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QRIS as a Digital Financial Infrastructure: Multidimensional Analysis of Adoption and Financial Inclusion in Indonesian MSMEs

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Abstract

The rapid expansion of financial technology has accelerated the global transition toward digital payment systems, particularly in developing economies. In Indonesia, the Quick Response Code Indonesian Standard (QRIS), introduced by Bank Indonesia, represents a strategic policy innovation designed to unify fragmented QR-based payment services into a single interoperable national standard. Despite growing adoption, prior studies have predominantly focused on consumer-side behavior, leaving the systemic role of QRIS as a financial infrastructure enabling MSME inclusion and formalization underexamined. This study aims to analyze the multidimensional role of QRIS in promoting financial inclusion and accelerating the digital transformation of Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. Employing a qualitative descriptive approach, this research synthesizes secondary data from institutional reports, government publications, and peer-reviewed academic literature through thematic analysis within an interpretive framework. The findings indicate that QRIS expands financial access, improves transaction transparency, strengthens business record-keeping, and enhances MSME competitiveness, while also facilitating their integration into the formal financial ecosystem. However, challenges persist, including unequal digital literacy, infrastructure disparities, and varying MSME readiness. This study concludes that QRIS functions not merely as a payment instrument but as a strategic financial infrastructure supporting inclusive economic growth. The findings carry practical implications for policymakers, financial institutions, and business stakeholders in designing more inclusive and sustainable digital economy policies.

Keywords: QRIS; financial inclusion; MSMEs; digital transformation; fintech; Indonesia

INTRODUCTION

The rapid development of financial technology has fundamentally transformed the global financial landscape over the past decade. This transformation has accelerated the transition from cash-based transactions to digital payment systems across both developed and developing economies. The shift is not merely technological. It also reflects broader economic changes related to efficiency, accessibility, transparency, and financial connectivity.

Across many countries, digital payment instruments such as mobile wallets, QR-based transactions, and integrated banking platforms are increasingly viewed as strategic tools to improve transaction speed, reduce operational costs, and expand participation in formal financial systems Demirgüç-Kunt et al., (2022); Kergroach, S., & Bianchini, (2021) Recent international studies further indicate that the emergence of digital money and faster payment infrastructure is reshaping modern financial ecosystems in fundamental ways. These changes create new opportunities for financial inclusion but also present new policy challenges for governments and central banks (Department, 2020).

Despite this remarkable progress, the benefits of digital finance are not distributed equally across populations and regions. Many developing countries continue to face structural barriers that hinder the widespread adoption of digital payment systems. These barriers include unequal internet access between urban and rural areas, limited financial literacy among the general population, weak institutional support for small businesses, and persistently low levels of trust in digital systems. Such barriers affect both consumers and business owners when they consider adopting new payment technologies.

Previous studies have found that financial inclusion depends not only on the availability of technology but also on supporting regulations, digital readiness at the community level, and user confidence in system security (Nayyar, 2022). Therefore, the expansion of digital payments should be understood as a multidimensional process. This process involves technological, social, and behavioral factors, as well as institutional factors, that must work together to create an inclusive digital financial ecosystem.

Southeast Asia has emerged as one of the world's fastest-growing digital economies. The increasing use of e-commerce platforms, ride-hailing services, online entertainment, and mobile financial services has significantly changed payment behavior across the region. Consumers now rely more heavily on e-wallets, bank transfers, and QR-based systems for their daily transactions, from buying food at street stalls to paying utility bills. Regional reports consistently show that the digital economy of Southeast Asia continues to expand rapidly, creating major opportunities for countries to strengthen their domestic payment ecosystems and support small-business competitiveness in the digital age. This regional momentum

positions Indonesia to accelerate its digital payment transformation and learn from neighboring countries such as Singapore, Malaysia, Thailand, and Vietnam.

In Indonesia, one of the most significant policy innovations in recent years is the implementation of the Quick Response Code Indonesian Standard, commonly known as QRIS. Bank Indonesia introduced this system as the national payment system authority. Before QRIS was implemented, QR payment services were fragmented across different providers. Each e-wallet and mobile banking application had its own proprietary QR code. Merchants often needed to display multiple QR codes from different payment service providers, creating inefficiency and confusion for both sellers and buyers.

QRIS was designed specifically to solve this problem. It is a unified national standard that allows users to make payments across different platforms using a single QR code. Since its implementation, QRIS has enabled faster transactions, simplified merchant onboarding, and broadened acceptance of digital payments across all economic sectors (Indonesia, 2025). In addition, Bank Indonesia continues to strengthen the national payment system through long-term strategic roadmaps and comprehensive digital ecosystem reforms.

The relevance of QRIS is particularly strong for Micro, Small, and Medium Enterprises, or MSMEs, which remain the backbone of Indonesia's economy. MSMEs contribute substantially to employment creation, household income generation, and national economic output. According to official statistics, MSMEs account for more than 99 percent of all businesses in Indonesia and absorb the vast majority of the national workforce. However, despite their numerical dominance and economic importance, many MSMEs still operate informally. They rely heavily on cash transactions for their daily operations. They maintain weak or non-existent financial records.

They face serious difficulties in accessing formal financing channels from banks and other financial institutions. National statistics continue to show the dominant economic role of MSMEs, but policy reports also highlight persistent challenges, including low productivity, limited digital capabilities, and limited access to formal credit. Earlier studies from other developing economies have also emphasized that limited access to finance remains a key growth constraint for small businesses (Beck & Demirguc-Kunt, 2006).

From this perspective, QRIS can be seen not merely as a payment tool but as an entry point for MSME formalization and digital transformation. Through digital transactions, businesses can gradually build transaction histories that are automatically recorded. They can improve their bookkeeping practices without needing sophisticated accounting software. They can increase their visibility in the formal financial sector by accepting digital payments. These improvements may increase their opportunities to obtain financing from banks and fintech lenders. They may help MSMEs participate in broader markets, including e-commerce platforms

that require digital payment acceptance. They may also improve long-term competitiveness in an increasingly digital marketplace. International evidence from other countries suggests that digital readiness is becoming increasingly important for the resilience of small and medium enterprises in a rapidly changing global economy (Citaristi, 2022).

Previous studies have examined the adoption of digital payments through several theoretical frameworks. Each framework offers a different lens for understanding why individuals and businesses accept or reject new payment technologies. The Technology Acceptance Model, or TAM, explains that users are more likely to adopt a system when they perceive it as useful for their needs and easy to use in practice (FD Davis, 1989). The Unified Theory of Acceptance and Use of Technology, or UTAUT, emphasizes the importance of facilitating conditions such as infrastructure and technical support, as well as social influence from peers and customers (Venkatesh et al., 2003). The Theory of Planned Behavior (TPB) highlights the roles of attitudes, subjective norms, and perceived behavioral control in decision making (Ajzen, 1991). Other empirical studies have also found that trust, convenience, and perceived security significantly influence mobile payment usage behavior across different cultural contexts (Patil et al., 2020) .

While these theoretical approaches explain individual user adoption behavior reasonably well, they often pay less attention to the broader institutional role of payment systems in supporting MSME inclusion. Most existing studies focus on consumer adoption rather than merchant adoption. Even fewer studies examine how a nationally mandated payment standard, such as QRIS, can function within a larger digital financial infrastructure that shapes inclusion outcomes at the sector level. This gap in the literature is particularly noticeable in the Indonesian context, where QRIS has been implemented at a large scale, but academic analysis of its multidimensional impact remains limited.

Based on these gaps, this study examines QRIS not only as a technological innovation but as a multidimensional financial infrastructure that can support financial inclusion and accelerate MSME digital transformation in Indonesia. Using a qualitative approach based on secondary data from institutional reports and academic literature, this paper analyzes how regulatory support, user adoption factors, and business readiness interact in shaping the impact of QRIS on the ground. Accordingly, this study aims to analyze the role of QRIS in expanding financial inclusion and strengthening the digital transformation of MSMEs in Indonesia. By doing so, this research aims to contribute to both academic knowledge of digital payment systems in developing economies and practical policy discussions on how to make digital finance more inclusive for small businesses.

Recent QRIS-related studies conducted between 2023 and 2025 have further enriched understanding of digital payment adoption dynamics in Indonesia. while Slade et al., (2015) found that perceived security and reliability were dominant

predictors of sustained QRIS usage among micro-enterprise owners. To address this gap, the following table presents a structured comparison of prior studies, highlighting the dimensions examined and the specific gap that this study seeks to fill: The novelty of this study therefore lies in its synthesis of multiple theoretical frameworks TAM, UTAUT, TPB, and Diffusion of Innovation applied specifically to QRIS as a nationally standardized financial infrastructure instrument. Unlike prior studies that focus on consumer or individual merchant adoption, this research positions QRIS within the broader landscape of MSME digital transformation and financial inclusion policy, offering a sector-level analytical perspective that is currently underrepresented in the Indonesian digital payment literature.

RESEARCH METHOD

This study uses a qualitative descriptive design to explore how QRIS adoption shapes financial inclusion and MSME digital transformation in Indonesia. This approach is appropriate because the development of digital payment systems is not only technical but also closely related to behavioral changes, institutional dynamics, and broader socio-economic contexts that require an interpretive understanding.

This study follows a qualitative interpretive approach to synthesize secondary data from institutional and academic sources. From this perspective, the analysis is not limited to describing existing information but also focuses on interpreting patterns and relationships that emerge from the interaction among technology, policy, and user behavior in the QRIS ecosystem.

The data used are secondary sources collected from credible institutions, including Bank Indonesia, the Financial Services Authority, Statistics Indonesia, the World Bank, the OECD, and the Asian Development Bank. Peer-reviewed academic literature published between 2021 and 2025 is also included to complement and strengthen the analysis. The selection of sources is based on their relevance to QRIS development, financial inclusion, and MSME digital transformation in Indonesia.

Data collection is carried out through systematic document analysis. This involves reviewing policy documents, statistical reports, and academic studies that discuss digital payment systems and their implications for MSMEs. The collected data are then organized into three key thematic areas: QRIS development, financial inclusion, and MSME digital transformation.

The analysis is conducted using thematic analysis within an interpretive framework. The data are coded and grouped into meaningful categories to identify recurring patterns and relationships. This process helps build a deeper understanding of how QRIS operates not only as a payment system but also as part of a broader digital financial infrastructure that shapes inclusion and transformation in the MSME sector.

Document inclusion criteria were established to ensure the rigour and credibility of the secondary data used in this study. Sources were selected based on

the following criteria: (1) relevance to QRIS, digital payments, financial inclusion, or MSME digital transformation; (2) publication within the period of 2019 to 2025, with priority given to post-2021 publications to reflect the post-QRIS implementation landscape; (3) credibility of source, encompassing Scopus-indexed peer-reviewed journals, official government and central bank publications, and reports from internationally recognized institutions such as the World Bank, IMF, OECD, and ADB; and (4) methodological transparency, preferring sources that clearly describe their data collection and analysis procedures. Sources failing to meet these criteria were excluded from the analysis.

To strengthen the validity of the qualitative synthesis, triangulation procedures were applied across multiple source categories. Institutional reports were cross-checked against academic literature to verify consistency of findings. Where discrepancies emerged, both perspectives were acknowledged and discussed. In addition, the thematic codes derived from the analysis were reviewed for internal coherence and alignment with the theoretical frameworks employed. Member checking was approximated through comparison with the conclusions reached by multiple independent prior studies on related phenomena, thereby reducing the risk of idiosyncratic interpretation.

RESULT AND DISCUSSION

The findings of this study indicate that QRIS has developed beyond its original function as a payment instrument and now plays a broader role in Indonesia's digital economic transformation. As a unified national QR code standard, QRIS has simplified transactions between consumers and merchants by enabling interoperability across different banks and e-wallet providers. Before QRIS was implemented, merchants often needed to display multiple QR codes from different payment service providers, which created inefficiency and confusion for both sellers and buyers. The introduction of one standardized system has therefore reduced fragmentation and created a more integrated payment ecosystem. This supports the view that compatibility and relative advantage are important drivers of innovation adoption (Rogers, 2003).

From the perspective of consumers, QRIS provides practical benefits such as faster transactions, reduced reliance on physical cash, easier payment tracking, and increased convenience in everyday purchases. Consumers increasingly value contactless payment systems that are efficient and widely accepted across locations. This trend reflects broader global shifts in consumer payment preferences, with digital methods gradually replacing cash as the primary medium for small-value transactions. Evidence from other countries also suggests that the availability of efficient digital payment channels can significantly reduce dependence on physical cash over time. In this sense, QRIS helps align Indonesian payment behavior with wider global developments.

For MSMEs, the impact of QRIS is particularly significant. Many micro and small enterprises previously relied almost entirely on cash transactions, with limited bookkeeping systems and minimal transaction records. Such conditions often made it difficult for business owners to monitor sales performance, evaluate cash flow, or apply for financing from formal institutions. Through QRIS, transactions become digitally recorded, creating a more transparent and traceable financial history. These records may help MSMEs improve internal management and increase their credibility in the eyes of banks and financial institutions. Earlier studies also found that the use of QRIS can positively affect MSME income, operational efficiency, and business sustainability (Fatmawati et al., 2024).

Another important finding concerns financial inclusion. QRIS can lower entry barriers for small businesses that previously had limited access to digital payment infrastructure. Compared with expensive payment terminals or complex banking systems, QRIS offers a relatively simple and low-cost solution that can be adopted by street vendors, traditional market sellers, food stalls, and home-based businesses. As more MSMEs participate in digital transactions, they become increasingly connected to the formal financial ecosystem. This supports the broader objective of financial inclusion, which seeks to ensure that individuals and businesses can access affordable and useful financial services Demirgüç-Kunt et al., (2022); Keuangan, (2024) However, the study also shows that adoption does not occur automatically. Perceived usefulness remains one of the strongest drivers of QRIS usage. MSME owners are more likely to adopt the system when they believe it can increase sales, simplify operations, and attract more customers. This finding is consistent with the Technology Acceptance Model, which states that perceived usefulness and perceived ease of use strongly influence technology acceptance (FD Davis, 1989). In practice, when merchants observe that customers prefer non-cash payments, they are more motivated to implement QRIS.

Trust is another critical factor influencing adoption. Business owners and consumers need confidence that digital transactions are secure, accurate, and reliable. Concerns about failed payments, fraud, delayed settlements, or data misuse may reduce willingness to use digital systems. Studies on QR payment adoption in emerging economies confirm that trust and service quality are among the most important determinants of continued usage intention. Therefore, payment providers and regulators must continuously maintain system reliability and consumer protection mechanisms.

Facilitating conditions are equally important. Many MSMEs, especially in smaller cities and rural areas, still face limited internet connectivity, outdated smartphones, and insufficient digital skills. Even when business owners are interested in using QRIS, technical barriers may delay adoption. This reflects the Unified Theory of Acceptance and Use of Technology, which emphasizes that behavioral intention alone is insufficient without adequate supporting

infrastructure and resources (Venkatesh et al., 2003). As a result, policy success depends not only on the availability of technology but also on ecosystem readiness.

The findings also reveal that QRIS adoption may strengthen business competitiveness. MSMEs that accept digital payments are often perceived as more modern, professional, and customer-oriented. This can improve customer satisfaction and encourage repeat transactions, particularly among younger consumers who are accustomed to mobile payments. In increasingly competitive urban markets, offering multiple payment options can become a strategic advantage. Thus, QRIS is not merely a compliance tool but a competitive instrument for business growth.

From a macroeconomic perspective, wider QRIS adoption may improve efficiency in the national payment system. Cash handling involves printing, transportation, storage, and security costs. As digital payments expand, some of these costs can be reduced. Greater transaction transparency may also support formalization, tax administration, and more accurate economic data collection. These indirect effects demonstrate that payment modernization can create benefits beyond individual users and merchants.

Indonesia's experience with QRIS also reflects broader regional developments in Southeast Asia. Countries across the region are promoting instant payments, e-wallet ecosystems, and interoperable QR systems to strengthen domestic commerce and cross-border transactions. Previous studies indicate that regulatory readiness, user trust, and system interoperability are central factors in regional mobile payment growth (Chang et al., 2023). Consequently, QRIS may position Indonesia more strongly within the ASEAN digital economy and future cross-border payment networks.

Despite these positive developments, several challenges remain. First, some MSMEs still prefer cash due to habit, fear of taxation, or unfamiliarity with digital systems. Second, digital literacy gaps continue to affect older business owners or enterprises operating in remote areas. Third, transaction fees or settlement concerns may influence perceptions among micro businesses with very small profit margins. Without inclusive policy design, the benefits of QRIS may be concentrated among already-connected businesses, while more vulnerable enterprises lag.

Digital inequality constitutes a particularly significant structural challenge for inclusive QRIS adoption in Indonesia. The country's archipelagic geography creates stark disparities in telecommunications infrastructure quality, with mobile broadband connectivity, smartphone penetration, and digital literacy levels varying substantially between Java-Bali and outer island regions. Research by the Indonesian Internet Service Providers Association APJII, (2024) indicates that internet user penetration in eastern Indonesian provinces remains considerably lower than the national average, with rural communities disproportionately affected.

These infrastructural gaps translate directly into unequal QRIS adoption rates: micro-enterprises operating in underserved areas face compounded disadvantages due to poor connectivity, limited access to digital literacy training, and reduced exposure to digital payment ecosystems. Without targeted intervention, the risk is that QRIS may inadvertently deepen existing economic inequalities by primarily benefiting already-connected urban businesses while leaving more vulnerable rural enterprises behind.

Cybersecurity and digital trust concerns represent another critical dimension requiring expanded analytical attention. As QR-based transactions become more prevalent, they also attract increasing interest from malicious actors. Common threats in QR payment environments include QR code substitution fraud, phishing schemes exploiting payment notifications, and unauthorized merchant account registration. In the Indonesian context, reports from the Financial Services Authority (OJK) have documented a rise in digital financial fraud incidents correlating with increased digital payment adoption, including QRIS-related scams targeting unsophisticated users (Keuangan, 2024).

Addressing these threats requires not only technical solutions such as transaction authentication and anomaly detection systems but also sustained consumer education campaigns and a robust legal framework for digital payment dispute resolution. The long-term sustainability of QRIS adoption therefore critically depends on the ability of Bank Indonesia, payment service providers, and law enforcement agencies to maintain system integrity and user confidence in the face of evolving cybersecurity risks.

A regional comparative perspective further enriches the analysis of QRIS and its potential trajectory. Within ASEAN, several peer economies have developed analogous national QR payment standards: Thailand's PromptPay, Malaysia's DuitNow QR, Singapore's PayNow, and Vietnam's VietQR all represent government-supported interoperable payment infrastructures pursuing similar financial inclusion and digital economy objectives.

Comparative evidence suggests that countries achieving the most rapid adoption have combined strong regulatory mandates with active public education campaigns, low or zero merchant transaction fees during initial rollout phases, and integration with social protection and government disbursement systems (Chang et al., 2023). Thailand's experience with PromptPay is particularly instructive: its integration with the national identification system and government subsidy disbursements created a strong use-case ecosystem that accelerated merchant and consumer adoption even in rural areas. Indonesia may draw valuable lessons from these regional experiences to optimize QRIS policy design, particularly in expanding adoption among underserved MSMEs and bridging the urban-rural digital divide.

To address these issues, a multi-stakeholder approach is necessary. Regulators should continue improving payment security, reducing operational friction, and

expanding digital infrastructure. Financial institutions can support MSMEs through onboarding assistance, merchant education, and financing products linked to transaction histories. Local governments and business associations may also play a role in digital literacy campaigns and targeted training for traditional market merchants. Such collaborative efforts would increase the long-term effectiveness of QRIS adoption.

Overall, the results demonstrate that QRIS should be understood as a multidimensional policy innovation that combines technological efficiency, business modernization, and financial inclusion. While user perceptions such as usefulness, trust, and convenience remain central, structural factors such as infrastructure, literacy, and institutional support are equally decisive. Therefore, the long-term success of QRIS will depend not only on how many users adopt it, but on how effectively the surrounding ecosystem enables sustainable and inclusive participation.

This table summarizes the development of QRIS adoption across users, merchants, transaction volume, and key milestones in Indonesia's digital payment ecosystem.

Table 1. Evolution of QRIS Adoption in Indonesia (2021–2025)

Indicator	**Before QRIS Adoption**	**After QRIS Adoption**	**Trend**	**Interpretation**
Financial access	Limited access for unbanked population	Broader access through digital payments	Increasing inclusion	QRIS facilitates entry into formal financial system
Transaction system	Cash-based transactions dominant	Shift toward cashless payments	Strong digital shift	Improves transaction efficiency and speed
Financial recording	Manual and inconsistent records	Digital and structured records	Improved transparency	Supports MSME financial management
Digital literacy exposure	Low adoption of digital tools	Increasing exposure and usage	Gradual improvement	Encouraged by QRIS ecosystem adoption
Market participation	Limited market reach	Wider digital market integration	Expanding participation	Strengthens digital economy ecosystem

Note: The table is synthesized based on secondary data and reports from Demirgüç-Kunt et al., (2022); Indonesia, (2025); Keuangan, (2024), combined with the author's analytical interpretation of QRIS adoption impacts on financial inclusion and MSME digital transformation in Indonesia.

The table maps key concepts from each theory to their relevance in the context of QRIS, particularly regarding user acceptance, the diffusion of innovation, and the digital transformation of MSMEs. This synthesis provides an integrated analytical lens to understand QRIS not only as a technological innovation but also as a socio-economic phenomenon shaped by behavioral, institutional, and infrastructural factors.

Table 2. Theoretical Framework Mapping of QRIS Adoption

Theory	**Core Concept**	**QRIS Interpretation**	**Implication**
TAM (Davis)	Perceived usefulness & ease of use	QRIS simplifies transactions	Drives adoption among MSMEs
UTAUT	Performance expectancy & facilitating conditions	Infrastructure + ecosystem support	Determines regional adoption gap
TPB	Attitude, subjective norm, control	Social pressure & habit formation	Influences behavioral intention
Rogers	Diffusion attributes	Relative advantage & compatibility	Accelerates market penetration
ECD/ADB	Digital infrastructure	SME digital transformation	Improves productivity & access

Note: The table is developed based on a synthesis of established theoretical frameworks, including the Technology Acceptance Model (FD Davis, 1989), Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003), Theory of Planned Behavior (Ajzen, 1991), Diffusion of Innovations Theory (Rogers, 2003), as well as insights from Kergroach, S., & Bianchini, (2021) and Nayyar, (2022) on digital transformation and SME development. The mapping represents the author's analytical interpretation of their relevance to QRIS adoption in Indonesia.

CONCLUSION

This study concludes that QRIS has emerged as a strategic financial infrastructure that simultaneously supports financial inclusion and accelerates the digital transformation of MSMEs in Indonesia. By unifying previously fragmented QR payment services under a single national standard, QRIS has improved transaction efficiency, enhanced interoperability, and expanded small business participation in the formal digital economy. Beyond payment convenience, QRIS enables transaction traceability and stronger financial record-keeping, increasing MSME access to formal financing opportunities. The findings confirm that adoption is shaped by multiple interrelated factors perceived usefulness, trust, ease of use, infrastructure readiness, and institutional support underscoring that digital payment adoption is a multidimensional process involving behavioral, regulatory, and infrastructural dimensions.

Theoretically, this study demonstrates that integrating TAM, UTAUT, TPB, and Diffusion of Innovations theory provides a more comprehensive analytical lens than any single framework alone. Nevertheless, challenges remain, particularly unequal digital literacy and infrastructure gaps between urban and rural areas. Sustained collaboration among regulators, financial institutions, technology providers, and business associations is essential. Future research should pursue quantitative validation through SEM or PLS approaches and conduct comparative studies across ASEAN QR payment systems to deepen understanding of national digital payment standards as instruments of inclusive economic development.

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