Towards a cashless society: examining the adoption of QR mobile payments among university students

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ABSTRACT

In line with the increasing spread of smartphones and the internet, there is a growing trend towards cashless payment via smartphone or mobile payment systems. Electronic payments are gradually replacing traditional cash-based payment methods. Malaysia is among the many nations that have recently started to pay greater attention to quick response (QR) mobile payments. Therefore, the purpose of this research is to examine the factors influencing UMK students' intention to use quick response (QR) mobile payment in Pengkalan Chepa. This study will identify the relationship between the independent variables and dependent variables, namely perceived usefulness, perceived ease of use, personal innovativeness, and perceived security, with the relationship of intention to use QR mobile payment. By using quantitative methodology as the main research instrument of the study, data will be collected through a questionnaire containing five-point Likert scale questions. A total of 400 questionnaires were collected. The quantitative data collected is processed using the SPSS data analysis method. Reliability and validity tests, a descriptive analysis, and a Spearman correlation analysis were performed using the SPSS tools. The result shows the significant relationship between perceived usefulness, perceived ease of use, personal innovativeness, and perceived security with the intention to use QR mobile payment. In conclusion, the results of this study demonstrate that perceived usefulness, perceived ease of use, personal innovativeness, and perceived security significantly influence the intention to use QR mobile payments among university students

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1.   INTRODUCTION

The proliferation of mobile technologies in the last several years has caused a sea change in the way money is transferred. Smartphone payments, which utilise QR codes or QR mobile payments, have gained widespread popularity worldwide as a practicable and prevalent method of payment. These two-dimensional, machine-readable QR codes are used to store data. To swiftly read them, we can use a smartphone or a specialised scanner. QR code was designed by DENSO WAVE, an automotive industry in Japan (Suo et al., 2022). A QR code consists of black squares arranged in a square grid on a white background and serves for many purposes (Tay & Fernandez, 2021). By way of illustration, when we are making a purchase using mobile payments, we scan these various codes (Ibrahim et al., 2019). The rapid advancement of smartphone technology has greatly increased the need for QR codes in the market (Tay & Fernandez, 2021).

In search of better ways to do business, more people switched to contactless payments after COVID-19 (Wisniewski et al., 2024). Because QR code payments are clean and contactless, they have become popular. Additionally, they simplified things for consumers. Using applications to pay using QR codes has become faster and easier, providing a convenient method of making payments. Consumers could make payments more quickly and easily since these applications securely stored their payment information. However, not all businesses use QR codes seamlessly, which creates unequal access. Data security concerns and the necessity of smartphones may also prevent some individuals from utilising them. These problems must be resolved before QR payments are generally accepted by everyone. In line with Malaysia's national aspiration to achieve a 90% cashless society by 2025 (Bank Negara Malaysia, 2022; Wisniewski et al., 2024), understanding the determinants of digital payment adoption has become increasingly important. Prior research highlights the roles of perceived usefulness, perceived ease of use, and security concerns in shaping technology adoption; however, limited studies specifically examine students' intention to use QR code payment systems. Therefore, this study seeks to address this gap by investigating how perceived usefulness, perceived ease of use, personal innovativeness, and perceived security influence students' intention to integrate QR mobile payment into their daily routines. Gaining an understanding of these elements is essential to understanding how student preferences for mobile payments are changing.

2.   LITERATURE REVIEW

2.1   Intention to use QR mobile payment

Consumers' intention to use mobile payments reflects favourable behaviours that they anticipate engaging 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 up to 70% of Malaysians are willing to use mobile payment systems in their daily lives (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 has been defined as the likelihood of performing a specific action (Ajzen, 1991). In mobile payment adoption, intention is influenced by multiple factors, including perceived convenience, trust, and utility (Tan et al., 2019). Among younger consumers such as university students, these drivers are particularly salient, highlighting the need for tailored strategies that address their preferences and concerns.

Recent research highlights the role of social influence and subjective norms in shaping mobile payment intentions. Younger consumers often look to peers and digital communities when deciding whether to adopt financial technologies, with acceptance within social networks serving as a powerful motivator (Mat Napis & Daud, 2023). In addition, institutional support, including government incentives and central bank initiatives, strengthens consumer trust and thereby enhances intention to adopt mobile payment technologies (Bank Negara Malaysia, 2022). Another dimension of intention to use mobile

payments relates to lifestyle compatibility and perceived financial benefits. When consumers view QR payments as seamlessly integrated into their daily routines and associate them with rewards such as cashback or discounts, their intention to adopt increases (Anwar et al., 2024). These findings suggest that beyond system usability and security, contextual factors such as lifestyle alignment, financial incentives, and cultural acceptance are crucial determinants of adoption. Furthermore, emerging literature emphasises the impact of digital literacy and financial education on adoption behaviour. Consumers with higher levels of digital skills and awareness of financial technologies are more confident and willing to engage with mobile payments (Abu Bakar & Ng, 2024). This indicates that efforts to improve financial literacy among students could significantly enhance their intention to adopt QR mobile payments, thereby supporting national goals towards a cashless society.

2.2   Perceived Usefulness

Perceived usefulness refers to a person's perception that using a particular application would increase their productivity at work while also offering advanced features that offer remarkable flexibility (Lim & Zulkipli, 2023). As an individual's perceived usefulness of a given technology increases, their intentions to use the technology also increase. Individuals desire to use a system if they view it to be useful and enables quick, speedy, and convenient transactions (Senali et al., 2023). In fact, smartphone apps often offer unique ways to earn rewards and receive receipts, making them easier to use. Other than that, there are several variables that influence the existence of perceived usefulness, such as consumer experience, satisfaction, and the amount of time spent using the application (Ibrahim et al., 2019). Many previous studies have examined the relationship between perceived usefulness and intention. As a result, one of the most studied variables in mobile payment adoption is perceived utility. Many studies on mobile payment have empirically proven a positive relationship between the two constructs (Ibrahim et al., 2019).

2.3   Perceived Ease of Use

Perceived ease of use refers to a person's belief that using a specific technology will be effortless (Sariyon et al., 2020). Consumer trust can be earned if there is a user-friendly combination and an outstanding guide on how to use mobile payment practices, and by demonstrating the competency and friendliness of the service providers (Majercakova & Gregus, 2021). There is also a perspective on operating a technology with the fewest number of efforts. Consumer acceptance of a system can be measured by ease of use. When a system is judged to be simple to use, people are more likely to use it. There is a substantial positive relationship found between perceived ease of use and consumers ' intention to use mobile payments in China (Ibrahim et al., 2019). It was determined that perceived ease of use and technology usage intention have a substantial relationship in various cultures and consumer reactions (Majercakova & Gregus, 2021).

2.4   Personal Innovative

Personal innovation is defined as "an individual's willingness to try out any new information technology" (Ibrahim et al., 2019). Individuals who are innovative are more willing to embrace and adapt new technologies than those who are not (Lui et al., 2021). Furthermore, individuals with greater personal innovativeness are more receptive to change and are more likely to take risks with new technology. Therefore, it can verify this theory by noticing that more innovative individuals tend to accept bigger risks. There is a substantial positive relationship found between personal innovation and QR mobile payments in a study done in Spain. This finding is consistent with previous research on mobile payment (Ibrahim et al., 2019).

2.5   Perceived Security

Perceived security is the sense of protection from risks associated with mobile payments, including the possibility of losing personal data and suffering financial losses (Ibrahim et al., 2019). Following the rapid evolution of technology and e-commerce offers, security is becoming a growing concern in the platform ecosystem (Lai & Liew, 2021). It is about how mobile payment systems protect consumers' payment information. If the perceived security risk, such as the feeling of being reliable, secure, and unthreatened, is greater than with previous payment methods, people are generally more willing to accept a new payment alternative. Since the interactions when paying with QR codes are not physical, it is easy for consumers to question the security of this type of payment instrument in many ways (Chang et al., 2021). Perceived security is the strongest predictor of consumers' intention to use mobile payment in Qatar. These findings are similar to previous research on mobile payment adoption, which shows that perceived security has a substantial positive relationship with intention to use mobile payment.

2.6   Hypotheses Development

The following hypotheses were refined and derived from the following literature review.

H1: Perceived usefulness significantly influences intention to adopt QR mobile payments.

Perceived usefulness reflects the extent to which individuals believe that using mobile payments will improve the efficiency and convenience of their daily transactions. Recent research highlights that usefulness significantly increases adoption intention, particularly when consumers perceive tangible benefits such as faster transactions and time savings (Mat Napis & Daud, 2023; Anwar et al., 2024).

H2: Perceived ease of use significantly influences intention to adopt QR mobile payments.

A system that requires minimal effort to use increases acceptance and adoption (Hajazi et al., 2021). Current studies emphasise that user-friendly mobile applications significantly boost students' adoption of QR payments (Mat Napis & Daud, 2023).

H3: Personal innovation significantly influences intention to adopt QR mobile payments.

Individuals with higher innovativeness are more open to trying new technologies and demonstrate stronger adoption intentions (Ashrafi & Easmin, 2023). Recent research confirms that personal innovation is positively related to mobile payment adoption among young consumers (Senali et al., 2023).

H4: Perceived security significantly influences intention to adopt QR mobile payments.

Security remains a central concern for consumers when engaging in digital financial transactions (Lai & Liew, 2021). Recent studies report that perceived security significantly influences consumers' trust and willingness to adopt QR mobile payments (Wang et al., 2024).

Based on the proposed hypotheses, a framework was developed to illustrate the relationships among variables. The framework provides a structured representation of how these key factors interact to shape behavioural intention, thereby guiding the empirical analysis of this study.
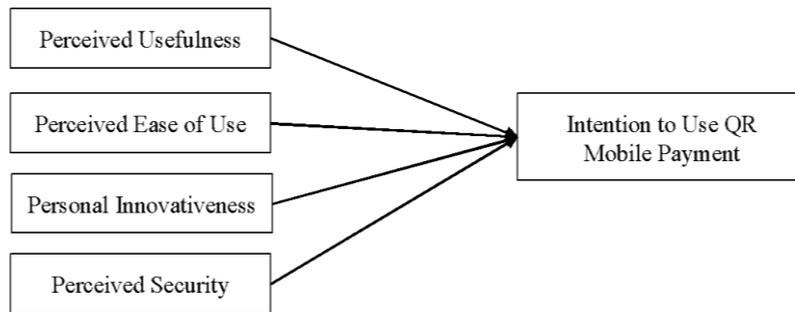
Fig. 1. The Research Model

## 3.	RESEARCH METHODOLOGY

This study employed a quantitative research design, which is commonly used in behavioural and social science research to objectively measure relationships between variables through numerical data (Creswell & Creswell, 2023). Data were collected using a structured questionnaire consisting of demographic questions and items measuring the four independent constructs and the dependent variable on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The Likert scale is widely adopted for measuring attitudes and perceptions in technology adoption studies due to its simplicity and reliability (Rokeman, 2024). The target population comprised 6,048 undergraduate students enrolled at Universiti Malaysia Kelantan (UMK), spanning three faculties: Entrepreneurship and Business (FKP), Hospitality, Tourism and Wellness (FHPK), and Data Science (FSDK). Referring to Krejcie and Morgan's (1970) sample size table, 400 respondents were deemed adequate to represent the population. A non-probability sampling technique, specifically convenience sampling, was applied to ensure practical accessibility of respondents, which is appropriate for exploratory technology adoption research (Etikan, 2016).

Data collection was conducted online through widely used platforms such as WhatsApp and Instagram, ensuring broader reach and efficiency in engaging students who are already accustomed to digital interactions. The instrument was pilot tested to confirm the clarity and reliability of the items before full distribution. For data analysis, SPSS version 29 was utilised. Reliability analysis using Cronbach's alpha was performed to test internal consistency, while descriptive statistics summarised respondent profiles. As the data did not meet normality assumptions, non-parametric Spearman correlation analysis was used to test hypotheses and determine the strength of relationships among constructs. The application of Spearman correlation analysis is particularly useful in behavioural studies involving ordinal data, making it an appropriate technique for examining relationships in mobile payment adoption research (Chan, Yong, & Harmizi, 2020). These methods together ensure both rigour and reliability in interpreting the factors influencing students' intentions to adopt QR mobile payments

## 4.	ANALYSIS AND FINDINGS

Understanding the perspectives of UMK students regarding QR mobile payments requires a significant amount of background, which is provided by the demographic profile. Among 400 responses, 60% were female, and 40% were male. This indicates enhanced female participation in the study sample, aligning with previous research that demonstrates women's growing involvement with digital financial platforms. Age distribution revealed that most respondents (67%) were between 19 and 23 years old, followed by 29.3% between 24 and 28 years, while only a small minority were older than 29 years. This reflects a predominantly young population, aligning with Malaysia's broader demographic of tech-savvy youth who are often the earliest adopters of financial innovations. Ethnically, the respondents mirrored Malaysia's

multicultural society, with Malays forming the majority at 54.5%, followed by Indians (18.5%), Chinese (17.3%), and others (9.8%). Academic year distribution showed that senior students were most represented, with 44.3% from Year 4, followed by Year 3 (28%), Year 2 (17%), and Year 1 (10.8%). The dominance of final-year students suggests that many respondents had greater exposure to technology use and financial decision-making maturity.

The study further enriches this demographic analysis by illustrating respondents' perceptions through mean and standard deviation scores. The intention to use QR mobile payments recorded the highest mean (M = 4.47, SD = 0.499), reflecting a strong willingness among students to adopt cashless payment systems. Among the independent variables, personal innovativeness was also rated highly (M = 4.41, SD = 0.444), showing students' openness to experimenting with new technologies. Perceived usefulness (M = 4.40, SD = 0.409) and perceived ease of use (M = 4.37, SD = 0.458) further emphasise that students value QR payments for their practicality and simplicity. However, perceived security scored comparatively lower (M = 4.35, SD = 0.517), indicating lingering concerns about data safety and fraud prevention. In general, the findings indicate that students at UMK, who are primarily junior and more senior students, have favourable opinions towards QR mobile payments. The main aspect that requires improvement to achieve wider adoption is security.

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	0.907	Excellent
Perceived Usefulness	5	0.743	Acceptable
Perceived Ease of Use	5	0.862	Good
Personal Innovative	5	0.823	Good
Perceived Security	5	0.863	Good

Based on Table 1, the reliability statistics showed the value of Cronbach's Alpha for the entire data obtained after the researcher conducted a review of 400 respondents with 26 question items. The coefficient Alpha for intention to use QR mobile payment showed an excellent coefficient value of 0.907 for intention to use QR mobile payment. Perceived utility showed an acceptable coefficient value of 0.743. Hence, perceived ease of use, personal innovation and perceived security, Cronbach's alpha are 0.862, 0.823, 0.863, which can be measured as a good coefficient value.

The hypothesis testing results presented revealed that all four proposed hypotheses were supported, demonstrating significant relationships between the independent variables and students' intention to adopt QR mobile payments. For H1, perceived usefulness showed the strongest correlation with intention to use (r = .723, p < .001), confirming 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, H2 was supported as perceived ease of use exhibited a significant positive relationship with intention to adopt (r = .454, p < .001). This suggests that students are more likely to engage with QR payments when they find the process straightforward, user-friendly, and requiring minimal effort, a result that aligns with prior studies on technology adoption behaviour (Lim & Zulkipli, 2023).

H3 and H4 were also confirmed, with personal innovation (r = .606, p < .001) and perceived security (r = .555, p < .001) significantly influencing adoption intention. The strong relationship between personal innovation and intention highlights the role of innovative students who are eager to try out 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, Hamamurad, & Jusoh, 2024). Although security scored 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.

Table 2: Summary of Hypothesis Testing (Spearman Correlation Analysis)

Relationship	Correlation Coefficient (r)	Significance (p-value)	Remarks
H1: Perceived Usefulness → Intention to Use	0.723	< 0.001	Supported
H2: Perceived Ease of Use → Intention to Use	0.454	< 0.001	Supported
H3: Personal Innovative → Intention to Use	0.606	< 0.001	Supported
H4: Perceived Security → Intention to Use	0.555	< 0.001	Supported

5.   DISCUSSIONS

This study confirms that perceived usefulness, perceived ease of use, personal innovativeness, and perceived security significantly influence university students' intention to adopt QR mobile payments. The strong effect of perceived usefulness aligns with the Technology Acceptance Model, which emphasises that users adopt technology when it enhances efficiency and performance (Chuah et al., 2024; Tee et al., 2024), consistent with mobile payment studies among Malaysian youth (Ibrahim et al., 2019; Mat Napis & Daud, 2023). These groups frequently engage in fast-paced transactions such as food purchases and online shopping, and may perceive QR payments as time-saving and convenient. Perceived ease of use also significantly predicted intention, supporting prior research that highlights simplicity and user-friendly interfaces as key drivers of digital payment adoption (Hajazi et al., 2021; Lim & Zulkipli, 2023). With seamless navigation, minimal transaction steps, and an intuitive design reduce cognitive effort, making QR mobile payments more appealing among Generation Z users. The significance of personal innovation indicates that students who are more open to trying new technologies are more inclined to adopt QR payments, which echoes findings from innovation adoption research and youth-focused fintech studies (Senali et al., 2023). University environments often encourage experimentation with emerging technologies, positioning innovative students who can accelerate and highlighting the strategic role of youth in advancing Malaysia's transition towards a cashless society. Additionally, perceived security was found to significantly influence intention, reinforcing earlier evidence that trust, privacy, and fraud protection remain critical considerations in mobile financial services (Lai & Liew, 2021; Chang et al., 2021). Although security concerns persist, the positive relationship suggests growing confidence in QR payment systems among digitally literate students. Although perceived security recorded a slightly lower mean score compared to other variables, its significant relationship with intention indicates that students remain cautious about financial data protection. Compared to earlier studies where security acted as a barrier, the present findings suggest that while confidence in QR payment systems is improving, perceived risk still plays a decisive role in adoption decisions.

Overall, the findings are largely consistent with previous technology adoption literature, confirming that functional benefits, ease of use, individual innovativeness, and perceived safety collectively shape digital payment intentions. Minor differences in the strength of relationships compared to other studies may be attributed to the homogenous sample of university students, who typically demonstrate higher digital exposure and familiarity with fintech platforms. Despite its contributions, this study has several limitations. The sample was limited to students from a single university, limiting generalisability to broader populations. The use of convenience sampling may also introduce selection bias (Etikan et al., 2016). Furthermore, the cross-sectional design captures intention at only one point in time and does not reflect changes in behaviour over time. Future research should include more diverse demographic groups, apply probability sampling techniques, and consider longitudinal designs to better understand evolving digital payment adoption patterns.

QR mobile payments hold clear significance in Malaysia's digital transformation. They offer fast and efficient alternatives to cash, promote financial inclusion through accessibility, and align with the nation's digital economy agenda by enhancing transparency, efficiency, and innovation in financial services. These findings also carry practical implications: policymakers should strengthen regulatory frameworks to build consumer trust; fintech developers must prioritise user-friendly, secure, and innovative solutions; and universities should embed financial literacy initiatives that encourage adoption. In the era of IR4.0, such activities will collectively contribute to a cashless society that is secure, inclusive, and driven by innovation. This will be accomplished by encouraging increased adoption among younger generations.

6.   CONCLUSION

This study examined the factors influencing UMK students' intention to adopt QR mobile payments and found that perceived usefulness, perceived ease of use, personal innovativeness, and perceived security significantly shape adoption behaviour. The findings indicate that students not only recognise the benefits of QR payments but also show a strong willingness to integrate them into daily life. This reflects broader national trends, where Bank Negara Malaysia (2022) reported a 30% increase in e-payment transactions in 2021 compared to the previous year, underscoring Malaysia's rapid progress towards a cashless economy. Within the context of the Fourth Industrial Revolution (IR4.0), digital payments are positioned as a key enabler of financial innovation and consumer digitalisation, with youth playing a pivotal role as early adopters. The adoption of QR payments demonstrates evolving consumer behaviour, marked by growing preferences for convenience, security, and contactless interactions.

The results further highlight the importance of addressing perceived security, as concerns over data safety and fraud remain barriers despite overall positive adoption intentions. Policymakers, financial institutions, and fintech providers must prioritise security enhancements, improve consumer experience, and promote financial literacy among students to strengthen confidence in QR systems. The strong influence of personal innovation also indicates that early adopters can accelerate diffusion among peers, making students an essential driver of Malaysia's transition to cashless transactions and advancing the national vision of achieving a 90% cashless society by 2025.

This study, however, has several limitations. The sample was restricted to one university, limiting generalisability across Malaysia's diverse higher education sector. The use of non-probability sampling may have introduced bias, and the cross-sectional design precludes capturing long-term behavioural patterns. Future research should extend the sample to multiple institutions, adopt probability sampling, and use longitudinal approaches to assess evolving adoption trends. Incorporating additional factors such as social influence, rewards, and lifestyle compatibility could further enhance explanatory power.

QR mobile payments hold clear significance in Malaysia's digital transformation. They offer fast and efficient alternatives to cash, promote financial inclusion through accessibility, and align with the nation's digital economy agenda by enhancing transparency, efficiency, and innovation in financial services. These findings also carry practical implications: policymakers should strengthen regulatory frameworks to build consumer trust; fintech developers must prioritise user-friendly, secure, and innovative solutions; and universities should embed financial literacy initiatives that encourage adoption. In the era of IR4.0, such activities will collectively contribute to a cashless society that is secure, inclusive, and driven by innovation. This will be accomplished by encouraging increased adoption among younger generations.

7.   CONTRIBUTION OF AUTHORS

Both authors contributed significantly to the study. The first author led the data collection, analysis, and manuscript drafting, while the second author provided supervision, conceptual guidance, and critical revisions to the final manuscript.

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9. CONFLICT OF INTEREST STATEMENT

The authors state there is no conflict of interest regarding the publication of this paper. The research was conducted independently without any financial or commercial influence.

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