International Journal of Finance, Economics and Business

Vol. 3, No. 4, December 2024, pp.279-285 © 2024 SRN Intellectual Resources

Original Article

e-ISSN: 2948-3883 DOI: 10.56225/ijfeb.v3i4.403

Adoption of QR Code-Based Payment Systems in Malaysia: A Study on the Utilization of Mobile Banking Among Smartphone Users

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Citations: Rafi, F.W., Yazid, Z.E., Hussain, N.F.M., & Saputra, J. (2024). Adoption of QR Code-Based Payment Systems in Malaysia: A Study on the Utilization of Mobile Banking Among Smartphone Users. *International Journal of Finance, Economics and Business*, 3(4), 279-285.

Received: 26 July 2024 Revised: 8 September 2024 Accepted: 9 December 2024 Published: 31 December 2024

Abstract: The rapid growth of digital transactions and the increasing prevalence of mobile banking (Mbanking) necessitate a comprehensive understanding of the factors influencing the adoption of QR codebased payment systems. This study seeks to identify utilization of M-banking through QR code technology among Malaysian smartphone users with access to M-banking applications, encompassing a diverse demographic across Malaysia, from Perlis to Sabah. Employing a quantitative approach, the study collects data through an online survey distributed via Google Forms to 200 Malaysian smartphone users. The findings reveal that the sample is predominantly composed of younger, single individuals, many of whom are students or hold advanced educational qualifications. The respondents represent a wide range of income levels and geographic locations, providing a comprehensive view of the Malaysian mobile banking user base. Additionally, the study identifies that established market leaders, such as Maybank and CIMB, continue to dominate Malaysia's digital banking sector, while Islamic banks exhibit moderate growth potential. The remarkably low rate of non-users highlights the increasing integration of mobile banking into everyday financial practices within Malaysian society.

Keywords: Mobile Banking (M-Banking); QR Code Adoption; Technology Acceptance; Digital Financial Services; User Behavior in Fintech.



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1. Introduction

Back in the old days, there were only traditional banks that mean to conduct daily banking transactions. However, a new aspect of banking services—mobile banking—has evolved within the banking industry because of the technological advancements made in mobile phones and the emergence of various wireless communication technologies (Mallat et al., 2004). "A channel whereby the user interacts with a bank via mobile devices, such as phones or Personal Digital Assistants (PDAs)" is the definition of mobile banking, sometimes referred to as "m-banking" or "sms-banking" (Tiwari et al., 2007). Thanks to mobile banking services, consumers may now use their phones anywhere and at any time to manage their own accounts, send and receive money transfers, receive alerts through text messages, and even pay bills (Wang et al., 2006). With so much functionality and so many advantages, thus it is not surprising that m-banking has become one of the most typical applications around mobile commerce.

Tiwari et al. (2007) has drawn the differences between electronic banking (e-banking) and mobile banking (m-banking) in terms of prefix of 'e' and 'm'. The authors further illustrate that electronic banking is associated with 'anytime accesses, whilst mobile banking offers both 'anytime and anywhere accesses. Tan et al. (2011) on the other hand, has associated the prefix of 'm' to any wireless internet (WiFi) that takes place between people. Despite of the differences that can be seen, the benefits of mobile banking can also be viewed in terms of ubiquity, flexibility and mobility (Sulaiman et al., 2007). Subsequently, banks have prioritized the implementation of mobile banking services as a way to enhance customer service quality, reduce their operating expenses differentiate their products, generate additional revenue (Tiwari et al., 2007), and reach out to customers who are 'unbanked'. Tiwari et al. (2007) predicted that mobile phonebased financial transactions would continue to rise in growth, surpassing the volume of transactions made through traditional banking channels like retail, ATM, and online banking. Even so, despite the previous researcher has studied that the mobile banking would surpass beyond its par, recent views suggested that the adoption of m-banking is still very much at the infancy stage where the uptake of using it is still under consideration to few generations. According to Wang et al. (2006) reported that the adoption of m-baking rate remains low even within the established markets. Mallat et al. (2004) for example explained how some American banks were forced to terminate their m-banking services due to users' shortage and supports. Likewise, the m-banking transaction levels in Malaysia were reported low despite the high mobile phone's penetration rate (Malaysia Communication and Multimedia Commission (MCMC), 2010).

Taking into consideration on regards the high investments and quite an amount of bills that might have been spent to develop the IT infrastructure in introducing m-banking (Wang et al., 2006), it is important for users are adopting to the new system introduced. Many studies have been conducted regarding the uptake of mobile banking (Wang et al., 2006), but emerging countries such as Malaysia have received little attention. Given that developing nations have been a major contributor to the dynamic growth of mobile penetration—Malaysia is one of the fastest-growing mobile telecommunications markets in South East Asia (SEA)—the study's findings are still worth exploring further. Comparably, there have been a few attempts to look at the uptake from the perspectives of gender, age, wealth, and education (Porter & Donthu, 2006). According to Munnukka (2007), the researcher found that the independent variables are important explanatory variables in the pursuing decision. Likewise, in the context of any information system's (IS) adoption, the consumer's decision is also influenced by the social environment factor.

The evolution of mobile technology has significantly transformed the banking sector, giving rise to mobile banking (M-banking), which offers consumers the ability to perform banking transactions conveniently and efficiently through their mobile devices. This shift has led to a surge in mobile banking adoption, with studies highlighting the growing importance of mobile platforms in enabling financial inclusion, particularly in regions with limited access to traditional banking services has streamlined financial transactions, allowing users to check balances, transfer funds, pay bills, and even invest in financial products, all from the palm of their hand (Chong et al., 2010). Moreover, mobile banking solutions (Riquelme & Rios, 2010). Despite its promising potential and the widespread availability of smartphones and mobile internet in Malaysia, the adoption rate of M-banking services—particularly those utilizing QR code technology—remains comparatively low.

This contradiction raises concerns regarding the effectiveness of investments made by financial institutions to develop and promote mobile banking infrastructure. Previous studies have explored various determinants of M-banking adoption in developed markets; however, there remains a scarcity of research focusing on emerging economies like Malaysia. Moreover, while mobile penetration in Malaysia is among the highest in Southeast Asia, the uptake of M-banking does not reflect this growth. The lack of user engagement, limited trust, perceived complexity, and varying demographic influences may contribute to this issue. Hence, there is a need to investigate the multifaceted factors that influence the adoption of QR code-based M-banking among Malaysian users to bridge the gap between technological advancement and actual user behavior.

2. Materials and Methods

This study examines the adoption of mobile banking (M-banking) via QR code technology among Malaysian smartphone users who have access to M-banking applications. Primary data were collected through an online survey distributed via Google Forms. Online, home-based, and workplace survey methods were employed to enhance response rates, ensure time efficiency, minimize costs, and reach a broader population, in line with the recommendations of Malhotra (2012). A non-probability sampling technique was utilized due to limitations in accessing exact customer data from financial institutions. Specifically, purposive sampling was employed, as it was deemed appropriate for the nature of this investigation. The target population comprised individual smartphone users in Malaysia, specifically those aged between 18 and 54 years. This age range was selected because individuals within this group are more likely to possess purchasing power and actively use QR mobile payment systems. Respondents' demographic characteristics were measured using Stevens' scale, which categorizes measurement into nominal, ordinal, interval, and ratio scales. The questionnaire included five demographic items, which were adapted from previous studies. Gender, race, and marital status were measured using nominal scales; age was measured using either interval or ratio scales; and education level was assessed using an ordinal scale. A total of 200 respondents participated in the survey. The collected data were analyzed using descriptive statistical methods with the assistance of SPSS version 23.

3. Results

The results of the profiling of Malaysian smartphone users, as presented in Table 1, provide a comprehensive overview of the demographic and behavioral characteristics of the population under study.

Demography	Category	Frequency	Percentage
Gender	Male	89	44.5
	Female	111	55.5
Race/Ethnicity	Chinese	79	39.5
	Indian	46	23
	Malay	72	36
	Bumiputera	3	1
	18-23	82	41
	24-29	39	19.5
	30-35	29	14.5
Age Group	36-41	23	11.5
	42-47	17	8.5
	48-53	10	5
	Divorce/Widowed	19	9.5
Marital Status	Living together	7	3.5
Maritar Status	Married	55	27.5
	Single	119	59.5
Education Level	Malaysia Certificate of Education (SPM)	20	10
	Malaysia Higher Certificate for Islamic Education (STAM)	3	1.5
	Malaysia Higher Certificate of Education (STPM)	4	2
	Certificate	6	3
	Diploma	39	19.5
	Degree	101	50.5
	Master	23	11.5
	Doctorate	4	2
Occupation	Employed full time (Private Sector)	53	26.5
	Employed full time (Public Sector)	21	10.5
	housewife	1	0.5
	Retired	3	1.5

Table 1. Result of Profiling of Malaysian Smartphone Users

Demography	Category	Frequency	Percentage
	SelfEmployed	26	13
	Student	85	42.5
	Student with Employment	11	5.5
	Johor	12	6
	Kedah	46	23
	Kelantan	10	5
	Kuala Lumpur	45	22.5
	Labuan	3	1.5
	Melaka	12	6
	Negeri Sembilan	10	5
State of Onigin	Pahang	6	3
State of Origin	Perak	8	4
	Perlis	4	2
	Pulau Pinang	18	9
	Putrajaya	6	3
	Sabah	7	3.5
	Sarawak	5	2.5
	Selangor	4	2
	Terengganu	4	2
Monthly Income Range	Below RM 1,500	87	43.5
	RM 1,501 – RM 2,50	16	8
	RM 2,501 – RM 3, 5	25	12.5
	RM 3,501 – RM 4,50	33	16.5
	RM 4,501 -RM5,500	14	7
	RM 5,501 – RM6,500	18	9
	Above RM 6,500	7	3.5

Table 1 presents a detailed demographic profile of Malaysian smartphone users, covering key aspects such as gender, race/ethnicity, age, marital status, education level, occupation, state of origin, and monthly income range. The gender distribution shows that 55.5% of respondents were female (111 users), while 44.5% were male (89 users), indicating a higher representation of females in the sample. In terms of ethnicity, most respondents were Chinese (39.5%, 79 users), followed by Malay users (36%, 72 users) and Indian users (23%, 46 users). A small proportion identified as Bumiputera (1%, 3 users). Age-wise, the sample was predominantly young, with 41% (82 users) in the 18-23 age group, followed by 19.5% (39 users) in the 24-29 group. Users aged 30-35 made up 14.5% (29 users), and the percentage gradually decreased for older age groups, with 5% (10 users) in the 48-53 range. Regarding marital status, most respondents were single (59.5%, 119 users), followed by married individuals (27.5%, 55 users). Smaller proportions were divorced/widowed (9.5%, 19 users) or living together (3.5%, 7 users).

Educationally, a significant proportion of respondents had completed higher education, with 50.5% (101 users) holding a Degree. 19.5% (39 users) had a Diploma, and 11.5% (23 users) held a Master's degree. Smaller groups had completed Malaysia Certificate of Education (SPM) (10%, 20 users), Certificate (3%, 6 users), STPM (2%, 4 users), and Doctorate (2%, 4 users). The occupational profile showed that 42.5% (85 users) were students, while 26.5% (53 users) were employed full-time in the private sector. 13% (26 users) were self-employed, and 10.5% (21 users) worked full-time in the public sector. A small percentage were housewives (0.5%, 1 user) or retired (1.5%, 3 users). Geographically, the respondents came from various states, with the largest proportion from Kedah (23%, 46 users) and Kuala Lumpur (22.5%, 45 users). Other notable regions included Pulau Pinang (9%, 18 users), Johor (6%, 12 users), and Melaka (6%, 12 users). The remaining respondents were spread across other states, such as Perak, Pahang, Labuan, and Sarawak.

In terms of income, a significant portion of the respondents earned below RM 1,500 (43.5%, 87 users), followed by those earning between RM 3,501 – RM 4,500 (16.5%, 33 users) and RM 2,501 – RM 3,500 (12.5%, 25 users). Smaller percentages earned in the higher-income ranges, with 9% (18 users) earning between RM 5,501 – RM 6,500, and 3.5% (7 users) earning above RM 6,500. Thus, the data reflects a diverse group of Malaysian smartphone users, with a predominant representation of younger, single

individuals, many of whom are students or highly educated. The respondents also span a wide range of income levels and geographic locations, offering a broad view of the Malaysian mobile banking user base.

Furthermore, the results of the most frequently used mobile banking apps by Malaysian smartphone users are outlined, shedding light on the preferences and trends within the mobile banking landscape as reported in Table 2.

Mobile Banking App	Frequency	Percentage
Affin Islamic Bank Berhad	7	2.00
Al-Rajhi Bank	5	1.40
Alliance Islamic Bank Berhad	6	1.70
AmBank Islamic Berhad	17	4.80
Bank Islam Malaysia Berhad	20	5.70
Bank Muamalat Malaysia Berhad	8	2.30
Bank Rakyat	31	8.80
CIMB Bank Berhad	70	19.90
CIMB Islamic Bank Berhad	11	3.10
HSBC Amanah Malaysia Berhad	14	4.00
Hong Leong Islamic Bank Berhad	19	5.40
Kuwait Finance House	2	0.60
Maybank Berhad	96	27.40
OCBC Al-Amin Berhad	4	1.10
Public Bank Berhad	32	9.10
Standard Chartered Berhad	8	2.30
I don't have any mobile banking apps with me.	1	0.30

Table 2. Result of Most Frequent Mobile Banking App used by Malaysian Smartphone Users

Table 2 captures that mobile banking adoption among Malaysian smartphone users is widespread, with the vast majority utilizing mobile banking applications. Maybank Berhad emerged as the most frequently used mobile banking app, with 96 users representing 27.4% of the sample. This aligns with Maybank's status as one of Malaysia's largest and most established banks, known for its user-friendly mobile interface and wide range of services. CIMB Bank Berhad follows as the second most popular, used by 70 respondents (19.9%), indicating its strong digital presence and customer reach. Other banks with moderate user engagement include Public Bank Berhad (32 users, 9.1%), Bank Rakyat (31 users, 8.8%), Bank Islam Malaysia Berhad (20 users, 5.7%), and Hong Leong Islamic Bank Berhad (19 users, 5.4%). These institutions reflect a steady user base, with a notable presence of Islamic banks in the mid-tier range of popularity. Banks such as HSBC Amanah, AmBank Islamic, and CIMB Islamic also appear with usage ranging between 3.1% to 4.8%, demonstrating a moderate level of engagement. In contrast, smaller or more niche banking institutions such as Affin Islamic Bank, Al-Rajhi Bank, Alliance Islamic Bank, Bank Muamalat, and OCBC Al-Amin report lower usage, with each holding between 1.1% to 2.3% of the sample. Kuwait Finance House recorded the lowest usage with only 2 users (0.6%), suggesting limited reach or niche market appeal. Notably, only one respondent (0.3%) indicated not using any mobile banking app, highlighting the near-universal adoption of mobile banking among the surveyed users. Thus, the results suggest that traditional market leaders like Maybank and CIMB continue to dominate the digital banking landscape in Malaysia, while Islamic banks show moderate growth potential. The extremely low rate of non-users underscores the increasing normalization of mobile banking as a daily financial tool in Malaysian society.

4. Discussion

The findings from this study reveal a comprehensive snapshot of Malaysian smartphone users, particularly those engaged in mobile banking. The data highlights a significant skew towards younger, single individuals, many of whom are students or have high educational qualifications. This demographic trend is in line with global patterns, where younger generations are more likely to adopt digital financial tools due to their familiarity with technology and mobile applications (Oliveira et al., 2014). The high educational attainment among respondents may also be a factor in their adoption of mobile banking, as those with higher levels of education tend to be more comfortable with technology and may see greater utility in the

convenience of mobile financial services (Lee & Hwan, 2016). In terms of income and geographic diversity, the survey captures a broad spectrum of users, underscoring the widespread appeal of mobile banking across various socioeconomic strata in Malaysia. This finding is consistent with research that suggests mobile banking is increasingly seen as a convenient and accessible financial tool for people across different income levels (Zhou, 2014). The wide geographic representation also highlights that mobile banking is not restricted to urban centers but is also making inroads into rural areas, further demonstrating its normalization within the Malaysian financial ecosystem.

An especially striking result from the study is the near-universal adoption of mobile banking, with only one respondent (0.3%) indicating non-use of any mobile banking app. This near-total penetration suggests that mobile banking has become an essential part of daily life for Malaysian consumers, reinforcing findings from similar studies that mobile banking is becoming a central platform for financial transactions globally (Dahlberg et al., 2015). This high adoption rate is particularly notable given the relatively short time frame in which mobile banking giants such as Maybank and CIMB continue to lead the digital banking space in Malaysia. Their dominance in the mobile banking sector is reflective of their established customer bases, brand trust, and extensive networks (Lichtenstein & Williamson, 2006). However, Islamic banks, while showing moderate growth potential, may still be in the early stages of fully leveraging mobile platforms to capture a wider market. This indicates that there is room for growth and competition within the Islamic banking sector, particularly as more Malaysian consumers look for services aligned with their values, including Shariah-compliant banking solutions.

The extremely low rate of non-users emphasizes the extent to which mobile banking has permeated the financial behavior of Malaysian citizens. As mobile banking adoption becomes nearly ubiquitous, it is expected that future research and innovations will focus on improving the user experience, enhancing security, and integrating more sophisticated financial services into mobile applications (Puschel et al., 2010). This will likely drive even greater engagement and loyalty among users, further solidifying mobile banking as the future of financial services in Malaysia and beyond.

5. Conclusions

In conclusion, this study offers valuable insights into the mobile banking landscape in Malaysia, revealing that mobile banking has become a central tool in the financial lives of Malaysians, particularly among younger, educated individuals. With a near-universal adoption rate of mobile banking (99.7% of respondents), the findings underscore how deeply mobile banking has integrated into daily financial activities. The dominance of traditional banks like Maybank and CIMB in this sector highlights their strong market position, but the emerging growth potential for Islamic banks suggests a developing competitive landscape. Mobile banking is now seen as an essential, mainstream financial service, and as the adoption rate continues to rise, further innovations will likely focus on enhancing user experience, security, and expanding the range of financial services available. The policy implications of these findings are significant. First, it is crucial to promote digital literacy programs, particularly for older adults and rural populations, to ensure that the benefits of mobile banking reach all segments of society.

Policymakers should prioritize education to improve digital skills, fostering inclusivity in mobile banking adoption. Additionally, as mobile banking grows, strengthening cybersecurity and data protection is essential. Regulations must be put in place to safeguard user data and maintain trust in digital financial services. Supporting the growth of Islamic banks in the digital space is another key opportunity; targeted policies that encourage Islamic financial institutions to expand their mobile offerings could help diversify the banking sector. Furthermore, mobile banking can play a critical role in financial inclusion, particularly for underserved populations in rural and remote areas. Policymakers should encourage financial institutions to extend their services to these communities, providing access to crucial financial tools such as savings, credit, and insurance. Lastly, regulating competition and market fairness will be necessary to prevent monopolistic practices by dominant players and to encourage innovation, ensuring that all mobile banking users benefit from technological advancements and improved services. Through these policy initiatives, Malaysia can continue to strengthen its mobile banking ecosystem, making it more accessible, secure, and inclusive for all its citizens.

Author Contributions: Conceptualization, F.W.R. and Z.E.Y.; methodology, F.W.R.; software, F.W.R.; validation, Z.E.Y., N.F.M.H. and J.S.; formal analysis, F.W.R.; investigation, F.W.R.; resources, F.W.R.; data curation, Z.E.Y., N.F.M.H. and J.S.; writing—original draft preparation, F.W.R., Z.E.Y., and N.F.M.H.; writing—review and editing,

F.W.R., Z.E.Y., N.F.M.H. and J.S.; supervision, Z.E.Y. and N.F.M.H.; project administration, Z.E.Y. and N.F.M.H.; funding acquisition, N.F.M.H. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Not applicable.

Acknowledgments: The author would like to thank AIMST University and Universiti Utara Malaysia, Kedah, Malaysia, for supporting this research and publication. We would also like to thank the reviewers for their constructive comments and suggestions.

Conflicts of Interest: The authors declare no conflict of interest.

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