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Understanding Quick Response Mobile Payment Adoption: An Extended TAM Approach among Malaysian University Students

Nik Syuhailah Nik Hussin[1*] and Zuraimi Abdul Aziz[1]

[1]Faculty of Entrepreneurship & Business, Universiti Malaysia Kelantan, 16010 Kelantan, Malaysia

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ABSTRACT

The transition toward a cashless economy has accelerated globally, with Malaysia actively promoting digital payment systems such as Quick Response (QR) mobile payments. Drawing upon the Technology Acceptance Model (TAM) Approach, this study investigates the determinants influencing the intention of Universiti Malaysia Kelantan (UMK) students in Pengkalan Chepa to adopt QR mobile payment technologies. A quantitative research design was employed, involving 400 undergraduate students who responded to a structured questionnaire measured using a five-point Likert scale. Data analysis was conducted using SPSS version 29, including reliability testing, descriptive statistics, and Spearman's rank correlation analysis. The findings reveal that the core TAM constructs which are perceived usefulness and perceived ease of use, alongside external variables of personal innovativeness and perceived security significantly influence students' intention to adopt QR mobile payments. Among these factors, perceived usefulness emerged as the strongest predictor. Although respondents demonstrated a high level of openness toward technological innovation, concerns related to security remain evident. These findings suggest that fintech providers and policymakers should prioritise enhancing system security and improving user-friendly features to increase user confidence. This study contributes to Malaysia's aspiration of achieving a 90% cashless society by identifying key behavioural drivers among young consumers. Furthermore, by integrating personal innovativeness into traditional adoption frameworks, this research offers a more comprehensive understanding of technology acceptance within the higher education context.

Keywords: Intention to Use, Mobile Payment, Quick Response (QR), TAM Approach

1. INTRODUCTION

The rapid evolution of mobile technology has significantly transformed financial transactions worldwide. One of the most prominent innovations is the use of QR code-based mobile payments, which allow users to perform transactions quickly and efficiently. QR codes, developed by Masahiro Hara, an engineer at Denso Wave, a subsidiary of Toyota, to enhance efficiency in manufacturing processes, are two-dimensional barcodes capable of storing various types of information that can be accessed via smartphones (Suo et al., 2022). These codes have become increasingly relevant in facilitating seamless payment processes (Ibrahim et al., 2019).

The COVID-19 pandemic further accelerated the adoption of contactless payment methods, as consumers sought safer and more hygienic alternatives to traditional cash transactions (Wisniewski et al., 2024). QR mobile payments offer convenience, speed, and reduced physical interaction, making them highly attractive to modern consumers.

*Corresponding Author: niksyuhailah@umk.edu.my

In Malaysia, the government aims to achieve a 90% cashless transaction rate by 2025 (Ipsos, 2024). Despite this ambition, challenges such as security concerns and unequal access to digital infrastructure persist. While previous studies have explored mobile payment adoption broadly, there remains limited research focusing on university students, particularly in the East Coast region. Additionally, the interaction between personal innovativeness and traditional technology acceptance factors remains underexplored. Therefore, this study aims to examine how perceived usefulness, perceived ease of use, personal innovativeness, and perceived security influence students' intention to adopt QR mobile payments.

2. LITERATURE REVIEW

2.1 Intention to Use Quick Response (QR) Mobile Payment

Consumers' intention to use mobile payments refers to favourable behaviours that they expect to engage in the future (Sariyon & Harun, 2020). This construct has attracted considerable attention from both scholars and practitioners, given its importance to financial institutions and service providers in understanding the determinants of consumer adoption. For instance, a recent survey revealed that approximately 70% of Malaysians are willing to adopt mobile payment systems in their daily transactions, indicating a strong and growing acceptance of digital payment technologies among consumers (Tan & Memon, 2019). As mobile payment usage expands rapidly, understanding consumers' behavioural intentions becomes critical in shaping strategies that enhance adoption and sustain usage. Behavioural intention refers to an individual's likelihood of performing a specific action (Ajzen, 1991). In the context of mobile payments, intention reflects users' willingness to adopt and continuously use the technology. Prior research indicates that intention is influenced by perceived benefits, convenience, and trust (Tan et al., 2019). Social influence also plays a significant role, particularly among younger users who are highly connected through digital networks (Mat Napis & Daud, 2023). Institutional support, such as policies and incentives provided by regulatory bodies, further enhances adoption (Bank Negara Malaysia, 2022). Moreover, lifestyle compatibility and financial incentives such as cashback and rewards have been found to strengthen adoption intention (Anwar et al., 2024). Digital literacy also contributes significantly, as individuals with higher technological competence are more confident in using digital financial services (Abu Bakar & Ng, 2024).

2.2 Perceived Usefulness

Perceived usefulness is defined as an individual's belief that using a particular application enhances job performance and productivity, while providing advanced functionalities and flexibility (Lim & Zulkipli, 2023). A higher level of perceived usefulness is consistently associated with stronger behavioural intentions to adopt the technology. Individuals are more inclined to use a system when they perceive it as beneficial in facilitating faster, more efficient, and convenient transactions (Senali et al., 2023). In the context of mobile applications, features such as reward mechanisms and digital receipt management further enhance usability and user appeal. Moreover, perceived usefulness is shaped by several factors, including prior user experience, satisfaction levels, and the duration of system usage. Extant literature has extensively examined the linkage between perceived usefulness and behavioural intention, establishing it as one of the most prominent constructs in mobile payment adoption research. Empirical evidence consistently supports a significant and positive relationship between perceived usefulness and intention to use mobile payment systems (Ibrahim et al., 2019).

2.3 Perceived Ease of Use

Perceived ease of use refers to an individual's belief that a particular technology can be understood and operated with minimal effort. When a system is perceived as user-friendly, it is

more likely to foster positive attitudes and strengthen users' intention to adopt and utilise the technology, particularly in the context of mobile payment systems (Sariyon & Harun, 2020). User trust can be enhanced through intuitive system design, clear usage guidance, and the demonstrated competence and responsiveness of service providers (Majercakova & Gregus, 2021). From a behavioural perspective, technologies that require less cognitive and operational effort are more readily accepted by consumers. Consequently, the simplicity of system usage serves as a critical determinant of user acceptance, as individuals are more inclined to engage with technologies that are easy to navigate and operate. Empirical evidence further supports a significant positive relationship between perceived ease of use and consumers' intention to adopt mobile payment systems, as observed in studies conducted in China (Ibrahim et al., 2019).

2.4 Personal Innovative

Personal innovativeness is defined as an individual's willingness to experiment with and adopt new information technologies (Ibrahim et al., 2019). Individuals exhibiting higher levels of innovativeness are generally more inclined to embrace emerging technologies, as they tend to be open to novel experiences and more tolerant of uncertainty and risk (Lui et al., 2021). Moreover, highly innovative individuals demonstrate greater adaptability to technological change and are more willing to engage with unfamiliar systems, thereby increasing their likelihood of adoption. This perspective aligns with the notion that individuals with stronger innovative traits are more prepared to accept the risks associated with new technologies. Empirical evidence supports this argument, indicating a significant positive relationship between personal innovativeness and the adoption of QR mobile payment systems, as observed in a study conducted in Spain. These findings are consistent with prior research in the mobile payment domain, which highlights the critical role of personal innovativeness in shaping technology adoption behaviour (Ibrahim et al., 2019).

2.5 Perceived Security

Perceived security refers to the extent to which individuals feel protected from potential risks associated with mobile payment usage, including concerns related to personal data breaches and financial loss (Ibrahim et al., 2019). With the rapid advancement of digital technologies and the expansion of e-commerce platforms, security concerns have become increasingly prominent within the digital ecosystem (Lai & Liew, 2021). In the context of mobile payments, perceived security reflects users' confidence in the system's ability to safeguard sensitive financial and transactional information. When users perceive a payment system as reliable, secure, and free from threats, particularly in comparison to traditional payment methods, they are more likely to accept and adopt it. This concern is further amplified in QR code-based transactions, where the absence of physical interaction may heighten users' uncertainty regarding system security (Chang et al., 2021).

2.6 Underlying Theory of Technology Acceptance Model (TAM)

This study is grounded in the Technology Acceptance Model (TAM), which identifies perceived usefulness and perceived ease of use as key determinants of behavioural intention to adopt new technologies (Davis, 1989). Perceived usefulness relates to performance enhancement, while perceived ease of use reflects system simplicity. These constructs jointly shape users' attitudes and intentions, and TAM has been widely validated in digital payment research (Venkatesh et al., 2012). To improve its explanatory power, this study extends TAM by incorporating personal innovativeness and perceived security. Personal innovativeness captures individuals' willingness to experiment with new technologies (Simarmata & Hia, 2020), while perceived security addresses concerns related to data protection and financial risk, which are critical in fintech

adoption (Wang et al., 2024). This extension provides a more comprehensive framework for explaining QR mobile payment adoption.

2.7 Hypotheses Development

The hypotheses of this study were developed and refined based on the preceding literature review:

H_1: Perceived usefulness significantly influences the intention to adopt QR mobile payments. Perceived usefulness represents the degree to which individuals believe that mobile payment usage enhances the efficiency and convenience of daily transactions. Prior studies indicate that perceived usefulness positively drives adoption intention, particularly when users recognise tangible benefits such as faster processing and time savings (Mat Napis & Daud, 2023; Anwar et al., 2024).

H_2: Perceived ease of use significantly influences the intention to adopt QR mobile payments. Systems that are simple and require minimal effort tend to achieve higher acceptance levels (Hajazi et al., 2021). Empirical evidence further suggests that user-friendly mobile applications significantly encourage students' adoption of QR payment systems (Mat Napis & Daud, 2023).

H_3: Personal innovativeness significantly influences the intention to adopt QR mobile payments. Individuals with higher levels of innovativeness are generally more receptive to new technologies and exhibit stronger adoption intentions (Ashrafi & Easmin, 2023). Recent findings also confirm a positive relationship between personal innovativeness and mobile payment adoption, particularly among younger consumers (Senali et al., 2023).

H_4: Perceived security significantly influences the intention to adopt QR mobile payments. Security concerns remain a critical factor in digital financial transactions (Lai & Liew, 2021). Recent studies highlight that perceived security significantly enhances consumers' trust and their willingness to adopt QR mobile payment systems (Wang et al., 2024).

Based on these hypotheses, a conceptual framework (Figure 1) was developed to illustrate the relationships among the variables. This framework provides a structured basis for examining how these factors collectively influence behavioural intention and supports the empirical analysis of the study.

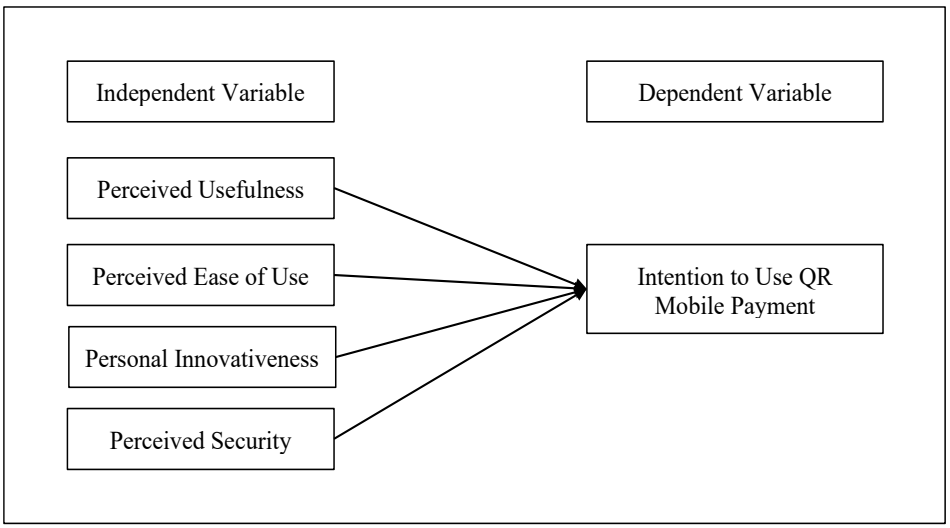

Figure 1. Proposed Framework

3. RESEARCH METHODOLOGY

This study adopted a quantitative research design to examine relationships between variables using numerical data (Creswell & Creswell, 2023). Data were collected via a structured questionnaire comprising demographic items and measures of four independent variables and one dependent variable, using a 5-point Likert scale from strongly disagree (1) to strongly agree (5). The Likert scale is widely recognised for its simplicity and reliability in measuring attitudes and perceptions in technology adoption studies (Rokeman, 2024).

The target population consisted of 6,048 undergraduate students at Universiti Malaysia Kelantan (UMK) from three faculties: Faculty of Entrepreneurship and Business (FKP), Faculty of Hospitality, Tourism and Wellness (FHPK), and Faculty of Data Science and Computing (FSDK). Based on Krejcie and Morgan (1970), a sample size of 400 respondents was deemed sufficient. Convenience sampling was employed due to its practicality and suitability for exploratory research, particularly in identifying patterns and relationships rather than generalising findings (Saunders et al., 2019; Etikan, 2016).

Data were collected via platforms such as WhatsApp and Instagram to ensure efficient reach among digitally active students. A pilot test was conducted to ensure clarity and reliability of the instrument. Data analysis was performed using SPSS version 29, including Cronbach's alpha for reliability and descriptive statistics for respondent profiles. As normality assumptions were not met, Spearman's rho correlation was applied to test hypotheses and examine relationships among variables, which is appropriate for ordinal data in behavioural research (Chan et al., 2020).

4. ANALYSIS AND FINDINGS

The demographic profile provides important context for understanding UMK students' perspectives on QR mobile payments. Of the 400 respondents, 60% were female and 40% male, indicating higher female participation consistent with trends in digital financial adoption. The majority were aged 19–23 (67%), followed by 24–28 (29.3%), reflecting a predominantly young and tech-savvy cohort. Ethnically, respondents represented Malaysia's diversity, with Malays (54.5%) forming the majority, followed by Indians (18.5%), Chinese (17.3%), and others (9.8%). Most respondents were senior students, particularly Year 4 (44.3%), suggesting greater exposure to technology and financial decision-making. Descriptive analysis shows strong acceptance of QR mobile payments, with intention to use recording the highest mean (M = 4.47, SD = 0.499). Personal innovativeness (M = 4.41), perceived usefulness (M = 4.40), and perceived ease of use (M = 4.37) were also rated highly, indicating students' openness and positive evaluation of functionality and usability. However, perceived security scored comparatively lower (M = 4.35), suggesting ongoing concerns regarding data protection and fraud. Overall, UMK students demonstrate favourable attitudes toward QR mobile payments, with security remaining the key area requiring improvement for broader adoption.

Table 1 Result of Reliability of Cronbach's Alpha

Reliability Statistic			
Variables	**Number of Items**	**Cronbach's Alpha**	**Level of Reliability**
Intention to use QR mobile payment	6	.907	Excellent
Perceived Usefulness	5	.743	Acceptable
Perceived Ease of Use	5	.862	Good
Personal Innovative	5	.823	Good
Perceived Security	5	.863	Good

Based on Table 1, the reliability statistics indicate the Cronbach's alpha values obtained from 400 respondents across 26 measurement items. The Cronbach's alpha coefficient for intention to use

QR mobile payment is 0.907, which can be considered excellent. Perceived usefulness recorded a value of 0.743, indicating an acceptable level of reliability. Meanwhile, perceived ease of use (0.862), personal innovativeness (0.823), and perceived security (0.863) demonstrate good levels of internal consistency. According to guidelines, Cronbach's alpha values of 0.70 and above are considered acceptable, values above 0.80 indicate good reliability, and values exceeding 0.90 are regarded as excellent (Cronbach, 1951). Therefore, all constructs in this study meet the recommended threshold, confirming that the measurement items are reliable and suitable for further analysis.

Table 2 Hypothesis Testing

Intention to Use Mobile Payment		
Variables	**Correlation Coefficient (r)**	**p-value**
Perceived Usefulness	0.723	$p < .001$
Perceived Ease of Use	0.454	$p < .001$
Personal Innovative	0.606	$p < .001$
Perceived Security	0.555	$p < .001$

The hypothesis testing results (as shown in Table 2) reveal that all four proposed hypotheses are supported, demonstrating significant relationships between the independent variables and students' intention to adopt QR mobile payments. For H_1, perceived usefulness shows the strongest correlation with intention to use ($r = .723$, $p < .001$), indicating a strong positive relationship. According to guidelines, correlation coefficients ranging from 0.70 to 0.90 are considered strong, 0.40 to 0.69 moderate, and 0.10 to 0.39 weak (Jacob Cohen, 1988). The p-value of less than 0.001 further indicates that the relationship is highly statistically significant, as values below 0.05 are generally considered significant (Fisher, 1925). This confirms that when students perceive QR mobile payments as beneficial and efficient, they are more inclined to adopt the technology. This finding is consistent with recent research highlighting that perceived usefulness is a primary driver of mobile payment adoption, particularly among younger consumers who prioritise convenience and speed (Mat Napis & Daud, 2023; Anwar et al., 2024).

Similarly, H_2 is supported as perceived ease of use exhibits a significant positive relationship with intention to adopt ($r = .454$, $p < .001$), representing a moderate correlation based on the rule of thumb. This suggests that students are more likely to engage with QR payments when they find the process straightforward, user-friendly, and requiring minimal effort, consistent with prior studies on technology adoption behaviour (Lim & Zulkipli, 2023).

H_3 and H_4 are also confirmed, with personal innovativeness ($r = .606$, $p < .001$) and perceived security ($r = .555$, $p < .001$) showing moderate to strong positive relationships with adoption intention. The strong relationship between personal innovativeness and intention highlights the role of innovative students who are eager to try new technologies, thereby accelerating adoption within their peer groups (Senali et al., 2023). Meanwhile, the significant effect of perceived security supports the notion that even among tech-savvy youth, confidence in data safety and fraud protection remains a critical factor in driving adoption (Wang et al., 2024). Although security records the lowest mean, its significant correlation with intention demonstrates that concerns about reliability and protection must still be addressed by fintech providers.

Collectively, the results affirm that usefulness, ease of use, innovativeness, and security are all crucial in shaping UMK students' intention to adopt QR mobile payments, thereby supporting the proposed model and extending evidence from prior studies in the Malaysian context.

5. DISCUSSION

The findings offer important implications for the continued growth of mobile payment systems by highlighting the role of consumer intention in driving QR mobile payment adoption. This study

confirms that perceived usefulness, perceived ease of use, personal innovativeness, and perceived security significantly influence UMK students' intention to use QR mobile payments. These insights are valuable for entrepreneurs and consumers, as QR payments enhance transaction efficiency, speed, and convenience, ultimately improving productivity. As a technology designed to facilitate seamless exchanges between buyers and sellers, QR mobile payments require strong emphasis on functionality, simplicity, user openness, and security. Strengthening these factors can enhance user acceptance and support wider adoption of QR mobile payment systems among UMK students in Pengkalan Chepa.

6. CONCLUSION

This study investigated the determinants of UMK students' intention to adopt QR mobile payments, revealing that perceived usefulness, perceived ease of use, personal innovativeness, and perceived security significantly influence adoption behaviour. The findings suggest that students recognise the benefits of QR payments and are highly willing to integrate them into daily transactions. This aligns with national trends, where e-payment usage has grown substantially, reflecting Malaysia's shift toward a cashless economy and the role of youth as early adopters in the IR4.0 era. Despite the overall positive outlook, perceived security remains a key concern, indicating the need to address issues related to data protection and fraud. Policymakers, financial institutions, and fintech providers should therefore prioritise security, enhance user experience, and promote financial literacy to strengthen user confidence. The strong role of personal innovativeness further highlights students as catalysts for wider technology diffusion.

However, this study is limited by its focus on a single university in Kelantan, which may restrict generalisability due to contextual differences in culture, socioeconomic background, and digital access. The use of convenience sampling and a cross-sectional design also limits broader inference and longitudinal insights. Future research should include multiple institutions, apply probability sampling, and adopt longitudinal approaches while incorporating additional variables such as social influence and lifestyle compatibility. Overall, QR mobile payments play a crucial role in Malaysia's digital transformation by enhancing transaction efficiency, supporting financial inclusion, and advancing the national cashless agenda. Practical implications suggest the need for stronger regulatory frameworks, secure and user-friendly fintech solutions, and increased financial literacy initiatives to encourage sustained adoption among younger generations.

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