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THE MOBILE TECHNOLOGY ACCEPTANCE MODEL: ORIGINS, STRENGTHS, AND APPLICATIONS IN CROSS-BORDER QR PAYMENTS

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Abstract: *The Mobile Technology Acceptance Model (MTAM) provides a valuable framework for understanding the use of QR mobile payments across borders, particularly in tourism and international transactions. This study explores the origins, strengths and applications of MTAM, highlighting its relevance in addressing key challenges in mobile payment adoption. Although QR-based payments offer a convenient and efficient method for financial transactions, their adoption is hindered by regulatory inconsistencies, security concerns, interoperability issues and consumer awareness gaps. This research categorizes these barriers and emphasizes the importance of harmonizing international financial regulations, improving the connectivity of payment systems, and increasing consumer trust to facilitate widespread adoption. The study also discusses how fluctuating exchange rates and high transaction costs impact the efficiency of cross-border payments. The findings suggest that advanced security measures, AI-driven fraud detection, and blockchain integration can significantly improve the reliability and trustworthiness of QR-based mobile payments. Future research should highlight the need for future research on AI-driven fraud detection, blockchain integration and comparative studies across different cultural and economic landscapes to improve trust and security in cross-border mobile transactions.*

Keywords: *Mobile Technology Acceptance Model and QR Payments,*

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Introduction

The main objective of this paper is to explore the Mobile Technology Acceptance Model (MTAM) and analyze its relevance in the application of QR mobile payments, specialized in a cross-border context. Mobile payments have become essential for facilitating seamless international transactions in the growing globalization of digital finance. Mobile payments via QR applications are highly relevant for international payment transactions as they make cashless and seamless payments easier, especially for tourists, travellers, retailers in the destination country and etc. QR mobile payments are fast and convenient for users when making transactions. On the other hand, the rise of mobile wallets in financial technology has revolutionised consumer transactions globally, presenting eco-friendly, secure, faster and convenient payment alternative (Hopalı et al., 2022). According to Statista (2024), the global cross-border digital payment market is expected to exceed USD 290 billion by 2027. This means that cross-border digital payments have a high demand rate. However, there are still many users who accept payments in cash or while abroad, and the adoption rate among outbound tourists from Malaysia is still low.

Technically, mobile payment systems have transformed global commerce by offering convenient and cost-effective payment solutions Chatterjee (2023) specialized in QR-based payments, in particular, have gained traction in many countries due to their simplicity and the widespread use of smartphones. According to the Deepalakshmi Manickam (2025), Malaysia has emerged as the second-highest user of QR (quick-response) codes globally, trailing only behind China, reflecting the nation's rapid move towards a cashless society. However, when transactions cross national borders, users face challenges such as exchange rate fluctuations, cybersecurity threats, financial regulations, and interoperability issues (Sharma et al. 2023; Santi and Chalid, 2024). Besides that, as QR payments continue to dominate the digital landscape adopting QR-based mobile payments across different countries faces several challenges, including security concerns, regulatory inconsistencies and infrastructure limitations. This paper aims to provide a theoretical perspective on the strengths of MTAM in understanding and improving the acceptance of QR mobile payments internationally. Understanding the factors that influence the adoption of mobile payments through a theoretical lens such as MTAM is essential for financial institutions, regulators, and technology providers who want to improve the usability and security of digital transactions. The Theory of Technology Acceptance Model (TAM) or the Unified Theory of Acceptance and Use of Technology (UTAUT) theory has been dominant in previous studies on mobile payment adoption Latif et al. (2025). However, these theories have different designs and less focus on mobile-specific contexts. In contrast, the Mobile Technology Acceptance Model (MTAM) was developed to capture the characteristics of mobile usage. However, few studies have applied MTAM in research on cross-border QR payment settings, highlighting a significant research gap.

To address this issue, this paper focuses on the application of the Mobile Technology Acceptance Model in the context of cross-border QR mobile payments. It explores why the Mobile Technology Acceptance Model is more suitable compared to well-known theories such as TAM and UTAUT, which have dominated the technology context. The paper also examines the strengths and weaknesses of MTAM in the adoption of cross-border QR payments. By addressing these issues, it aims to provide a clear understanding and information on how the Mobile Technology Acceptance Model works and can serve as a guide for researchers in the mobile payment ecosystem.

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Literature Review

The use of mobile payment systems has skyrocketed, driven by advances in digital technology and the increasing need for convenient, secure and efficient transaction methods (Venkatesh et al., 2016). Understanding the factors influencing consumer behaviour towards mobile payments is essential for financial institutions, policymakers and technology developers. Various theoretical models have been developed to explain user acceptance of technology, with the Technology Acceptance Model (TAM) being one of the most widely used frameworks in information systems research (Davis, 1989).

Several studies have explored how consumers perceive and interact with mobile payment systems, identifying key factors such as trust, ease of use, perceived usefulness and security as essential acceptance determinants (Zhou, 2011; Tian and Chan, 2024; Yamin and Abdalatif, 2024) these models were initially designed to explored how consumers interact with mobile payment systems. They did not fully consider the unique characteristics of the mobile payment environment, such as mobility, real time transactions and regulatory concerns.

The evolution of technology acceptance models, leading to the development of the Mobile Technology Acceptance Model (MTAM), which addresses the specific needs of mobile users and provides a more comprehensive framework for studying the acceptance of QR-based payments.

The Evolution of TAM, TAM 2, and TAM 3

Davis introduced the Technology Acceptance Model (TAM) in 1986 to explain why people accept new technologies, focusing on two main factors: the perceived usefulness of the technology (Perceived Usefulness, PU) and the perceived ease of use (Perceived Ease of Use, PEOU). However, TAM has some limitations. It assumes that users make decisions based only on perceived usefulness and ease of use, ignoring other important factors such as social influence, system quality and experience.

Later, Venkatesh and Davis (2000) improved the TAM by adding a new factor, creating TAM 2 by including the factor of social influence, which means that people can use technology because others around them do. Venkatesh and Davis also added to the work relationship, suggesting that people are more likely to use technology if it helps them in their work. However, TAM2 still has some limitations as it is primarily focused on workplace use, making it less applicable to consumer-based technologies such as mobile payments (Venkatesh et al., 2000).

Venkatesh and Baladeveloped TAM 3 in 2008 by adding more details on how users build confidence in using new technologies. TAM 3 is useful for studying mobile payments because it includes both personal factors and external influences that influence user acceptance, such as computer skills, enjoyment, and external support (Venkatesh & Bala, 2008).

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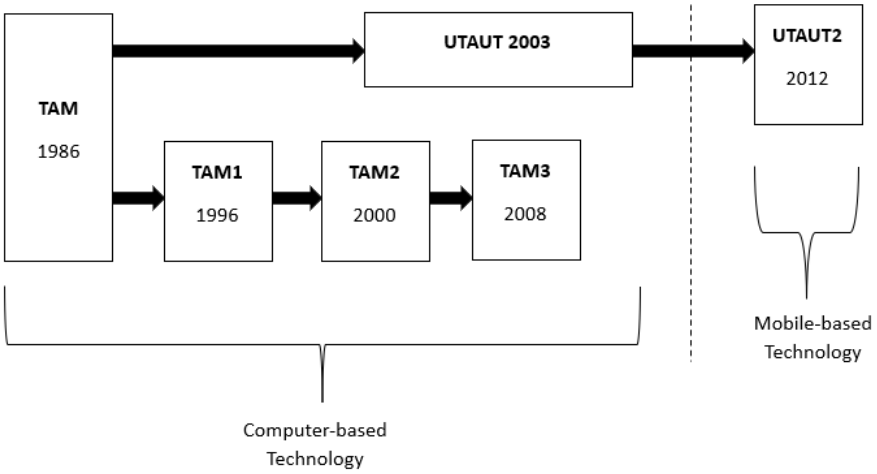

Source: *(Dwiyana Putra, 2019)*

Figure 1: The evolution of technology acceptance model (TAM)

Origin and Transition to MTAM

MTAM was produced by (Ooi & Tan, 2016a) to overcome the shortcomings of the technology acceptance model, which focuses on technology within regulatory content (Elsotouhy et al., 2023). 'Mobile Technology Acceptance Model' (MTAM), which consists of Mobile Usefulness (MU) and Mobile Ease of Use (MOEU) based on the most relevant mobile technology literature (Ooi & Tan, 2016a) based on the Figure 2.

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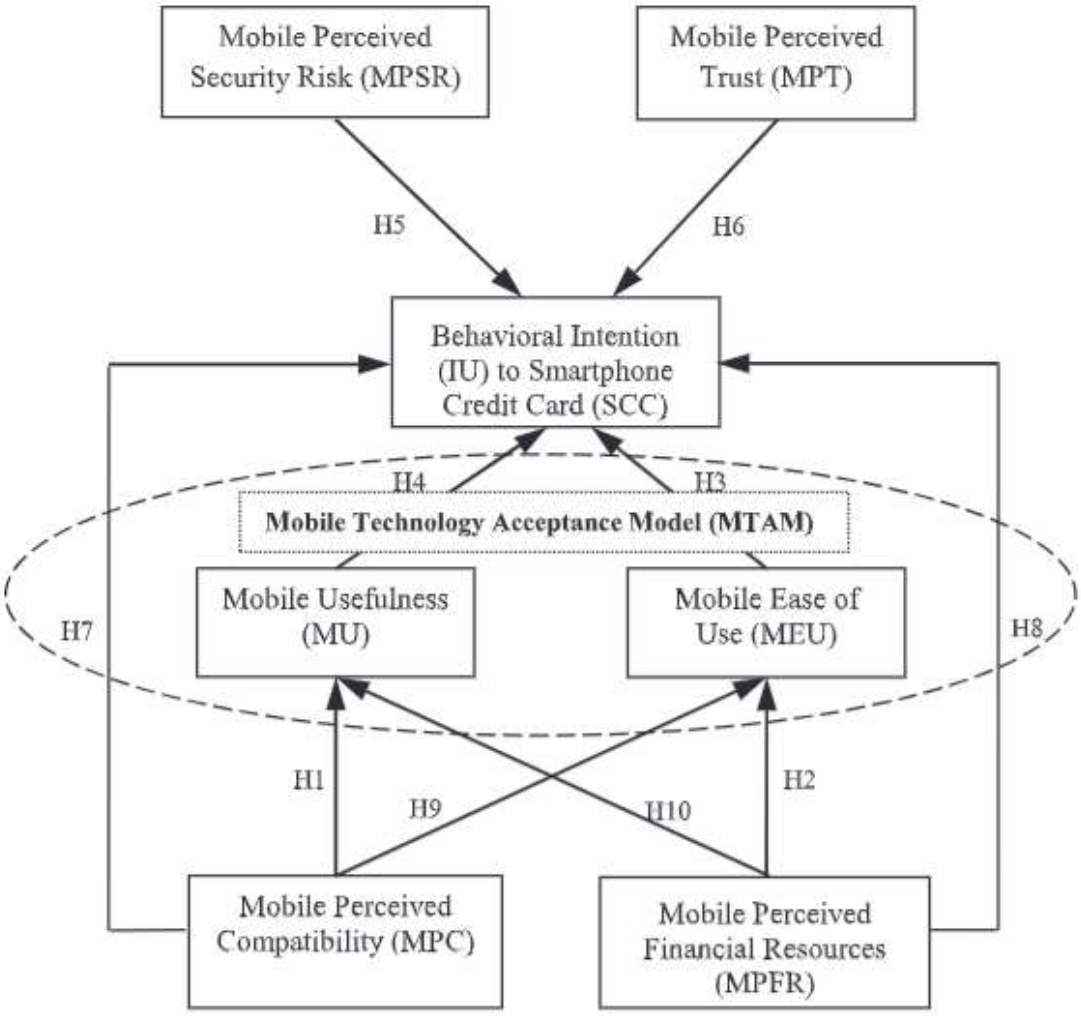

Source (Ooi & Tan, 2016)

Figure 2: Main component of Mobile Technology Acceptance Model (MTAM)

Adding important factors related to mobile such as mobility, accessibility and connection speed, MTAM builds on TAM 3 and focuses specifically on mobile technology. The key elements in MTAM are Security and Trust where users need to feel secure when making transactions in the context of mobile payments. The theory may also help explain why people accept or reject mobile payments based on how safe and reliable they believe the system is.

The Mobile Technology Acceptance Model (MTAM) in the context of payment systems can help understand the factors that influence the use of mobile technology due to the basic theory of technology acceptance, which has evolved to accommodate the unique characteristics of mobile technology.

Application of MTAM in QR Payments

The COVID-19 pandemic has increased consumer awareness of cleanliness and security, leading to increased adoption of mobile payment technology. This has made the MTAM App in cross-border QR mobile payments relevant, enabling businesses operating in cross-border markets to use QR cross-border payments to ensure settlement. Their mobile payments are not only convenient but also considered safe. The shift in consumer behaviour dictates the need for

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payment providers to improve their security measures and communicate them effectively to consumers, promoting trust and acceptance (Rawat et al., 2024). On the other hand, technology has made life easier and decreased the likelihood of human error, which is one of the most well-known advantages it has brought to society (Lee et al., 2025). Mobile payment solutions have become widely accepted across national borders, providing a flexible and effective substitute for traditional payment methods (Prasetyo et al., 2025).

Mobile Technology Acceptance Model (MTAM) theory is suitable for application in QR Mobile Payments, as it includes core constructs such as Mobile Usefulness (MU) and Mobile Ease of Use (MEOU), and is designed specifically for mobile technology contexts (Ooi & Tan, 2016a). One of the reasons why MTAM is more suitable than TAM and UTAUT in this context is because this theory is tailored for mobile settings. One of the most influential frameworks in this space is the Technology Acceptance Model (TAM) in technological advancements (Latif et al., 2025). Other well-known theories, such as TAM and UTAUT, do not specifically focus on mobile settings. The TAM theory focuses on two critical factors such as perceived usefulness (PU) and perceived ease of use (PEOU) Latif et al. (2025) in which referred to the extent to which a user believed the technology enhanced performance (Prasetyo et al., 2025).

Originally, TAM theory was designed to explain general computer systems, such as office IT systems which measured how easily users could learn and operate the system (Davis et al., 1989). Even though TAM effectively explains early-stage adoption, previous studies have identified several limitations in applying it to complex digital environments like mobile payments (Prasetyo et al., 2025). Especially when involved in foreign exchange transactions that include charges and exchange rates, this TAM theory is not suitable to explain in the context of mobile payment. Another limitation was TAM's inability to fully capture trust and security concerns, which played a crucial role in digital financial transactions (Prasetyo et al., 2025).

Besides that, the other models, such as the UTAUT theory model, have too many constructs, such as performance expectancy, effort expectancy, social influence, facilitating conditions, habit, etc. (Venkatesh et al., 2016). So, these theory models are too complicated when applied to cross-border QR payment settings. By only focusing on two main variables, such as mobile usefulness and mobile ease of use, this can make this study become more practical. Other than that, MTAM theory is more suitable in the context of mobile technology because it can be extended to handle real problems or issues of cross-border payment, such as fraud and data privacy, by integrating with interoperability, accessibility, trust, and risk, as highlighted in the ASEAN issues report. This makes the MTAM theory more relevant in the context of cross-border QR payments. When applied to QR-based cross-border payments, MTAM helps explain why some consumers are ready to adopt mobile payments. In conclusion, MTAM is more suitable than TAM/UTAUT because of its features that focus on mobile technology, making it more relevant and more flexible to handle real-time problems in the international context.

Methodology

This study uses a conceptual research approach, synthesizing existing literature on MTAM, mobile payment usage, and QR-based cross-border transactions to identify the key factors influencing mobile payment adoption such as Origins of MTAM, Strengths of MTAM, Applications of MTAM. This study uses keywords such as “Mobile Technology Acceptance Model (MTAM),” “mobile payment adoption,” “QR payments,” and “cross-border mobile payments” were used in various combinations, and this paper only focuses on articles that

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directly discuss mobile payment adoption. Technology acceptance model, UTAUT model, and MTAM model for review purposes. The purpose of this paper is to highlight the origins, strengths, and applications of the Mobile Technology Acceptance Model (MTAM) in the context of cross-border QR mobile payment adoption. Future studies should empirically validate these insights using quantitative methods such as Partial Least Squares Structural Equation Modeling (PLS-SEM) or large-scale multi-country surveys. This would enable more robust testing of MTAM's predictive power across different cultural and regulatory settings.

Results

The Mobile Technology Acceptance Model serves to understand the factors that influence the use of QR payment systems in a cross-border context because it is very complete for analyzing user behavior. By integrating constructs such as perceived usefulness, perceived ease of use, and cross-border payments continue to evolve, leveraging insights from MTAM will be important for stakeholders aiming to increase user acceptance and facilitate widespread adoption of mobile payment technology.

Discussion

The Mobile Technology Acceptance Model (MTAM) provides a theoretical framework for understanding and increasing the use of QR payments in cross-border digital transactions. Although mobile payments offer convenience, consumers still face security risks, regulatory inconsistencies and consumer awareness challenges. Addressing these challenges is essential to increase trust and acceptance across different regions.

One of the main barriers to mobile payment adoption is security and trust. Consumers are often concerned about data breaches, identity theft and fraud in digital payment systems. Studies have shown that strengthening encryption protocols, fraud detection mechanisms, and identity verification systems can increase trust in QR-based payments (Yamin & Abdalatif, 2024). In addition, blockchain technology and AI-driven fraud detection can improve transaction security by reducing the risks associated with unauthorized transactions (Olubusola Odeyemi et al., 2024).

Another critical challenge is harmonizing regulations across different countries some other countries haven't fully switched to digital payments yet (Mansour, 2022). Many jurisdictions have varying financial compliance laws, complicating cross-border mobile transactions. Aligning financial policies and international compliance standards can facilitate the integration of QR payments and reduce barriers for businesses and consumers.

Furthermore, specific problem is travellers have to bear high cost including cost of currency exchange such as high service fees and less favourable exchange rates at foreign exchange counters (Sharma et al., 2023). By using cross-border QR mobile payment can be a good alternative payment method due to this payment can be more cheap compare to other payment method. Addressing these challenges through increased security, regulatory harmonization and high cost including cost of currency exchange can make MTAM a valuable model for improving QR-based cross-border digital transactions.

Conclusion

This concept paper underscores the significance of Mobile Technology Acceptance Model (MTAM) in comprehending cross-border QR payments. The research findings indicate that while QR payments offer convenience and efficiency, their adoption is influenced by security

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concerns, regulatory policies, and consumer trust. The paper also discusses the evolution of TAM, TAM 2, and TAM3, as well as the beginning of the MTAM theory. MTAM addresses the limitations of TAM and UTAUT models by focusing on mobile usefulness and ease of use, particularly in the context of QR payments. Understanding the role of MTAM in the global digital economy can provide valuable insights for further exploration in cross-border QR mobile payments. Future research should explore the empirical validation of MTAM in diverse economic contexts and investigate the role of AI-driven fraud detection, blockchain and digital identity verification in improving the security of mobile payments. Collaboration between governments, financial institutions and technology providers will create a seamless and trusted global mobile payment ecosystem.

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