

Business Opportunities in the QRIS Ecosystem: Fintech Innovations and Solutions for Merchants

Adri¹ , Eli Febriani² , Kiki Razroma Yantika³ 

¹²³State Islamic University Sjech M. Djamil Djambek, Bukittinggi, Indonesia

Abstract. The development of financial technology (*fintech*) has become the main driver in the transformation of the payment system in Indonesia. The implementation of the QRIS ecosystem is designed to unify various QR codes into a single national standard, while expanding the reach of financial inclusion. Additionally, the increasing use of cryptocurrencies is strengthening the wider adoption of the technology. The presence of digital payment systems such as QRIS provides convenience and convenience for consumers in transacting, which in turn has a positive impact on increasing the income of business actors. This study uses a descriptive qualitative approach, with the method of literature study, analysis of policy documents from Bank Indonesia, as well as secondary data from industry reports and MSME case studies. The findings show that the use of QRIS contributes to transaction efficiency, digital financial recording, strengthening customer data, and ease of access to digital financing services. In addition, collaboration between business actors and *fintech service providers* also encourages the creation of new technology-based business models. The QRIS ecosystem has great business potential in strengthening the growth of the digital economy and empowering the trade sector, especially among MSMEs and the informal sector.

Keywords: QRIS, fintech, business opportunities, MSMEs, traders, digital payment system, digital economy, technological innovation,

1. Introduction

The rapid advances in technology and communication over the past decade have driven a major change in people's transaction patterns as economic actors. People are now taking advantage of digital services that offer high efficiency and speed in transactions. These changes have a wide impact, especially in the financial sector (Azka, 2023). Economies are now demanding financial services that are not only fast and efficient, but also secure and mobile-accessible. Convenience and variety in payment methods are important aspects in maintaining business continuity. To answer the increasing expectations of consumers, both individuals and organizations are competing to develop financial business models that are innovative and adaptive to technological developments (Akhyar, Hanani, and Gusli 2024).

Technology drives innovation (Hafid 2023). Today, cashless transactions have become part of the lifestyle of modern society, with a wide selection of methods such as credit cards, debit cards, online banking (*Online Banking*), to banking via mobile devices (*Mobile Banking*) (Siregar et al. 2025). The presence of digital wallet applications such as ShopeePay, OVO, DANA, and GoPay further strengthens this digital transformation, where the application system continues to undergo updates to improve user performance and convenience (Sitanggang et al. 2024).

In Indonesia, the most prominent technological innovation in the digital payment system is the launch of *the Quick Response Code Indonesian Standard* (QRIS) by Bank Indonesia on August 17, 2019. QRIS was developed as a national standard to bring together various digital payment methods, with the aim of facilitating transactions and encouraging the expansion of financial inclusion (Ekaputra et al., 2024). As an integrated QR code system, QRIS allows electronic transactions to be more efficient and practical. This innovation not only simplifies the non-cash payment process, but also opens up new economic opportunities, especially in the financial technology (*fintech*) sector and services for merchants, both small and large-scale (Balqis & Safitri, 2024). QRIS has now been widely implemented in eight key regions in Indonesia, demonstrating its commitment to driving digital transformation in the national financial sector (Ramadhani et al., 2023).

QRIS is an integrated QR code that brings together various QR codes from different Payment System Service Providers (PJSP). QR codes themselves contain a collection of data or information such as the identity of the merchant or user, transaction amount, and/or type of currency, which can be scanned using certain devices to process payments (Bank Indonesia, 2020; Puspitaningrum et al., 2023). QRIS is available as one of the features in digital payment applications that are downloaded and installed on users' mobile devices, such as mobile banking, digital wallets (*e-wallets*), and other applications that support the QRIS system. The development of QRIS is carried out by BI together with payment system industry players with the aim of simplifying transactions using QR Codes to make them easier, more efficient, and safer. In addition, BI is also actively encouraging Micro, Small, and Medium Enterprises (MSMEs) to adopt QRIS as a step towards business digitalization that brings various benefits (Widianita, 2023; Bachtiar et al., 2024).

QRIS which is generally in static form, like stickers, which are pasted in strategic locations such as store walls, checkout tables, or storefront glass, so that they can be easily scanned by customers. To make payments through QRIS, consumers must have a digital wallet application (*e-wallet*) installed on *their smartphones*. Fintech innovations in the QRIS ecosystem include various services, ranging from digital *point-of-sale* (POS) systems, transaction data analytics, to access microfinance based on transaction history. By utilizing the data generated from QRIS transactions, *fintech companies* can offer more personalized services that are in accordance with the needs of merchants, especially MSMEs that were previously difficult to reach by formal financial services (astagunadhyा. com. 27-5-2025).

With this description, this study will analyze in depth how business opportunities that arise in the QRIS ecosystem through the role of *fintech* innovation in providing solutions for merchants, as well as what are the challenges and strategies needed to optimize the potential of QRIS in driving digital economic growth in Indonesia?.

2. Method

This study applies the library research method with a qualitative-descriptive approach. This method is carried out through the collection, review, and analysis of various literature relevant to the topic of the QRIS ecosystem, financial technology (*fintech*) innovation, and business opportunities for trade actors. The main references include scientific books, accredited national journals, and official documents published by Bank Indonesia and the Financial Services Authority (OJK). The data collection

process was carried out through literature documentation that highlighted the issue of payment system digitalization, financial inclusion, MSME digital transformation, and the strategic role of QRIS as a QR code standard in payment transactions. Data analysis is carried out using content *analysis* techniques with the aim of understanding the content of the material in depth and systematically, so as to be able to identify patterns, main concepts, and relationships between variables. The ultimate goal of this method is to build a comprehensive theoretical synthesis of the business potential that arises from the use of QRIS-based financial technology, as well as to examine its implications for increasing the productivity and efficiency of traders in the digital economy era in Indonesia.

3. Results and Discussion

3.1 Dynamics of QRIS Development in Indonesia

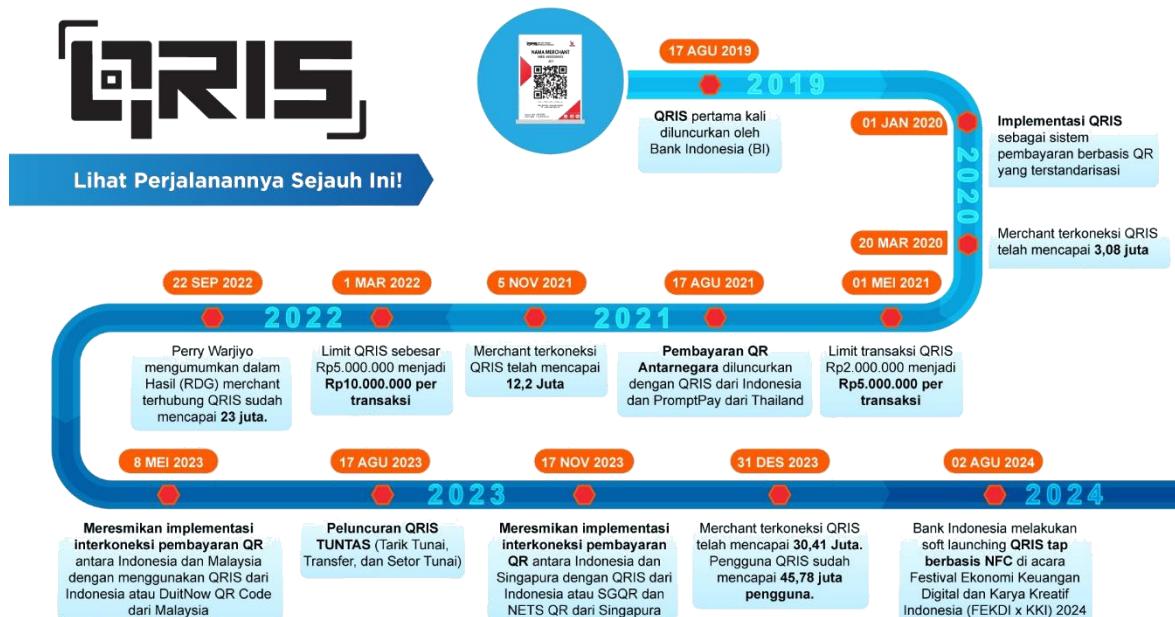
Quick Response Code Indonesian Standard (QRIS) is a QR code-based payment standard developed by Bank Indonesia (BI) and the Indonesian Payment System Association (ASPI). The system allows users to make payments by simply scanning one integrated QR code, regardless of the service provider used (N.D.). With QRIS, various financial service providers both banks and *Fintech* can leverage the same QR code, making it easy to *Merchant* and consumers.

In 2019, QRIS was launched by BI in August 2019 as the first step in the integration of the national digital payment system. In the initial stage, QRIS is designed to unite various digital payment service providers into one national standard, with the aim of providing convenience and consistency in transactions for consumers and business actors. BI targets QRIS to be the main driver in accelerating digital financial transformation in Indonesia. To encourage the widespread use of QRIS, BI actively conducts socialization and education campaigns for the public, merchants, and Micro, Small and Medium Enterprises (MSMEs). The initial penetration strategy was carried out through collaboration with banking institutions and fintech companies, which allowed merchants in various regions of Indonesia to accept payments through QRIS. The COVID-19 pandemic has become a significant driving factor in accelerating the adoption of QRIS. Restrictions on physical activities and the increasing need for non-cash transactions make people and business actors increasingly dependent on digital payment systems.

By the end of 2024, the number of merchants that have been integrated with the Quick Response Code Indonesian Standard (QRIS) throughout Indonesia will reach around 35.1 million, with around 90% of them coming from Micro, Small, and Medium Enterprises (MSMEs). This achievement reflects the success of Bank Indonesia's strategy in encouraging the massive adoption of QRIS, including in the informal sector. One of the steps that has contributed significantly to the acceleration of adoption is the Merchant Discount Rate (MDR) fee waiver policy for transactions of up to IDR 500,000 for micro business merchants, which will take effect on December 1, 2024. BI targets to increase the number of QRIS merchants to 40 million by 2025, as part of efforts to expand an inclusive, efficient, and equitable digital payments ecosystem throughout Indonesia. Overall, the rapid growth of QRIS adoption reflects its strategic role in supporting the digital transformation of the national financial sector, especially in strengthening MSMEs and expanding the reach of financial inclusion in various regions. (Liputan6.com, 31-11-2024).

Bank Indonesia continues to expand the implementation of QRIS to various strategic sectors, including tourism, transportation, education, and healthcare. These efforts are not only limited to increasing usage, but also include the development of innovations such as QRIS TTS (Transfer, Cash Withdrawal, Deposit), which expands the functionality of QRIS from just a means of payment to a wider range of financial services, such as remittances and cash withdrawals. In addition, BI is establishing cross-border cooperation to expand QRIS's reach to international markets, opening up opportunities for more efficient cross-border transactions. The government and Bank Indonesia are also committed to building QRIS-based digital payment infrastructure in remote areas, so that people in these areas can also enjoy the convenience and security of digital transactions (Chen and Guo 2024). QRIS is designed to create an efficient, secure, and inclusive payment system. By adopting a national standard for QR Codes, QRIS enables interoperability between payment service providers and makes integration easier for business actors. Studies show that the implementation of national standards such as QRIS is able to increase transaction efficiency while accelerating the adoption of technology in the informal sector and MSMEs (Ly and Ly 2024). In summary, the dynamics of QRIS development are as follows:

Figure 1. Dynamics of QRIS Development in Indonesia



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3.2 Fintech Innovation in the QRIS Ecosystem

Innovation *Fintech* plays an important role in the expansion of the QRIS ecosystem. Fintech offers payment platforms, cash management, integration with digital bookkeeping, to additional financial services such as microloans based on QRIS transaction data(Budiman, Hanani, and Rozi 2024). Studies show that innovation *Fintech* integrated with national payment systems has the potential to improve financial inclusion and expand the customer base for service providers (Anagnostopoulos 2018). As for the contribution of innovation *Fintech* in the development and adoption of QRIS, based on the findings:

3.2.1. Increased Financial Accessibility and Inclusion

Increased accessibility of digital financial services through the integration of QRIS with various payment platforms, such as *E-wallet*, *mobile banking*, and other payment applications are a must. Studies show that the digitization of QRIS has a direct influence on the decision of bank customers to make transactions (Mahrizal et al. 2023), assisting micro business actors in expanding market access and improving transaction efficiency (Widyawan et al. 2024). The integration of QRIS with Islamic banking services can expand public access to financial services in accordance with sharia principles (Sodik and Riza 2023). Thus, QRIS has proven to play a significant role in increasing financial accessibility and inclusion in Indonesia. However, to maximize its benefits, continuous efforts are needed to improve digital literacy, strengthen technology infrastructure, and encourage collaboration between the government, the private sector, and the community.

3.2.2. Payment System Interoperability

Innovation *Fintech* It supports interoperability between payment systems by adopting the QRIS standard, which allows a single QR code to be used for multiple payment methods. This not only makes it easier for consumers to transact but also reduces complexity for *Merchant* in managing various payment systems. The use of the QRIS payment system contributes positively to the business performance of MSMEs. QRIS helps improve operational efficiency and expand market access for MSME players (Rettobjaan, Widnyani, and Richadinata 2023). The study found that attitudes, intentions, ease of use, and usability positively influenced the adoption of QRIS. These findings highlight the importance of individual perceptions of technology in driving QRIS adoption (Yuniarti and Ernawati 2023). Innovation *Fintech* has contributed significantly to the development and adoption of QRIS in Indonesia, especially in improving the interoperability of payment systems. Factors such as technology readiness, trust, risk perception, and financial risk tolerance play an important role in driving the adoption of QRIS by various segments of society, including MSMEs and the younger generation (Hadi and Hanani 2023).

3.2.3. Increased Trust and Security of Transactions

Integration of security technology by the company *Fintech* in the QRIS ecosystem has increased consumer trust in digital transactions. Features such as data encryption and two-factor authentication help protect user information and prevent fraud, which is a critical factor in driving the adoption of digital payments (Nurqamarani, Fadilla, and Juliana 2024). Studies show that trust is a factor influencing the intention to adopt Mobile QRIS, in addition to the perception of usability and enjoyment, emphasizing the importance of building user trust in the security and reliability of digital payment systems (Ramadhani et al. 2023). Fintech innovations have contributed significantly to the development and adoption of QRIS through increased trust and security of digital transactions. Through the integration of technology adoption models and focus on the trust factor, *Fintech* successfully encouraging the adoption of QRIS by various segments of society, including MSMEs and the younger generation (Risal et al. 2024). However, challenges such as user education and compliance with security standards still need to be addressed to maximize QRIS's potential in supporting financial inclusion and digital payment system transformation in Indonesia.

3.2.4. Financial Education and Literacy

Fintech It also plays a role in improving people's financial literacy through education and training programs on the use of QRIS. These activities help people

understand the benefits and ways of using digital payments, which in turn encourages wider adoption of QRIS. Studies show that MSME actors still have a limited understanding of the use of QRIS. BI has implemented various education strategies to increase financial literacy and QRIS adoption among MSMEs. This strategy includes training in the use of technology and the development of the QRIS ecosystem (Sec. 2024). Likewise, financial literacy, the perception of ease of use and usability, significantly influences interest in adopting QRIS as a digital payment method (Wijayanto 2023), (Santoso and Nainggolan 2023). Fintech innovations have contributed significantly to the development and adoption of QRIS in Indonesia through improving education and financial literacy. Educational efforts carried out by various parties, including BI and educational institutions, have helped increase public understanding of the use of QRIS. However, challenges such as limited infrastructure and digital literacy still need to be overcome to maximize the adoption of QRIS at all levels of society.

3.2.5. Regional Collaboration and Cross-Border Expansion

Innovation in the sector *Fintech* play a crucial role in driving the development and adoption of QRIS, especially through regional collaboration and cross-border expansion. This collaborative initiative not only expands the scope of QRIS usage geographically, but also enables more efficient cross-border transactions. This directly supports the growth of the digital economy in the regional region (Outlook 2023). Bank Indonesia has established a strategic partnership with central banks in the ASEAN region to integrate a QR code-based payment system. Through this collaboration, users can make cross-border transactions faster and more efficiently by simply scanning the local QR code in the destination country. This integration will help boost regional payment system connectivity and strengthen the digital economy ecosystem in the region (Fintech. Id, 1-6-2025). Fintech innovations have contributed significantly to the development and adoption of QRIS through regional collaborations and cross-border expansion. Through cooperation with central banks and fintech companies in the ASEAN region, QRIS has become a bridge for digital payment system integration, improving cross-border transaction efficiency, and driving financial inclusion. This effort is in line with ASEAN's vision to create an integrated and inclusive digital payments ecosystem(Hafd 2023).

Thus, *fintech innovation* has become a catalyst in the development and adoption of QRIS in Indonesia, through increased accessibility, interoperability, security, financial literacy, and regional collaboration. The active role of *fintech* in the QRIS ecosystem not only strengthens the national payment system but also drives financial inclusion and overall growth of the digital economy.

3.3 QRIS as a Solution for Traders and MSMEs

The use of the QRIS Application for the Community and MSMEs is as follows:

3.3.1. Ease of Transactions

QRIS provides convenience for users to make payments through various applications from registered financial service providers. Simply scanning a single standard QR code, transactions can be completed quickly and conveniently in just a matter of seconds (Rettobjaan, Widnyani, and Richadinata 2023).

3.3.2. Efficiency and Safety

The use of QRIS eliminates the need to carry cash or download various apps for each different merchant. In addition to improving efficiency, QRIS also offers a higher

level of security as every transaction is recorded and verified electronically, thus minimizing the risk of fraud and loss of money (Sec. 2024).

3.3.3. Support for MSMEs through QRIS

QRIS plays a very effective role in encouraging the growth of Micro, Small, and Medium Enterprises (MSMEs). With a low transaction fee structure and ease of integration process, MSMEs can adopt this payment system without requiring large investment in technology infrastructure. The results of the study show that the perception of risk, ease of use, and individual attitude towards technology have a significant influence on behavioral intentions in using QRIS. The analysis model was able to explain up to 84.1% variability in behavioral intentions, which confirms the importance of psychological and perceptual factors in encouraging the adoption of QRIS among MSME actors (Issn et al. 2023).

3.3.4. Increasing Financial Inclusion

QRIS contributes to expanding public access to formal financial services, especially for previously unreached groups. With its ease and affordability, QRIS allows more individuals to participate in the digital economy ecosystem. This effort is in line with the national agenda in encouraging equitable financial inclusion throughout Indonesia (Nurqamarani, Fadilla, and Juliana 2024).

Thus, The use of the QRIS application provides various tangible benefits for the community and Micro, Small, and Medium Enterprises (MSMEs) (Wijayanto 2023). For the public, QRIS offers convenience, efficiency, and security in transactions, while encouraging wider adoption of digital financial services. Meanwhile, for MSMEs, QRIS is an affordable payment solution, easy to implement, and able to increase business competitiveness and professionalism (Siregar et al. 2025). QRIS integration also encourages digital transaction recording, expands access to financing, and accelerates financial inclusion in various regions, including remote areas (Sari 2024). Thus, QRIS plays a strategic role in supporting the digital transformation of the national financial sector and empowering the people's economy(Sodik and Riza 2023).

Micro-QRIS for banks and MSME actors get various benefits from QRIS integration, including: (1) Low transaction costs; (2) Increased access to digital financing; (3) Transaction track record for credit access; (4) Efficiency and transparency in financial recording. Studies show that the digitization of payments through QR codes can significantly increase the productivity and income of MSMEs (Ho, Li, and Whitworth 2021).

Some Micro, Small, and Medium Enterprises (MSMEs) have implemented the QRIS payment system according to their respective capacities. The use of QRIS is considered to provide convenience in the transaction process, especially when facing a surge in the number of customers. Based on the latest data from Bank Indonesia, until October 2024, the number of QRIS users has increased significantly, reaching 54.1 million users, with a total of 34.7 million registered merchants. The value of QRIS transactions also showed a very high annual (year-on-year/yoY) growth, which was 183.9%, which reflects the acceleration of the adoption of digital payment systems in the community. In addition, the volume of electronic money (EU) transactions also increased by 27.0% (yoY), with a total of 1,365.4 million transactions. Transactions through digital banking services also recorded significant growth of 37.1% (yoY), reaching 1,960.8 million transactions. In contrast, the use of ATM or debit cards decreased by 11.4% (yoY), with a total of 558.8 million transactions. Meanwhile, transactions using credit cards actually increased by 19.6% (yoY), reaching 39.7 million

transactions. In terms of rupiah management, the amount of currency in circulation (UYD) also showed an increasing trend of 11.8% (yoy), with a total value of Rp1,070.6 trillion by the end of October 2024 (CCNInIndonesia, 2025)

For merchants, QRIS provides convenience in accepting various types of payments without the need to have many devices or accounts from various providers. Some concrete solutions offered by actors Fintech through the QRIS ecosystem includes: (1) Digital cashier-based applications Smartphone; (2) Integration of digital wallet services with inventory of goods; (3) Empowering merchants through digital incentives (such as Cashback or Voucher loyalty); (4) Automatic disbursement facility to daily bank accounts. According to studies, the use of QRIS has been proven to increase transaction efficiency and accelerate cash turnover for MSMEs (Rettobjaan, Widnyani, and Richadinata 2023),(Widyawan et al. 2024) .

3.4 Business Opportunities for QRIS Ecosystem Traders

The QRIS ecosystem opens up opportunities for various business entities, including: (a) Digital payment application providers (*E-wallet*); (b) Integrated digital accounting platform; (c) Provider companies *Hardware POST*; (d) Transaction data-based financing service providers; (b) *Aggregator* and *Gateway* QRIS-based payments (Lee and Jae 2019). In this context, the collaborative model between banks, *fintech*, and technology players are the key to the success of a sustainable QRIS ecosystem (Issn et al. 2023).

Since its launch on August 17, 2019 by Bank Indonesia, QRIS has experienced significant growth. Until 2024, the number of users will reach 50.5 million with 32.71 million registered merchants, 92% of whom are MSMEs. The annual transaction value reached IDR 42 trillion (around USD 2.57 billion), an increase of 226.54% compared to the previous year (Wikipedia, 2025). This growth creates a great opportunity for fintechs to provide digital payment services, point-of-sale (POS) system integration, and financial management solutions for MSMEs (Yuniarti and Ernawati 2023).

Cross-border payment integration in ASEAN, QRIS has been integrated with QR payment systems in Thailand, Malaysia, and Singapore, enabling cross-border transactions using local currencies without conversion to USD. This initiative is part of ASEAN Local Currency Transaction (LCT) Framework, which aims to reduce dependence on the US dollar in cross-border transactions. For the perpetrators Fintech, this integration opens up opportunities to develop cross-border payment services, support tourism, and expand markets to other ASEAN countries. Studies show that advances Fintech significantly increase the likelihood of MSMEs to innovate, both in investment and the results of their innovations. Fintech encourage long-term strategic incentives and investment in human capital, including the use of promotions and stock options in return, as well as increased training and remuneration of technical staff (Chen and Guo 2024). Thus, the perpetrator Fintech which provides QRIS-based payment solutions can play an important role in encouraging innovation and growth of MSMEs.

Role Regulatory Sandbox and the innovation ecosystem is essential. The results of the study emphasize the importance of dynamic regulation, such as Regulatory Sandbox, in supporting fintech innovation. This approach allows fintechs to test new services in a controlled environment before full launch. Additionally, an innovation ecosystem that involves partnerships between established companies and fintech startups can accelerate the adoption of new technologies (Fenwick, Vermeulen, and Corrales 2018). In Indonesia, BI has implemented a similar approach to support the

development of QRIS, providing opportunities for fintechs to innovate within a supportive regulatory framework (Ekaputra, Ciptosari, and Halim 2024).

Adoption of security technology in payments Mobile, the study proposes a payment architecture Mobile which leverages multi-factor authentication, including biometric and location verification, to enhance transaction security. With the increasing adoption of QRIS, fintechs have the opportunity to integrate these advanced security features, increase user trust and reduce the risk of fraud (Alamleh, Alqahtani, and Al Smadi 2023). By taking advantage of the growth trend of digital transactions and progressive regulatory support, fintechs can play a strategic role in the transformation of Indonesia's digital economy and the ASEAN region (Azka 2023).

3.5 The Future of QRIS in Indonesia

The future of QRIS in Indonesia shows bright prospects as the main foundation in the transformation of the national digital payment system. Various innovations and strategies have been implemented to expand the adoption of QRIS, improve transaction efficiency, and strengthen financial inclusion across the country (Online and Putri 2022). BI has collaborated with central banks in the ASEAN region to integrate a QR code-based payment system. This collaboration allows users to make cross-border payments by scanning local QR codes, facilitating faster and more efficient transactions, and supporting the growth of the digital economy in the Region (Lee and Jae 2019). The implementation of QRIS has been proven to increase transaction efficiency and expand financial inclusion, especially for Micro, Small, and Medium Enterprises (MSMEs). With low transaction fees and ease of integration, MSMEs can adopt QRIS without requiring large investments in payment infrastructure. This encourages the growth of a more inclusive digital economy.

QRIS continues to innovate by developing new features that support user needs, such as QRIS TTS (Transfer, Cash Withdrawal, Deposit) which expands QRIS's functionality not only for payments, but also for other financial needs. This innovation aims to increase convenience and flexibility in transactions (Ramadhani et al. 2023). Although QRIS offers ease of transactions, challenges related to security and public understanding are still a concern. Improved digital infrastructure, public education, and collaboration between government, industry, and society are needed to address these challenges and ensure wider adoption of QRIS (Azka 2023).

QRIS simplifies digital transactions by integrating various payment service providers into one standard system. With just one QR code, merchants can accept payments from various digital wallet apps and Mobile Banking (Ramadhani et al. 2023). This not only makes transactions easier but also opens up new business opportunities, such as QRIS aggregator service providers, integrated POS system providers, and digital transaction analytics services. BI noted that at the beginning of 2024 there will be more than 30 million Merchant who have used QRIS, most of whom are MSME actors (Puspitaningrum et al. 2023). This shows that QRIS is a driver of digital transformation in the retail trade sector (Chen and Guo 2024).

Seeing the rapid development and enthusiasm of the community, the future of QRIS in Indonesia looks bright. In the next few years, Bank Indonesia plans to continue to expand QRIS's reach, including into new and international sectors. In addition, with innovations that continue to be developed (Sitanggang et al. 2024), QRIS is expected to be one of the main foundations in building a more inclusive and efficient digital payment system in Indonesia. With collaboration between the government, the financial

industry sector, and the active participation of the community, QRIS is projected to continue to play a strategic role in accelerating digital transformation in the national financial sector (Nurhaliza et al. 2023).

Government support, both from the central and regional governments, plays an important role in accelerating the adoption of QRIS. Supportive policies, such as incentives for business actors and payment service providers, as well as clear regulations, will strengthen Indonesia's digital payments ecosystem (Puspitaningrum et al. 2023). With various innovations implemented, QRIS is expected to continue to grow and become a key pillar in Indonesia's digital payment system, encouraging inclusive and sustainable economic growth. Thus, QRIS has opened up a wide range of business opportunities in the ecosystem Fintech, especially for small and medium business actors. Digital innovation through QRIS not only expands financial access but also becomes the foundation for inclusive digital economy growth. With the right regulatory support and the strengthening of digital literacy, the QRIS ecosystem can develop into an efficient, secure, and empowering future transaction solution.

3.6 Challenges in QRIS Ecosystem Development

Although the implementation of QRIS has experienced significant growth, there are a number of challenges that still need to be overcome in order for this ecosystem to develop evenly: (a) Lack of Equitable Digital Infrastructure; Although the adoption of QRIS has expanded in urban areas, rural areas and remote areas still face infrastructure barriers, such as slow or unstable internet access. This condition is the main obstacle in expanding the use of QRIS in these areas. (b) Lack of Public Awareness and Literacy; Some people, especially in rural areas, do not fully understand the benefits and how to use QRIS. Therefore, more intensive and sustainable socialization and education efforts are needed so that the implementation of QRIS can be accepted by all levels of society. (c) Lack of Technology Readiness and Device Access; Despite the many *Merchant* Having adopted QRIS, a number of small businesses and traditional traders still face difficulties in adapting to this technology. In addition, limitations in terms of devices that support digital payment applications are also an obstacle for some users (Yuniarti and Ernawati 2023), (Sari 2024).

The most urgent challenges faced are in the development of the QRIS ecosystem at least; (1) Traders' digital literacy is still low; (2) Inequality of network infrastructure in remote areas; (3) Regulation and data security are not guaranteed. However, with the development of 5G and AI technology, as well as government support, the future of QRIS has the potential to become the backbone of the national digital economy (Santoso and Nainggolan 2023), (Balqis and Safitri 2024).

4. Conclusion

The QRIS ecosystem plays an important role in driving the digital transformation of the payment system in Indonesia. The integration of QR codes in one national standard not only improves transaction efficiency and financial record-keeping, but also expands MSMEs' access to digital financial services. It was found that collaboration between business actors and fintech providers creates new business models that are more adaptive. QRIS has proven to be able to support financial inclusion, strengthen the competitiveness of MSMEs, and open up promising business opportunities in the national digital economy ecosystem. The sustainable and innovative implementation of

QRIS is expected to continue to support the growth of Indonesia's inclusive and sustainable digital economy.

Acknowledgments

The author expresses his highest appreciation to all parties who have provided support and contributions during the process of preparing this research. Special awards were given to the supervisor for the guidance, suggestions, and motivation that were always given throughout the writing process. It was also conveyed to Bank Indonesia and the Financial Services Authority (OJK) for the availability of official data and publications that are very useful in deepening research analysis. The author also appreciates various studies on MSME actors and fintech service providers that have become a source of reference and inspiration in compiling an analytical framework.

In closing, the author expresses his gratitude to his family, colleagues, and all parties who cannot be mentioned one by one, for all forms of moral, spiritual, and intellectual support that are very meaningful in the completion of this scientific work.

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