM is useful for forecasting users' intentions and technological adoption. Studies for instance by Kala Kamdjoug et al. (2021), Awa et al. (2015), and Alqatan et al. (2017) have verified TAM. TAM improvements, such as contextual adjustments (Rahimi et al., 2018), are consistent with changing technological developments (Musa et al., 2024). This work aims to improve understanding of mobile payment systems and to refine TAM theory. The following important questions are addressed in the study:

1. What behavioral intentions of Malaysia consumers to adopt QR Code Mobile Payment Systems (MPS) are influenced by subjective norm (SN), perceived compatibility (PC), perceived security (PS), perceived usefulness (PU), perceived ease of use (PEU), and perceived trust (PT)?
2. What impact do perceived usefulness (PU), perceived ease of use (PEU), and perceived trust (PT) have on the TAM model's prediction ability about the behavioural intention to use (QR) Code Mobile Payment Systems (MPS)?

Therefore, the objective of this study is to investigate the relevance of the extended Technology Acceptance Model (TAM) to the adoption of a QR code payment system, with a focus on perceived compatibility (PC), perceived security (PS), perceived usefulness (PU), perceived ease of use (PEU), perceived trust (PT), and subjective norm (SN). This expands upon the identified research gaps and the suggestions by C. Türker et al. (2022).

2.0 Literature Review

2.1 Mobile payment system (MPS)

According to Qasim & Abu-Shanab (2015), mobile payment combines online payment systems with mobile technology, enabling customers to pay for goods and services through wireless communication or mobile networks (Slade et al., 2015). When completing QR mobile payments, or contactless transactions, consumers can communicate with sellers immediately through a smartphone application. The usage of mobile payments remains low, despite its advantages (Qasim & Abu-Shanab, 2015). Consequently, extensive research has been conducted on mobile payments acceptance (Dahlberg et al., 2015). Studies show that perceived usefulness and social impact significantly contribute towards mobile

payment adoption among young customers (Koenig-Lewis et al., 2015).

Several scholars including Liébana-Cabanillas et al. (2018), have suggested that given the growing acceptance of the payment system across the globe, further research should look into other cutting-edge mobile payment technologies, such as QR code payment. Additionally, there has been little research conducted by several experts regarding the acceptance of QR mobile payments (Liébana-Cabanillas et al., 2015). Their study conducted in Spain found that attitude, individual inventiveness, and subjective norm impacted customers' propensity to use QR mobile payments. They suggested conducting such research in other nations. As a result, scholars have argued that the factors affecting consumer behaviour vary based on the type of mobile payment method used. (Liébana-Cabanillas et al., 2017).

2.2 Underpinning Theory

Ajzen and Fishbein (Ajzen, 2011) introduced the Theory of Reasoned Action (TRA) to predict the attitudinal bases of actions in various contexts. However, TRA's generality sparked debates on its theoretical limitations in the Information System (IS) domain (Davis et al., 1989; Bagozzi, 1981). TRA did not measure technology-specific variables, prompting the need for academics to identify crucial elements for technology and IS use. Davis (1989) developed the Technology Acceptance Model (TAM), based on TRA, to address these shortcomings by providing a theoretical model and scales to measure technology acceptance. TAM suggests that specific attitudes towards technology use influence behavioural intention rather than a general attitude.

2.3 Theory of Acceptance Model (TAM)

According to the TAM Model, users' intentions regarding technology acceptance depend on how beneficial and simple they find it to be. To forecast technology's behavior and offer a theoretical foundation for its practical implementation, TAM seeks to understand the principles underlying technology acceptance. Before putting mechanisms in place, it also advises practitioners on possible courses of action. Building on the Theory of Reasoned Action, which provided a psychological viewpoint on human behavior, Davis (1989; 1993)

expanded TAM by specifying how IS properties influence real system use. It was proposed that two important variables impacting user acceptance are perceived usefulness and perceived ease of use.

Studies suggested that individuals' decisions to engage in behaviour are based on the expected benefits compared to the effort and expenses involved (Johnson & Payne, 1985; Payne, 1982). Thus, assessing the balance between perceived usefulness and ease of use determines how the information system is utilised (Davis, 1989). Perceived usefulness, influenced by Bandura's outcome judgment concept, reflects the belief that favourable outcomes result from using a system (Bandura, 1982; Robey, 1979). Perceived ease of use, rooted in the self-efficacy concept, gauges how effortlessly one can use a system (Davis, 1989; Bandura, 1982) and it assesses a person's confidence in carrying out actions related to the task.

Three steps are involved in technology acceptability according to the Technology Acceptance Model (TAM): An effective response (intention/attitude towards using technology) is prompted by external circumstances, which in turn influence usage behavior. Cognitive responses are triggered by perceived usefulness and ease of use (Davis, 1989; Davis, 1993). Behaviour is influenced by perceived ease of use and perceived usefulness which both indicate the expectation of positive results with little effort. Perceived usability increases perceived usefulness, which influences behavior through an indirect mechanism (Davis, 1989). Attitude towards behavior, an emotional assessment of potential outcomes, can substitute for behavioral intention, increasing the likelihood of behavior occurrence (Ajzen, 2011; Davis, 1993). Perceived usefulness directly influences actual use, highlighting its importance in behavior prediction. This concept suggests that user-friendly applications are seen as more beneficial, thus increasing the likelihood of adoption (Davis, 1989; Davis, 1993).

2.4 Research Hypothesis and Conceptual Model

2.4.1 Perceived Compatibility (PC)

Adoption of new technologies for instance QR mobile payment systems, is influenced by perceived compatibility, defined by Rogers (2003) and Schierz et al. (2010) as alignment with current values, needs, and experiences. Aydin & Burmaz (2016) found that individuals who see the system as fitting their current demands and lifestyle prefer to use it. Moore & Benbasat (1991) described perceived compatibility (PC) as the alignment of adopters' wants and values, while C.Türker et

al. (2022) showed that PC positively affects perceived trust, usefulness, and the intention to use mobile health applications. Schierz et al. (2010) integrated PC into the DIT model, noting its direct impact on usage intention. Al-Fahim et al. (2024) discovered that perceived compatibility (PC) impacts perceived usefulness in mobile banking, while other scholars found that PC influences the likelihood of adopting mobile payment services (Yang et al., 2012). Thus, this paper postulated:

H1: Perceived compatibility positively influences a consumer's intention to use.

H2: Perceived compatibility positively influences perceived ease of use.

H3: Perceived compatibility positively influences perceived trust.

H4: Perceived compatibility positively influences perceived usefulness.

2.4.2 Perceived Ease of Use (PEU)

According to Davis (1993), perceived ease of use is defined as the amount of work, a user feels a technology requires to operate. Put another way, if a mobile wallet application is easy to use, users are more likely to use it regularly. Mobile payment systems (MPS) should be simple to use and comprehend because shortcomings like complexity can turn away older and less experienced consumers (To & Trinh, 2021). According to prior studies, perceived ease of use and behavioral intention to use are positively correlated (To & Trinh, 2021). Other researchers also discovered the association (C. Türker et al., 2022; Hajazi et al., 2021). Ricardianto et al. (2024) found that perceived ease of use influences the intention to use QR Code technology for commuter train tickets. Additionally, several studies indicate that perceived ease of use positively affects perceived usefulness in mobile payment usage among older adults (Yang et al., 2023). Accordingly, the following hypotheses are presented:

H5: Perceived ease of use positively influences a consumer's intention to use.

H6: Perceived ease of use positively influences perceived usefulness.

2.4.3 Perceived Security (PS)

Perceived security refers to individuals' feelings of safety regarding risks associated with mobile payments, such as potential financial loss and personal information (Ooi & Tan, 2016). Scholars such as Liébana-Cabanillas et al., (2018) mentioned that security concerns are vital in mobile payments and can influence the individual decision of adopting mobile payment. Research demonstrates a substantial correlation between the intention to use mobile payments and an individual's perception of security. According to Musa et al. (2015), mobile payment usage in Qatar is mostly driven by security perception. Sfenrianto et al. (2017) have also observed similar results, showing a positive association between perceived security and propensity to use mobile payments. The relationship between perceived security and perceived ease of use was also investigated by Lin & Kim (2016). While Wijanarko & Sihite (2024) discovered that perceived security influences trust and intention to utilize mobile banking, recent research by Kanaan et al. (2023) validates the impact of perceived security on trust in e-government services. Thus, the following hypotheses are put forth:

H7: Perceived security positively influences a consumer's intention to use.

H8: Perceived security positively influences a perceived ease of use.

H9: Perceived security positively influences a perceived trust.

H10: Perceived security positively influences a perceived usefulness.

2.4.4 Perceived Trust (PT)

Developers of successful mobile payment apps must prioritize user trust due to the sensitive personal and financial information involved (Toufaily et al., 2013; Zhou, 2011). Clients are concerned about security and privacy in online commerce and mobile payments (Kim et al., 2009). Trust is essential to ensure transactions proceed smoothly, information remains secure, and data is not shared with unauthorized parties (Chellappa et al., 2002). It significantly affects consumer behavior, particularly in electronic payments (Jarvenpaa et al., 1999), and is crucial for mobile wallet adoption (Lee, 2005). Based on earlier research, trust is positively related to behavioral intention (Luo et al., 2010; Zhang et al., 2010). Subsequent research revealed

comparable results (Gao & Waechter, 2017; Khalilzadeh et al., 2017). Researchers have generally shown that perceived usefulness is positively influenced by trust. Research by Francisco et al. (2015), Pavlou (2003) and Gefen et al. (2003) support this relationship. Furthermore, Pavlou (2003) and Hansen et al., (2018) support the relationship between trust and perceived ease of use. According to recent research, the intention to utilize e-government services (Kanaan et al., 2024) and e-commerce (Hasan & Erni, 2024) is influenced by perceived trust. ElSayad & Mamdouh (2024) also draw attention to the relationship between perceived usefulness and perceived trust. Consequently, the following hypotheses are postulated:

H11: Perceived trust positively influences a consumer's intention to use

H12: Perceived trust positively influences perceived ease of use

H13: Perceived trust positively influences perceived usefulness

2.4.5 Perceived Usefulness (PU)

Perceived usefulness (PU) is individuals' belief that using a system will enhance their effectiveness and performance (Redzuan et al., 2016). This perception strongly influences users' intentions to use a system by highlighting its perceived benefits (Khayati & Zouaoui, 2013). Empirical studies consistently show that perceived usefulness affects usage intention in e-payment adoption as reported by several scholars (Francisco et al., 2015). Furthermore, other studies found a direct link between users' attitudes toward payment options and perceived usefulness (Francisco et al., 2015). Scholars for instance Cheng & Huang (2013) found that perceived usefulness positively affected the use of mobile ticketing services, and Wang et al. (2006) showed that a rise in perceived usefulness corresponds with an increase in the intention to utilize mobile services. To put it briefly, if users perceive mobile services as advantageous, they are more inclined to adopt them. For example, a recent study by Al-Fahim et al. (2024) discovered that the intention to utilize mobile banking is influenced by perceived usefulness. Therefore, it is postulated:

H14: Perceived usefulness positively influences a consumer's intention to use

2.4.6 Subjective Norm (SN)

Ajzen (1991) defined subjective norm as the social pressure people experience to carry out a particular action influenced by their close friends, family, and acquaintances. The adoption of mobile payments is significantly influenced by subjective norms, according to a study by Liébana-Cabanillas et al. (2017). This conclusion is corroborated by other studies (Ting et al., 2016). Recent research by Tarawneh et al. (2024) links subjective norm to behavioural intention, while Tran et al. (2023) shows its impact on perceived ease of use. C.Türker et al. (2022) also confirm the relationship between subjective norms and perceived usefulness. In addition, some scholars exerted the relationship between subjective norms and perceived trust (Hwang & Lee, 2012; C.Türker et al., 2022). Thus, the following hypotheses are put forth:

H15: Subjective norm positively influences a consumer's intention to use.

H16: Subjective norm positively influences a perceived ease of use.

H17: Subjective norm positively influences a perceived trust.

H18: Subjective norm positively influences a perceived usefulness.

2.4.7 Intention to Use (IU)

According to Davis (1989), behavioral intention is the desire to take specific action because of making a conscious decision. Financial institutions and payment service providers are among the many parties interested in learning about consumers' intentions to adopt mobile payment technology (Kim et al., 2010). Intention to use frequently appears as the main dependent variable in some earlier studies, including those that concentrate on adopting mobile payments (Mun et al., 2017). In short, Figure 1 shows the framework of study.

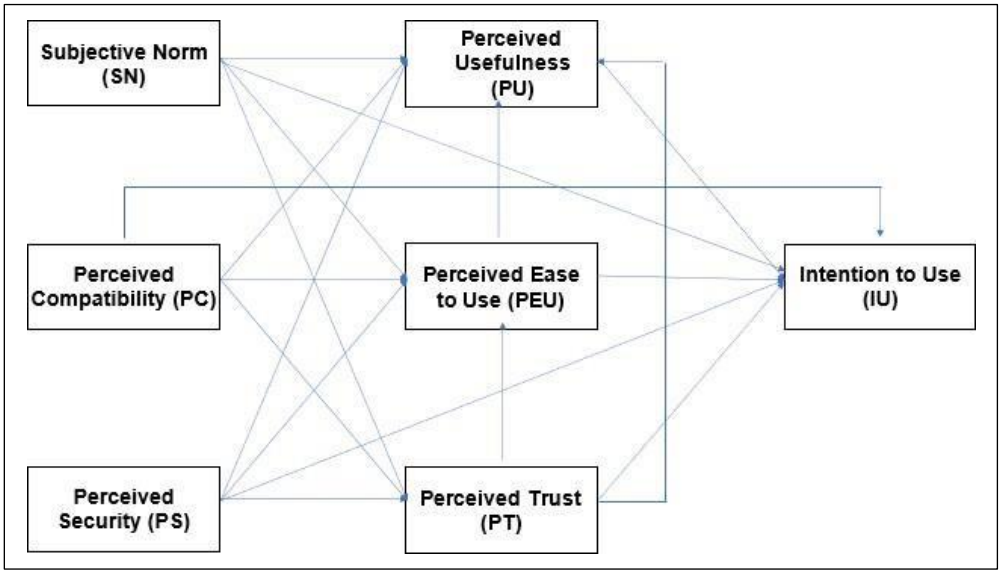

Figure 1 : The Model Showing the Proposed Relationship Between the Variables
Source: C. Türker et al. (2022)

3.0 Methodology

3.1 Design and Participation

Using a five-point Likert scale from "1-strongly disagree" to "5-strongly agree," a quantitative approach via a pretested questionnaire with 27 measurement items was utilized to collect data for the study. The scale components, adapted from validated research, were reviewed by experts for clarity. The questionnaire, distributed in Malaysia, had two sections: demographic information and experiences with QR code mobile payment systems. Convenience sampling was adopted and 206 became a sample size using G. Power-3.1.9.7 for a confidence level of 95%. Participants were screened to know their familiarity with smartphones and QR code payments. Malaysia was chosen because its consumers have a high digital payment adoption rate (Ibrahim et al., 2019; Qi, 2024). The survey was distributed via email, social media, and messaging apps, and 457 responses were collected between June and July 2023.

Partial least squares structural equation modeling (PLS-SEM) was adopted in this study's theoretical model analysis, while Smart PLS served as the statistical instrument. This approach was chosen due to its suitability for moderation analysis and data/sample characteristics,

and it is significant in marketing research (Rigdon et al., 2017). Hair et al. (2017) recommend PLS-SEM for estimating multiple equations simultaneously, revealing relationships between variables and measures through indirect methods. Moreover, PLSpredict was used to evaluate the model's predictability, showing positive Q^2 values for every indicator. In contrast, the linear regression model (LM) did not account for the PLS path model, leading to prediction errors and less accurate summary statistics. Comparing results with PLS-SEM, it was determined that applying the theoretically constructed path model improves predictive performance. Specifically, PLS-SEM demonstrates lower prediction errors (RMSE, MAE, and MAPE), compared to LM outcomes (Shmueli et al., 2019).

3.2 Measurement

There are two sections to the questionnaire. In the first section, questions about the experience and frequency of using QR codes are filtered, along with general demographic data like age, gender, ethnicity, and occupation. Perceived security, perceived usefulness, subjective norm, perceived compatibility, perceived ease of use, perceived trust, and intention to use QR code payment systems are the consumers' characteristics measured in the second section. A five-point Likert scale is used to rate each construct: 5 represents strongly agree, 4 indicates agree, 3 indicates neutral, 2 indicates disagree, and 1 indicates strongly disagree. Table 1 shows the measurement items for the study.

Table 1 : Measurements of Constructs

Constructs	Items	Measurement items	References
Perceived Ease of Use	PEU1	It is easy to become skilful at using QR code mobile payment services (MPS).	C. Türker et al. (2022) Schierz et al. (2010)
	PEU2	The interaction with QR code MPS is clear.	
	PEU3	It is easy to perform the steps required to use the QR code MPS	
	PEU4	It is easy to use QR code MPS	
Perceived Trust	PT1	I trust QR code MPS…. reliable.	C. Türker et al. (2022) Chandra, S., Srivastava, S. C.,
	PT2	I trust QR code MPS… secure.	
	PT3	I believe QR code MPS… trustworthy.	

Constructs	Items	Measurement items	References
	PT4	I trust the QR code MPS.	& Theng, Y. L. (2010)
	PT5	Even if the QR code MPS are not monitored, I'd trust them to do the job correctly.	
Subjective Norm	SN1	People who are important to me would recommend using the QR code MPS	C. Türker et al. (2022) Schierz et al. (2010)
	SN2	People who are important to me would find using the QR code MPS beneficial.	
	SN3	People who are important to me would find using the QR code MPS a good idea.	
Perceived Compatibility	PC1	Using the QR code MPS fits well with my lifestyle.	C. Türker et al. (2022) Schierz et al. (2010)
	PC2	Using the QR code MPS fits well with the way I like to purchase products and services.	
	PC3	I would appreciate using the QR code MPS instead of alternative modes of payment (e.g. credit card, cash).	
Perceived Security	PS1	The risk of an unauthorized third party overseeing the payment process is low when using QR code MPS.	C. Türker et al. (2022) Schierz et al. (2010)
	PS2	The risk of abuse when using information (e.g. business partners' names) is low when using QR code MPS.	
	PS3	The risk of abuse of billing information (e.g. credit card number, bank account data) is low when using QR code MPS.	
	PS4	I would find QR code MPS secure for conducting my payment transactions.	
Perceived Usefulness	PU1	QR code MPS is a useful mode of payment.	C. Türker et al. (2022) Schierz et al. (2010)
	PU2	Using QR code MPS makes the handling of payments easier.	
	PU3	QR code MPS allows for faster usage of mobile applications (e.g. ticket purchase on mobile applications).	
	PU4	By using the QR code MPS, my choices as a consumer are improved (e.g. flexibility, and speed).	

Constructs	Items	Measurement items	References
Intention to Use	IU1	I am considering using the QR code MPS	C. Türker et al. (2022) Schierz et al. (2010)
	IU2	I am likely to use the QR code MPS soon.	
	IU3	I am willing to use QR code MPS	
	IU4	I intend to use QR code MPS	

4.0 Finding and Discussion

Partial Least Squares-Structural Equation Modeling (PLS-SEM) and the Statistical Package for Social Sciences (SPSS 25.0) were used to evaluate the quantitative data. Because of its thorough multivariate approach and ability to analyze correlations between constructs simultaneously, PLS-SEM was chosen (Hair et al., 2017).

Table 2 provides the demographic profile of respondents where 67.2% are female and 32.8% male. The ethnicity shows 97.2% Malay, 1.5% Chinese and 1.3% Indian. For respondents' age: 86% are under 25 years old, 8.3% are 26-35 years old, 3.1% are over 45 years old, and 2.6% are 36-45 years old. The result for occupation shows that 77.7% are full-time students, 12.5% work in the private sector, 5.7% in the public sector, and 4.2% are unemployed. For education, it shows that 68.5% have a bachelor's degree, 14.9% have a diploma, 7.9% have education below SPM, 6.3% have an SPM, 2% have a master's degree, and 0.4% hold a doctorate. Regarding QR code payment usage, 99.1% of respondents have used QR code payments whereas 0.9% have not. Finally, for frequency of use: 50.3% of respondents always use QR code payments, 33.7% regularly, 14% seldom, and 2% have never used them.

Table 2 : Demographic Profile

Variables	Item	Percentage (%)	Frequency (f)
Gender	Male	32.8	150
	Female	67.2	307
Ethnicity	Malay	97.2	444
	Chinese	1.5	7
	Indian	1.3	6
Age	Below 25 years old	86.0	393
	26-35 years old	8.3	38
	36-45 years old	2.6	12
	Above 45 years old	3.1	14

Variables	Item	Percentage (%)	Frequency (f)
Occupation	Working in the Public Sector	5.7	26
	Working in Private Sector	12.5	57
	Full-time student	77.7	355
	Unemployed	4.2	19
Education	Below than SPM	7.9	36
	SPM	6.3	29
	Diploma	14.9	68
	Bachelor Degree	68.5	313
	Master's Degree	2.0	9
	Philosophy Degree	0.4	2
Experience using QR code for payment	Yes	99.1	453
	No	0.9	4
Frequency of using QR code payment in a week	Seldom use	14.0	64
	Always use	50.3	230
	Regularly use	33.7	154
	Never use	2.0	9

4.1 Measurement Model Evaluation

This study employs Smart PLS-SEM 3.0 software as the main tool for statistical inferential analysis. According to Hair et al., (2017), the PLS-SEM analysis follows a two-step process: first, evaluating the measurement model, and second, assessing the structural model to test the proposed relationships. Examining factor loading, CR, and AVE allowed for the assessment of convergent validity (Fornell & Larcker, 1981). The study's lowest factor loading, at 0.72 for all items, was higher than the suggested 0.60 (Chin et al., 1997). Convergent validity, discriminant validity, and internal consistency were analysed to establish the measurement model. The results of confirmatory factor analysis (CFA) are shown in Table 3. The model's reliability was evaluated using Cronbach's alpha (CA) and composite reliability (CR) tests where values of at least 0.7 are advised (Cheung et al., 2023; Hair et al., 2021). The CA and CR of each construct were greater than 0.7, indicating acceptable reliability. Convergent validity was confirmed because each factor loading was statistically significant ($p < 0.001$) and fulfilled the minimum requirement of 0.5. Furthermore, as shown in Table 3, the Average Variance Extracted (AVE) values for each construct were higher than the cutoff point of 0.5 (Hair et al., 2021).

Table 3 : Convergent Validity and Reliability

Variables	Items	Loading	Cronbach's Alpha	Composite Reliability (rho_a)[b]	Composite Reliability (rho_c)[b]	Average Variance Extracted (AVE)[c]
Perceived Compatibility	PC1	0.914	0.855	0.871	0.912	0.776
	PC2	0.920				
	PC3	0.804				
Perceived Security	PS1	0.855	0.863	0.872	0.906	0.707
	PS2	0.866				
	PS3	0.829				
	PS4	0.813				
Perceived Usefulness	PU1	0.879	0.910	0.911	0.937	0.787
	PU2	0.901				
	PU3	0.877				
	PU4	0.892				
Perceived Ease of Use	PEU1	0.868	0.911	0.914	0.938	0.790
	PEU2	0.906				
	PEU3	0.912				
	PEU4	0.868				
Perceived Trust	PT1	0.844	0.920	0.926	0.941	0.762
	PT2	0.900				
	PT3	0.930				
	PT4	0.922				
	PT5	0.755				
Subjective Norm	SN1	0.906	0.924	0.932	0.952	0.868
	SN2	0.948				
	SN3	0.940				
Intention to Use	IU1	0.896	0.938	0.938	0.955	0.843
	IU2	0.919				
	IU3	0.921				
	IU4	0.936				

[a]All item loadings >0.6 indicate indicator reliability (Chin et al., 1997).
[b]All composite reliability (CR) >0.7 indicates internal consistency (Hair et al., 2011). Call average variance extracted (AVE) >0.5 indicates convergent reliability (Hair et al., 2010).

The discriminant validity investigation was conducted before assessing the measurement model's fit. To ascertain the extent to which one construct may be discriminated from another, a discriminant validity analysis was performed. Therefore, to meet the requirements for discriminant validity, the square root of a construct's average

variance extracted (AVE) must be higher than the correlations between that construct and other constructs (Rönkkö & Cho, 2022). The AVE square root for each model exceeded the inter-construct correlations, as shown in Table 3, satisfying the discriminant validity requirement at the construct level (Fornell & Larcker, 1981). Additionally, Henseler and Schuberth's (2023) heterotrait-monotrait ratio (HTMT) criteria were applied. For all constructs, HTMT values should be below 0.90, and for constructs with different content, below 0.85.

Table 4 : Discriminant Validity (HTMT)

	IU	**PC**	**PEU**	**PS**	**PT**	**PU**	**SN**
IU							
PC	0.852						
PEU	0.778	0.744					
PS	0.744	0.788	0.574				
PT	0.762	0.820	0.712	0.812			
PU	0.901	0.914	0.735	0.750	0.783		
SN	0.770	0.793	0.606	0.728	0.756	0.764	

The HTMT cure was introduced by computing complete bootstrapping to obtain the HTMT inference, as Table 4 illustrates. Heseler et al. (2015) applied a two-tailed test with a significance threshold of 0.10 at a 90% confidence interval to complete the bootstrapping process. When the lower and upper confidence interval values do not exceed 1, discriminant validity has been demonstrated (Henseler et al., 2015). Furthermore, the HTMT values must be less than 1.00 to demonstrate discriminant validity (Franke & Sarstedt, 2019). Since all pairs of reflective constructs in this investigation have HTMT values between 0.574 and 0.914, discriminant validity can be confirmed. Based on Tables 3 and 4's results, discriminant validity is thought to be offered. Statistics like tolerance and VIF values show whether there is any multicollinearity issue or not. Multicollinearity is indicated if the tolerance value is less than 0.10 and the VIF value is larger than 10 (Henseler et al., 2015). Table 5 indicates that there is no multicollinearity issue in the study.

Table 5 : Multicollinearity Analysis Results

	VIF	Tolerance
PEU	2.087	.479
PT	3.193	.314
SN	2.482	.403
PC	3.560	.281
PS	2.391	.418
PU	3.537	.283

4.2 Structural Model Evaluation

Bootstrapping with 5,000 subsamples and a 95% confidence interval was conducted to examine direct effects using PLS-SEM in structural model studies (Streukens & Leroi-Werelds, 2016).

Table 6 : Hypothesis Test Summary

Hyp.	Ind.	β	Mean	Std. dev.	T statistics	f2	P values	Decision
H1	PC -> IU	0.080	0.080	0.062	1.280	0.008	0.201	Not supported
H2	PC -> PEU	0.394	0.391	0.083	4.769	0.116	0.000	Supported
H3	PC -> PT	0.312	0.310	0.053	5.850	0.118	0.000	Supported
H4	PC -> PU	0.429	0.433	0.060	7.170	0.222	0.000	Supported
H5	PEU -> IU	0.238	0.236	0.051	4.706	0.118	0.000	Supported
H6	PEU -> PU	0.174	0.174	0.055	3.150	0.055	0.002	Supported
H7	PS -> IU	0.115	0.114	0.042	2.757	0.023	0.006	Supported
H8	PS -> PEU	-0.070	-0.067	0.063	1.104	0.004	0.270	Not supported
H9	PS -> PT	0.359	0.360	0.056	6.362	0.177	0.000	Supported
H10	PS -> PU	0.132	0.132	0.055	2.381	0.025	0.017	Supported
H11	PT -> IU	-0.005	-0.003	0.055	0.084	0.000	0.933	Not supported
H12	PT -> PEU	0.374	0.373	0.069	5.382	0.096	0.000	Supported
H13	PT -> PU	0.083	0.081	0.069	1.206	0.008	0.228	Not supported
H14	PU -> IU	0.422	0.424	0.065	6.499	0.217	0.000	Supported
H15	SN -> IU	0.160	0.158	0.048	3.367	0.045	0.001	Supported
H16	SN -> PEU	0.066	0.065	0.065	1.013	0.004	0.311	Not Supported
H17	SN -> PT	0.242	0.242	0.048	4.998	0.076	0.000	Supported
H18	SN -> PU	0.158	0.156	0.051	3.109	0.037	0.002	Supported

The outcomes, shown in Table 6, reveal significant impacts on consumer intention to use, including perceived ease of use, perceived

security, perceived usefulness, and subjective norm (β = 0.238, p = 0.000; β = 0.115, p = 0.006; β = 0.422, p = 0.000; β = 0.160, p = 0.001), supporting H5, H7, H14, and H15. Perceived trust and perceived compatibility, however, shows insignificant effect on customer intentions (H1 and H11 are not supported). Supporting hypothesis H2, H3, and H4, where perceived compatibility has a significant impact on perceived ease of use, perceived trust, and perceived usefulness (β = 0.394, p = 0.000; β = 0.312, p = 0.006; β = 0.429, p = 0.000). H6 is supported by the considerable influence of perceived ease of use on perceived usefulness (β = 0.174, p = 0.002). Supporting H9 and H10, perceived security has a significant impact on perceived trust and perceived usefulness (β = 0.359, p = 0.000; β = 0.132, p = 0.017). Supporting H17 and H18, perceived trust and perceived usefulness are influenced by subjective norm (β = 0.242, p = 0.000; β = 0.158, p = 0.002). However, H8, H13, and H16 are not supported. Perceived security and perceived ease of use (β = -0.070, p = 0.270), perceived trust and perceived usefulness (β = 0.083, p = 0.228), and subjective norm and perceived ease of use (β = 0.066, p = 0.311) do not exhibit any significant associations. The strongest impact power is demonstrated by perceived usefulness, which has the largest significant effect (f2 = 0.100) on consumer intention to use. To put it briefly, Figure 3 illustrates the model's findings.

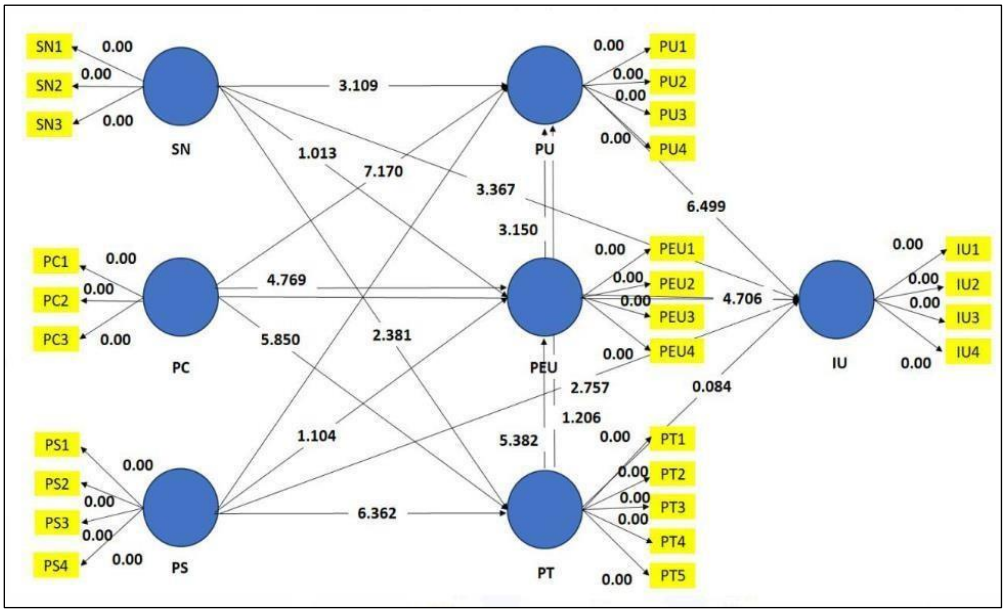

Figure 2 : Findings of the Model

Using analysis of 457 Malaysian consumers, this study examines how consumers behave when it comes to accepting the QR code mobile payment system (MPS). It was discovered that subjective norm (SN), perceived security (PS), perceived usefulness (PU), and perceived ease of use (PEU) all significantly positively affect intention to use (IU), while perceived compatibility (PC) and perceived trust (PT) do not. In particular, the greatest factor determining intention to use (IU) is perceived usefulness (PU). Therefore, the main objective for QR code MPS providers should be to increase client utility.

Once a key component of the original TAM, attitude has been left out of the TAM2, TAM3, UTAUT, and UTAUT2 models. Some research (De Luna et al., 2019) on the QR code mobile payment system (MPS) have included attitude in their models, whereas others have not. According to De Luna et al. (2019), several factors affect intention to use (IU) through attitude; however, in their model, attitude was only found to be determined by perceived usefulness (PU). The model proposed in this study, based on a literature review, does not incorporate attitude.

Unlike previous studies, this research showed that subjective norms (SN) impact perceived usefulness (PU). The finding indicates that people are more likely to view QR code MPS as simpler and easier to use if it fits their habits and experiences or if the system is recommended by others. Finally, this study showed that SN, PC, and PS all positively and significantly affect PT. The study's findings indicated that PS is the most reliable indicator of PT. This noteworthy discovery suggests that to maintain consumer faith in QR code MPS, there should not be any significant security flaws.

The study offers a few important implications. Starting with a business perspective, the study offers information about the critical elements that can assist QR code MPS providers in the country to draw in additional clients. As was already mentioned, it is evident that IU is positively and strongly impacted by PEU, PS, PU, and SN. Given that majority of QR code MPS users are under 25, the results suggest that providers of QR code payment system ought to develop and even modernize the systems with enhanced usability and added advantages to attract more young Malaysian users. Marketing initiatives should, therefore, focus on promoting these predictors. Additionally, keeping the consumers' perception of compatibility straightforward and pleasant will boost their sentiments of enthusiasm. In-depth research

on customer behaviour and habits is necessary to provide individualised service.

Moreover, the findings are also significant for local financial institutions and the fintech sector in Malaysia, offering valuable insights into the factors that drive consumers' intentions to adopt this technology. The industry and practitioners should take the opportunity from the findings to enhance the system that will offer advantages not only to the consumers but to business organizations which offer alternative payment platforms to their customers. Finally, in order to create a cashless society in the future, the government should also think about promoting system adoption among individuals, particularly older generations, through a variety of initiatives and programs. For instance, the government can start implementing the adoption of payment system for various government services nationwide.

5.0 Conclusion

This study contributes to the literature by offering initial cognizance of QR mobile payment acceptance in Malaysia. Furthermore, this study also expands the Technology Acceptance Model (TAM) by including more variables and confirms the enhanced TAM to be a strong framework for predicting QR mobile payments acceptance. This study adds to the body of knowledge by providing preliminary insight into Malaysians' adoption of QR mobile payments. Moreover, by adding more factors, this study broadens the scope of the Technology acceptability Model (TAM) by demonstrating that the extended TAM is a reliable framework for estimating the acceptability of QR mobile payments.

Like previous studies, this one has its limitations. To overcome a few of this study's limitations, more research is necessary. First off, the majority of the respondents in the sample are female and are mostly pursuing higher education. Secondly, future research should compare QR code MPS with other payment methods such as credit cards, VISA, and MasterCard to improve understanding of behavioural intention to adopt QR code MPS. Thirdly, more focus should be placed on the lack of a direct correlation between perceived trust and behavioural intention, considering the substantial influence that trust plays in the intention to use QR code MPS, as per the previous study. A plausible rationale could be that the majority of respondents who are young adults under 25, predominantly use QR code MPS for short

transactions, thus placing less emphasis on its trustworthiness perception.

To sum up, the research paradigm can be expanded to investigate new mobile payment technologies, other emerging economies, various adopter segments and diverse consumer segments such as different consumer generations. Future studies could use larger sample sizes for more precise and powerful results. Qualitative methodology via a focus group can also be considered to discover more data that would yield further valuable insights.

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References

Abdullah, B. S., Nawi, N. C., Zainuddin, S. A., Hassan, A. A., Ibrahim, W. S. A. A. W., Mohamed, A. F., & Zin, M. Z. M. (2023). Customer satisfaction and sustainable purchasing behaviour via QR code with the mediating role of perceived flow among Malaysian shoppers. *FIIB Business Review*. https://doi.org/10.1177/23197145231176951

Abuhassna, H., Yahaya, N., Zakaria, M. A. Z. M., Zaid, N. M., Samah, N. A., Awae, F., & Alsharif, A. H. (2023). Trends on using the technology acceptance model (TAM) for online learning: a bibliometric and content analysis. *International Journal of Information and Education Technology*, *13*(1), 131–142.

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & Health, 26*(9), 1113–1127.

Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Al-Fahim, N. H., Ateeq, A. A., Abro, Z., Milhem, M., Alzoraiki, M., Alkadash, T. M., & Nagi, M. (2024). Factors influencing mobile banking usage: mediating role of perceived usefulness. In *Digital Technology and Changing Roles in Managerial and Financial Accounting: Theoretical Knowledge and Practical Application* (Vol. 36, pp. 115-128). Emerald Publishing Limited.

Alit, N., & Mazouzi, D. (2018). Factors Influencing Consumers' Attitudes and Intentions Towards Online Shopping-A Survey of a Sample of Consumers in Algeria.

Alqatan, S., Noor, N. M. M., Man, M., & Mohemad, R. (2017). A Theoretical Discussion of Factors Affecting the Acceptance of M-Commerce among SMTEs by Integrating TTF with TAM. *International Journal of Business Information Systems*, *26*(1), 66–111.

Aman, A. S. (2022, March 30). E-payment gains further traction, growing 30.2pct to 7.2bil transactions in 2021, says Bank Negara. *Business Times.* https://www.nst.com.my/business/2022/03/784466/e-payment-gains-further-traction-growing-302pct-72bil-transactions-2021-says

Amarullah, A., Amaryllis, C., Kuslita, P., & Sundjaja, A.M. (2021). Consumers' Intention to Use Mobile Payment based on QR Code. *Turkish Online Journal of Qualitative Inquiry, 6*, 6090–6100.

Awa, H. O., Ojiabo, O. U., & Emecheta, B. C. (2015). Integrating TAM, TPB and TOE Frameworks and Expanding Their Characteristic Constructs for E-commerce Adoption by SMEs. *Journal of Science and Technology Policy Management*, *6*(1), 76-94.

Aydin, G., & Bumaz, S. (2016). Adoption of mobile payment systems: A study on mobile wallets. *Journal of Business, Economic and Finance, 5*(1), 73–74.

Bagozzi, R. P. (1981). Attitudes, intentions, and behaviour: A test of some key hypotheses. *Journal of Personality and Social Psychology, 41*(4), 607–627.

Bala, K. M., & Dugar, A. (2016). Product authentication using QR codes: A Mobile application to combat counterfeiting. *Wireless Personal Communications, 90*(1), 381–398.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122-147.

Bank Negara Malaysia. (2023). *Changes to Malaysia's payment statistics*. Payment Statistics, Bank Negara Malaysia. https://www.bnm.gov.my/payment-statistics

Behera, C. K., & Kumra, R. (2024). Two decades of mobile payment research: A systematic review using the TCCM approach. *International Journal of Consumer Studies*, *48*(1), e13003.

Chandra, S., Srivastava, S. C., & Theng, Y. L. (2010). Evaluating the role of trust in consumer adoption of mobile payment systems: An empirical analysis*, communications of the association for information systems*, *27*(1), 29.

Chellappa, R., Pavlou, K., & Paul, A. (2002). Perceived information security, financial liability and consumer trust in electronic commerce transactions. *Logistics Information Management, 15*(5/6), 358–368. https://doi.org/10.1108/09576050210447046

Chen, F., Du, X., & Wang, W. (2023). Can FinTech Applied to Payments Improve Consumer Financial Satisfaction? Evidence from the USA. *Mathematics*, *11*(2), 363.

Cheng, Y. H., & Huang, T.Y. (2013). High-speed rail passengers' mobile ticketing adoption. *Transportation Research Part C: Emerging Technologies, 30*, 143–160. https://doi.org/10.1016/j.trc.2013.02.001Childers

Cheung, G. W., Cooper-Thomas, H. D., Lau, R. S., & Wang, L. C. (2023). Reporting reliability, convergent and discriminant validity with structural equation modeling: A review and best-practice recommendations. *Asia Pacific Journal Management*. https://doi.org/10.1007/s10490-023-09871-y

Chin, W.W., Gopal, A., & Salisbury, W.D. (1997). Advancing the theory of adaptive structuration: The development of a scale to measure faithfulness of appropriation. *Information Systems Research, 8*(4), 342–367. https://doi.org/10.1287/isre.8.4.342.

Chong, Q. J., Alsamman, M., & ChePa, N. (2023). Encrypted QR code for brand authentication: enQRure mobile application development and evaluation. *Journal of Digital System Development*, *1*, 119–129.

Dahlberg, T., Guo, J., & Ondrus, J. (2015). A critical review of mobile payment research.
Electronic Commerce Research and Applications, 14(5), 265–284.

Davis, F. D. (1993). User acceptance of information technology: System characteristics, user perceptions and behavioural impacts. *International Journal of Man-Machine Studies, 38*(3), 475–487. https://doi.org/10.1006/imms.1993.1022

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Q, 13*(3), 319–340. https://doi.org/10.2307/249008

Davis, F. D., Bagozzi, R. P. & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982–1003.

Davies, H., Hjorth, L., Andrejevic, M., Richardson, I., & DeSouza, R. (2023). QR codes during the pandemic: Seamful quotidian placemaking. *Convergence*, *29*(5), 1121–1135.

De Luna, I. R., Li´ebana-Cabanillas, F., S´anchez-Fern´andez, J., & Mu˜noz-Leiva, F. (2019). Mobile payment is not all the same: the adoption of mobile payment systems depends on the technology applied. *Technological Forecasting and Social Change, 146*, 931-944.

ElSayad, G., & Mamdouh, H. (2024). Are young adult consumers ready to be intelligent shoppers? The importance of perceived trust and the usefulness of AI-powered retail platforms in shaping purchase intention. *Young Consumers*.

Elsotouhy, M. M., Mobarak, A. M. A., Dakrory, M. I., Ghonim, M. A. & Khashan, M. A. (2023). An integrated model predicting the drivers of mobile payment outcomes: evidence from emerging markets. *EuroMed Journal of Business*. https://doi.org/10.1108/EMJB-02-2023-0046

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39-50. https://doi.org/10.2307/3151312

Francisco, L. C., Francisco, M. L., & Juan, S. F. (2015). Payment systems in new electronic environments: Consumer behavior in payment systems via SMS. *International Journal of Information Technology & Decision Making, 14*(2), 421-449. https://doi.org/10.1142/S0219622015500078

Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. *Internet research*, *29*(3), 430-447.

Fu, H.P., Chang, T.S., Wang, C.N., Hsu, H.P., Liu, C.H., Yeh, C.Y., 2022. Critical factors affecting the introduction of mobile payment tools by micro retailers. Technol. Forecast. Soc. Chang. 175, 121319.

Gao, L., & Waechter, K. A. (2017). Examining the role of initial trust in user adoption of mobile payment services: An empirical investigation. *Information Systems Frontiers, 19*(3), 525-548. https://doi.org/10.1007/s10796-015-9611-0

Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model.*MIS Quarterly, 27*(1), 51-90. https://doi.org/10.2307/30036519

Grand View Research (2024). Mobile payment market size, share & trends analysis report by technology (near field communication, direct mobile billing), by payment type (B2B, B2C, B2G), by location, by end-use, by region, and segment forecasts, 2023-2030. https://www.grandviewresearch.com/industry-analysis/mobile-payments-industry

Hair, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Evaluation of reflective measurement models. *In Partial Least Squares Structural Equation Modeling (PLS-SEM) using R. classroom companion: Business*. Springer, Cham. https://doi.org/10.1007/978-3-030-80519-7_4

Hair, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis, 1*(2), 107–123.

Hair, J.F., Babin, B.J., & Black, W.C. (2010). *Multivariate data analysis: A global perspective*. Pearson.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, *19*(2), 139-152.

Hajazi, M. U. A., Chan, S. S., Ya'kob, S. A., Siali, F., & Abdul Latip, H. (2021). Usage intention of QR mobile payment system among millennials in Malaysia. *International Journal of Academic Research in Business and Social Sciences, 11*(1), 645–661.

Hani, A (202, April 1). Mobile banking transactions rise to RM800bil in 2022: Tengku Zafrul. *The Malaysian Reserve.* https://themalaysianreserve.com/2022/04/01/mobile-banking-transactions-to- rm800bil-in-2021-tengku-zafrul/

Hansen, J. M., Saridakis, G., & Benson, V. (2018). Risk, trust, and the interaction of perceived ease of use and behavioral control in predicting consumers' use of social media for transactions. *Computers in human behavior*, *80*, 197-206.

Hasan, G., & Erni, E. (2024). The Mediating Role of Attitude and Perceived Usefulness in the Relationship between Direct Marketing, Perceived Trust, Perceived Ease of Use, and Purchase Intention. *International Journal of Economics Development Research (IJEDR)*, *5*(1), 491-507.

Hazarika, B., Shrivastava, U., Singh, V. K., & Rea, A. (2023). Motivating mobile payment adoption during a global pandemic: Insights from protection motivation and theory of planned behaviour. *Global Knowledge, Memory and Communication*. https://doi.org/10.1108/GKMC-02-2023-0065

Henseler, J., & Schuberth, F. (2023). Partial least squares as a tool for scientific inquiry: Comments on Cadogan and Lee. *European Journal of Marketing, 57*(6), 1737- 1757. https://doi.org/10.1108/EJM-06-2021-0416

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modelling. *Journal of the Academy of Marketing Science, 43*, 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hong, S., Thong, J. Y. L., & Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. *Decision Support Systems, 42*(3), 1819–1834.

Hwang, Y., & Lee, K. C. (2012). Investigating the moderating role of uncertainty avoidance cultural values on multidimensional online trust. *Information & management*, *49*(3-4), 171-176.

Ibrahim, M. H., Hussin, S. R., & Hussin, S.H. (2019). Factors influencing Malaysian consumers' intention to use Quick Response (QR) mobile payment, *Jurnal Pengurusan, 57*, 22–37. https://doi.org/10.17576/pengurusan-2019-57-02

Jarvenpaa, S. L., Tractinsky, N., & Saarinen, L. (1999). Consumer trust in an Internet store: A cross-cultural validation. *Journal of Computer-Mediated Communication, 5*(2), JCMC526. https://doi.org/10.1111/j.1083-6101.1999.tb00337.x

Johnson, E. J., & Payne, J. W. (1985). Effort and Accuracy in Choice. *Management Science, 31*(4), 395–414.

Kala Kamdjoug, J. R., Djuitchou Chengo, S. M., & Gueyie, J. -P. (2021). Factors Affecting the Adoption of Information Technologies by Small Woman-Managed Enterprises in Cameroon. *Journal of Small Business & Entrepreneurship*, *33*(4), 433–451.

Kanaan, A., AL-Hawamleh, A., Abulfaraj, A., Al-Kaseasbeh, H., & Alorfi, A. (2023). The effect of quality, security and privacy factors on trust and intention to use e-government services. *International Journal of Data and Network Science*, *7*(1), 185-198.

Kang, H. (2021). Sample size determination and power analysis using the G*Power software. *Journal of Educational Evaluation for Health Professions, 18*, 17. https://doi.org/10.3352/jeehp.2021.18.17

Kazakov, T., Islam, M. F., osman, E., & hossain, M. B. (2024). An Analysis of Consumer Decision-making in Mobile Payment Adoption: Exploring Influencing Factors.

Khalilzadeh, J., Ozturk, A. B., & Bilgihan, A. (2017). Security-related factors in extended UTAUT model for NFC-based mobile payment in the restaurant industry. *Computers in Human Behavior,70*,460–474. https://doi.org/10.1016/j.chb.2017.01.001

Khayati, S., & Zouaoui, S. K. (2013). Perceived usefulness and use of information technology: The moderating influences of the dependence of a subcontractor towards his contractor. *Journal of Knowledge Management, Economics and Information Technology, 3*(6), 68–77. https://citeseerx.ist.psu.edu/viewdoc/download

Kim, C., Mirusmonov, M., & Lee, I. (2010). An empirical examination of factors influencing the intention to use mobile payment. *Computers in Human Behavior, 26*(3), 310–322.

Kim, G., Shin, B., & Lee, H. G. (2009). Understanding dynamics between initial trust and usage intentions of mobile banking. *Information Systems Journal, 19*(3), 283–311. https://doi.org/10.1111/j.1365-2575.2007.00269.x

Kline, P. (1994). *An easy guide to factor analysis*. Abingdon-on-Thames: Routledge.

Koenig-Lewis, N., Marquet, M., Palmer, A., & Zhao, A. L. (2015). Enjoyment and social influence: Predicting mobile payment adoption. *The Service Industries Journal, 35*(10), 537-554. https://doi.org/10.1080/02642069.2015.1043278

Lee, T. (2005). The impact of perceptions of interactivity on customer trust and transaction intentions in mobile commerce. *Journal of Electronic Commerce Research, 6*(3),165. http://www.jecr.org/sites/default/files/06_3_p01.pdf

Liébana-Cabanillas, F., Muñoz-Leiva, F. & Sánchez-Fernández, J. (2018). A global approach to the analysis of user behavior in mobile payment systems in the new electronic environment. *Service Business, 12*(1), 25–64.

Liébana-Cabanillas, F., Ramos de Luna, I., & Montoro-Ríos, F. (2017). Intention to use new mobile payment systems: A comparative analysis of SMS and NFC payments. *Economic Research-Ekonomska Istraživanja, 30*(1), 892–910.

Liébana-Cabanillas, F., Ramos de Luna, I., & Montoro-Ríos, F.J. (2015). User behaviour in QR mobile payment system: The QR payment acceptance model. *Technology Analysis and Strategic Management, 27*(9), 1031–1049.

Lin, C. A., & Kim, T. (2016). Predicting user response to sponsored advertising on social media via the technology acceptance model. *Computers in human behavior*, *64*, 710-718.

Lombardi, A., Carfora, V., Cicia, G., Del Giudice, T., Lombardi, P., & Panico, T. (2017). Exploring willingness to pay for QR code labelled extra-virgin olive oil: An application of the theory of planned behavior. *International Journal on Food System Dynamics*, *8*(1), 14-31.

Luo, X., Li, H., Zhang, J., & Shim, J. P. (2010). Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: An empirical study of mobile banking services. *Decision Support Systems, 49*(2), 222-234. https://doi.org/10.1016/j.dss.2010.02.008

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation*. Information Systems Research, 2*(3), 192-222.

Musa, A., Khan, H. U., & AlShare, K. A. (2015). Factors influencing consumers' adoption of mobile payment devices in Qatar. *International Journal of Mobile Communications, 13*(6), 670-689.

Musa, H. G., Fatmawati, I., Nuryakin, N., & Suyanto, M. (2024). Marketing research trends using technology acceptance model (TAM): a comprehensive review of research (2002–2022). *Cogent Business & Management*, *11*(1), 2329375.

Mun, Y. P., Khalid, H., & Nadarajah, D. (2017). Millennials' Perception of Mobile Payment Services in Malaysia. *Procedia Computer Science, 124*, 397-404.

Nandru, P., Senthil Kumar, S. A., & Chendragiri, M. (2023). Adoption intention of mobile QR code payment system among marginalized street vendors: An empirical investigation from an emerging economy. *Journal of Science and Technology Policy Management*. https://doi.org/10.1108/JSTPM-03-2023-0035

Ooi, K. B., & Tan, G. W. H. (2016). Mobile technology acceptance model: An investigation using mobile users to explore smartphone credit cards. *Expert Systems with Applications, 59*, 33-46.

Pavlou, P. A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce,7*(3),101-134. https://plinas.usp.br/pluginfile.php/941339/mod_resource/content/1/ConsumEcomPavlou.pdf

Payne, J. W. (1982). Contingent decision behavior. *Psychological Bulletin, 92*(2), 382–402.

Qasim, H., & Abu-Shanab, E. (2015). Drivers of mobile payment acceptance: The impact of network externalities. *Information Systems Frontiers, 18*(5), 1021–1034.

Qi, H.E (2024, May 28). *Malaysia leads in global mobile wallet adoption, Adyen survey shows.* Theedgemalaysia. https://theedgemalaysia.com/node/713314

Ricardianto, P., Soekirman, A., Pribadi, O., Atmaja, D., Suryobuwono, A., Ikawati, I., ... & Endri, E. (2023). Perceived ease of use and usefulness: Empirical evidence of behavioral intention to use QR code technology on Indonesian commuter lines. *International Journal of Data and Network Science*, *7*(4), 1815-1828.

Rahimi, B., Nadri, H., Afshar, H. L., & Timpka, T. (2018). A Systematic Review of the Technology Acceptance Model in Health Informatics. *Applied Clinical Informatics* 9: 604–34.

Redzuan, N., Razali, A., Muslim, A., & Hanafi, W. (2016). Studying perceived usefulness and perceived ease of use of electronic human resource management (e-HRM) with behavior intention. International Journal of Business Management, 1(2), 118–131. https://dokumen.tips/documents/studying-perceived-usefulness-and-perceived-ease-of-volume-1-issue-2-20166intention.html

Rigdon, E. E., Sarstedt, M., & Ringle, C. M. (2017). On comparing results from CB-SEM and PLS-SEM: Five perspectives and five recommendations. *Marketing: ZFP– Journal of Research and Management, 39*(3), 4–16.

Robey, D., & Farrow, D. (1982). User Involvement in Information System Development: A Conflict Model and Empirical Test. *Management Science, 28*(1), 73–85.

Robey, D. (1979). User Attitudes and Management Information System Use. *Academy of Management Journal, 22*(3), 527–538.

Rogers, E. (2003) Diffusion of innovations, (5th ed.). New York: Free Press.

Rosli, N. F., Ibrahim, R., Yahya, Y., Zainuddin, N. M. M., Yaacob, S., & Yusoff, R. C. M. (2020). Consumers' intention to use mobile payment: A case of quick response (QR) code applications. *Mathematical Sciences and Informatics Journal*, *1*(1), 20-34. http://www.mijuitmjournal.com DOI: 10.24191/mij.v1i1.14166.

Rönkkö, M., & Cho, E. (2022). An Updated Guideline for Assessing Discriminant Validity. *Organizational Research Methods, 25*(1), 6-14. https://doi.org/10.1177/1094428120968614

Samat, M. F., Ismail, W. S. A. W., Rahim, H. L., Awang, N. A., Hussin, S. N. A., & Anual, N. (2022). Use it or not to use it? Mobile wallet usage intention amidst COVID-19 outbreak among Malaysians. *Malaysian Journal of Consumer and Family Economics*, *29*(August), 216-232.

Santani, S. J. (2023, October 30). Malaysia makes sound progress in cashless usage. *The New Straits Times.*

Sang Ryu, J., & Murdock, K. (2013). Consumer acceptance of mobile marketing communications using the QR code. *Journal of Direct, Data and Digital Marketing Practice, 15*(2), 111-124.

Schierz, P. G., Schilke, O., & Wirtz, B. W. (2010). Understanding consumer acceptance of mobile payment services: An empirical analysis. *Electronic Commerce Research and Applications, 9*(3), 209-216.

Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J. -H., Ting, H., Vaithilingam, S. & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict, *European Journal of Marketing, 53*(11), 2322-2347. https://doi.org/10.1108/EJM-02-2019-0189

Sfenrianto, S., Junadi, J., & Saragih, M. H. (2017). The analysis of consumer's intention model for using the E-payment system in Indonesia. *Proceedings of the 2017 International Conference on Sustainable Information Engineering and Technology (SIET)*, 78-82. IEEE.

Sharda, R., Barr, S. H., & McDonnell, J. C. (1988). Decision Support System Effectiveness: A Review and an Empirical Test. *Management Science, 34* (2), 139-159.

Shukur MH, Ismail RJ, Flaih LR (2022) Empower E-wallets Payment System by using Secured Hybrid Approach of Online and Offline Services. Cihan University-Erbil Sci J 6(2):23-27

Sinha, N., Paul, J., & Singh, N. (2024). Mobile payments for the bottom of the pyramid: Towards a positive social change. *Technological Forecasting and Social Change*, *202*, 123313.

Slade, E., Williams, M., Dwivedi, Y., & Piercy, N. (2015). Exploring consumer adoption of proximity mobile payments. *Journal of Strategic Marketing, 23*(3), 209-223.

Streukens, S., & Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. *European Management Journal, 34*, 618–632. https://doi.org/10.1016/j.emj.2016.06.003

Sum Ye, K., & Siew-Phaik, L. (2023). Use Of Scan-To-Order System: Generation X and Y In Klang Valley, Malaysia. *Journal of Social Sciences and Business*, *2*(2), 1–13.

Tarawneh, M., Alsoud, M., & Albhirat, M. (2024). The impact of attitude, subjective norms, perceived behavioral control, and perceived risks on intention in online shopping in Jordan. *International Journal of Data and Network Science*, *8*(4), 2677-2684.

Thakur, R., & Srivastava, M. (2014). Adoption readiness, personal innovativeness, perceived risk and usage intention across customer groups for mobile payment services in India. *Internet Research, 24*(3), 369–392. https://doi.org/10.1108/intr-12-2012-0244

The Star (2023, July 5). Cash is no longer king for payments in Malaysia. *The Star.* https://www.thestar.com.my/news/nation/2023/07/05/cash-is-no-longer-king-for-payments-in-malaysia

Ting, H., Yacob, Y., Liew, L., & Lau, W. M. (2016). Intention to use mobile payment system: A case of developing market by ethnicity. *Procedia - Social and Behavioral Sciences, 224*, 368–375.

Tran, H. T. T., Nguyen, N. T., & Tang, T. T. (2023). Influences of subjective norms on teachers' intention to use social media in working. *Contemporary Educational Technology*, *15*(1), ep400.

Türker, C., Altay, B. C., & Okumuş, A. (2022). Understanding user acceptance of QR code mobile payment systems in Turkey: An extended TAM. *Technological Forecasting and Social Change*,184,121968. https://doi.org/10.1016/j.techfore.2022.121968

To, A. T., & Trinh, T. H. M. (2021). Understanding behavioral intention to use mobile wallets in Vietnam: Extending the tam model with trust and enjoyment. *Cogent Business & Management, 8*(1), 1891661, https://doi.org/10.1080/23311975.2021.1891661

Toufaily, E., Nizar, S., & Ladhari, R. (2013). Consumer trust toward retail websites: Comparison between pure click and click-and-brick retailers. *Journal of Retailing and Consumer Services, 20*(6), 538–548. https://doi.org/10.1016/j.jretconser.2013.05.001

Trivedi, R., Teichert, T., & Hardeck, D. (2020). Effectiveness of pull-based print advertising with QR codes: Role of consumer involvement and advertisement appeal. *European Journal of Marketing*, *54*(1), 145-167.

Verkijika, S. F. (2020). An affective response model for understanding the acceptance of mobile payment systems. *Electronic Commerce Research and Applications, 39*, 100905. https://doi.org/10.1016/j.elerap.2019.100905

Wang, Y. S., Lin, H. H., & Luarn, P. (2006). Predicting consumer intention to use mobile service. *Information Systems Journal, 16*(2), 157–179. https://doi.org/10. 1111/j.1365-2575.2006.00213.x

Wijanarko, M. F., & Sihite, J. (2024). Analysis of the Effect of Perceived Ease of Use, Perceived Usefulness and Perceived Security on Intention to Use Brimo Mobile Banking with Trust as Mediation. *Indonesian Journal of Business Analytics*, *4*(1), 93-110.

Yang, C. C., Yang, S. Y., & Chang, Y. C. (2023). Predicting older adults' mobile payment adoption: An extended TAM model. *International journal of environmental research and public health*, *20*(2), 1391.

Yang, S., Lu, Y., Gupta, S., Cao, Y., & Zhang, R. (2012). Mobile payment services adoption across time: An empirical study of the effects of behavioral beliefs, social influences, and personal traits. *Computers in Human Behavior, 28*(1), 129–142.

Zhang, J., Huang, J., & Chen, J. (2010). Empirical research on user acceptance of mobile searches. *Tsinghua Science and Technology, 15*(2), 235–245. https://doi. org/10.1016/S1007-0214(10)70056-0

Zhou, T. (2011). An empirical examination of initial trust in mobile banking. *Internet Research, 2*(5), 1085–1091. https://doi.org/10.1108/10662241111176353