



Financial Technology and Inclusion Effects on SME Performance: Moderating Role of Financial Literacy

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Abstract

This study examines the effects of mobile money, quick response code (QR code), and financial inclusion on the performance of MSMEs in Kendari City, with financial literacy as a moderating variable. Using a quantitative approach with descriptive and explanatory designs, primary data were collected through structured questionnaires distributed to 300 MSME actors selected through purposive sampling. The data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS. The results show that mobile money, QR code adoption, and financial inclusion have positive and significant effects on MSME performance. In addition, financial literacy amplifies the influence of these variables, indicating that MSME actors with greater financial knowledge are better able to manage transactions, cash flow, and financial decisions effectively. These findings imply that improving MSME performance requires not only broader access to digital financial technology and formal financial services, but also stronger financial literacy among business actors. This study contributes to the literature by confirming the moderating role of financial literacy in the relationship between digital finance, financial inclusion, and MSME performance. However, the study is limited by its cross-sectional design, its restricted scope in Kendari City, and the limited number of variables examined, suggesting that future research should expand the study area, adopt a longitudinal approach, and include additional variables such as innovation, digital capability, and entrepreneurial orientation.

Keywords: SME Performance, Mobile Money, Financial Literacy

Introduction

The development of digital financial technology is driving significant changes in the activities of micro, small, and medium enterprises (Chen, 2024; Fathonah & Santoso, 2022;

Moonti et al., 2023). The digitization of payment systems through mobile money and quick response codes is becoming increasingly popular because it offers ease of transactions, cost efficiency, and faster service (Nandru et al., 2024; Roslan, 2024; Yamin & Abdalatif, 2024). The adoption of this technology continues to increase along with the growth of smartphone and internet use, including in developing areas such as Kendari City. A number of studies show that the use of mobile money and digital payment systems contributes to increasing operational efficiency, cash flow management, and business growth (Minarni, 2025; Mohamed, 2023).

In addition, financial inclusion is an important factor supporting the sustainability of MSMEs through access to formal financial services, such as credit, savings, and digital payment systems. Financial inclusion provides opportunities for business actors to expand their business scale, increase working capital, and better manage business risks (Attah et al., 2024; Bhattacharyya et al., 2023; Ozili, 2021). However, the success of the use of financial technology is inseparable from the ability of business actors to understand and manage finances, so financial literacy is a key factor that determines the effectiveness of the use of mobile money, QR codes, and other financial services in improving the performance of MSMEs (Ahmeti, 2025; Koskelainen et al., 2023; Sarlawat & Azis, 2025).

Mobile money and quick response codes play a strategic role in improving MSME performance by enhancing transaction efficiency and ease of access to payments (Prananingrum et al., 2026). Mobile money allows business actors to make transactions quickly, safely, and flexibly without relying on the conventional banking system (Roslan & Rahayuningsih, 2026; Sapovadia, 2018; Tengeh & Gahapa Talom, 2020). The use of this technology has been shown to increase business liquidity, accelerate cash turnover, and expand market reach, as transactions can be made anytime, anywhere (Ayomide & Godwin Olaoye, 2024). Meanwhile, QR codes provide convenience for practical, integrated non-cash transactions, thereby improving customer experience and service efficiency (Wang & Chan, 2025).

Financial inclusion and financial literacy also play an important role in improving MSME performance (Nurfauzi et al., 2026; Yanuarisyah et al., 2025; Sayfidinovich, 2025). Financial inclusion enables businesses to access a range of formal financial services, thereby strengthening capital and increasing capacity (Phil-Ugochukwu, 2024). On the other hand, financial literacy helps business actors understand financial products, manage cash flow, and make the right financial decisions (Hussain et al., 2018). The latest literature shows that high financial literacy can strengthen the positive impact of financial technology on business performance, as business actors are better able to utilize these services.

Research on the influence of mobile money, quick response codes, and financial inclusion on MSME performance has been conducted, but the results remain inconsistent. Some studies have found that mobile money and financial inclusion have a positive and significant influence on the performance of MSMEs, while other studies show an insignificant or dependent influence on certain conditions, such as infrastructure and technology adoption rates (Anthanasius Fomum & Opperman, 2023; G. Okello Candiya Bongomin & J. Ntayi, 2020; G. Okello Candiya Bongomin & J. M. Ntayi, 2020). The same thing happens with the financial inclusion variable: some studies find a strong influence on business performance,

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while others show that this influence weakens when not supported by other factors, such as financial technology or managerial ability. From a theoretical perspective, most research still focuses on the direct relationship between financial technology variables and MSME performance, without considering the role of moderating variables that can strengthen or weaken these relationships (Zikrillah & Sartika, 2024). Financial literacy as a moderating variable has not been comprehensively tested, even though the literature shows that business actors' ability to understand finance strongly determines the success of financial technology implementation (Hidayat-ur-Rehman, 2025; Kumari et al., 2023; Sreenu, 2025). Therefore, there is a need to develop a research model that incorporates financial literacy as a moderating variable to explain differences in previous research findings.

This research model proposes that mobile money, quick response codes, and financial inclusion directly influence MSME performance by increasing transaction efficiency, facilitating access to finance, and improving business management. Mobile money and QR codes allow businesses to make transactions faster and more transparently, thereby increasing customer satisfaction and operational efficiency (Ledi et al., 2023). Meanwhile, financial inclusion provides access to sources of financing and financial services that support business growth. Financial literacy serves as a moderating variable that strengthens the relationship between these variables and MSME performance (Herrera et al., 2023). Business actors with high financial literacy tend to be better at managing cash flow, leveraging digital transaction data, and making more effective financial decisions. Thus, the benefits of mobile money, QR codes, and financial inclusion can be maximized, significantly improving business performance.

This research was conducted on MSMEs in Kendari City, which have considerable economic potential but still face challenges in adopting financial technology and increasing financial literacy. The variation in levels of mobile money use, QR code adoption, and access to formal financial services makes Kendari City a relevant setting for testing the relationship among the research variables. This study aims to analyze the influence of mobile money, quick response code, and financial inclusion on the performance of MSMEs in Kendari City, and to test the role of financial literacy as a moderating variable in this relationship. This research is expected to make theoretical contributions by enriching the literature on financial technology and MSME performance, as well as practical contributions for business actors and policymakers in formulating strategies to improve MSME performance through the use of financial technology and by increasing financial literacy.

Literature Review

Mobile money is one of the innovations in digital financial services that is growing rapidly, especially in developing countries, as a solution to limited access to formal banking services (Siano et al., 2020). Mobile money is defined as a mobile technology-based payment system that allows users to carry out various financial transactions, such as fund transfers, payments, money storage, and fund withdrawals, quickly, efficiently, and affordably only through mobile devices (Adaba & Ayoung, 2017; Morgan, 2022). The presence of mobile

money not only increases financial inclusion but also provides convenience for people who cannot access conventional banking services, especially in remote areas (Ahmad et al., 2020). In the context of MSMEs, mobile money plays an important role in improving operational efficiency by accelerating transactions, reducing costs, and facilitating the recording of business cash flow. Various empirical studies show that the adoption of mobile money can improve business performance, both in terms of revenue and efficiency, because business actors can manage transactions more transparently and in a more structured manner (Mpofu, 2022; Prananingrum et al., 2026). In addition, mobile money also opens up opportunities for integration with other digital financial services, such as microcredit and QR-based payments, thereby further strengthening its role in supporting business sustainability.

A Quick Response Code (QR Code) is a two-dimensional barcode technology that can store various types of information in visual form and can be scanned using digital devices such as smartphones (Focardi et al., 2017; Tiwari, 2016). Compared to conventional barcodes, QR Codes offer greater data storage capacity and higher scanning speeds, making them more efficient for supporting various digital activities. In the context of payment systems, QR codes are an important innovation in digital financial services because they enable transactions to be carried out quickly, conveniently, and without cash. Through scanning the code provided by business actors, consumers can make payments directly using a digital wallet or mobile banking applications. In Indonesia, the implementation of QR Code is growing through the QRIS (Quick Response Code Indonesian Standard) system, which makes it easier for MSMEs to accept payments from various platforms in an integrated manner. Various studies show that the use of QR Codes positively affects MSME performance, particularly by improving transaction efficiency, productivity, and the quality of financial management (Sarlaw & Azis, 2025). In addition, QR Codes support greater transaction transparency and financial recording, thereby helping business actors make more appropriate decisions. However, the success rate of QR Code use remains influenced by financial literacy and the technological readiness of MSME actors, so adequate educational and infrastructure support is needed (Harnida et al., 2024). Thus, QR Code functions not only as a digital payment tool but also as a strategic instrument for improving efficiency, financial inclusion, and MSME performance in the digital era.

Financial literacy is the ability of individuals to understand, manage, and make financial decisions effectively to achieve financial well-being. Financial literacy not only includes knowledge of financial concepts, but also involves skills, attitudes, and beliefs in managing financial resources wisely (Dewi et al., 2020). According to Muñoz-Murillo et al. (2020), financial literacy is related to a person's ability to manage daily finances and plan the use of funds for the future. Individuals with good financial literacy tend to set financial goals, manage savings, make investments, and use financial products, such as insurance, effectively, thereby improving financial well-being (Lusardi, 2019). In the context of MSMEs, financial literacy is an important factor because it determines business actors' ability to manage cash flow, use digital financial services, and make strategic decisions that affect business performance (Gunawan et al., 2023). Thus, financial literacy can be understood as financial intelligence that reflects an individual's ability to manage finances effectively, efficiently, and sustainably in order to achieve economic stability and welfare.

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Financial inclusion is an effort to provide fair, easy, and affordable access to financial services for all levels of society, especially groups that have not been served by the formal financial system. Financial inclusion is a process that aims to expand access to financial services for vulnerable groups, such as low-income communities, to improve welfare and reduce poverty (Ouechtati, 2020). The development of financial inclusion is further strengthened by advances in digital technology, which allow wider, faster, and more efficient access to financial services (Arner et al., 2018; Salampasis & Mention, 2018; Tay et al., 2022). In the context of MSMEs, financial inclusion plays a strategic role by facilitating access to financing, enabling transactions, and managing business finances more effectively (Purohit et al., 2018). Several studies show that financial inclusion positively affects MSME performance, with higher access to and utilization of financial services leading to better business performance (Gunawan et al., 2023; Ratnawati, 2020). However, the effectiveness of financial inclusion is also influenced by business actors' ability to manage finances, so adequate financial literacy support is needed to optimize the benefits (Gunawan et al., 2023; Kyeyune & Ntayi, 2025).

The performance of Micro, Small, and Medium Enterprises (MSMEs) is a measure of business success in achieving set goals across both financial and non-financial dimensions (Mahohoma, 2024). The performance of MSMEs reflects the extent to which businesses can generate income, increase profits, expand capital, and maintain sustainability in a dynamic business environment (Hariyono & Narsa, 2024). MSMEs not only contribute to job creation and income equity but also serve as the main drivers of economic growth and national stability. Therefore, the performance of MSMEs is an important indicator for assessing the sector's success in supporting economic development (Gunawan et al., 2023). Thus, the performance of MSMEs can be understood as the result of business activities that reflect the level of effectiveness, efficiency, and sustainability of the business in achieving economic goals and contributing to the economy at large.

Research Method

This study uses a quantitative approach with descriptive and explanatory designs to analyze the influence of mobile money, quick response code (QR Code), and financial inclusion on MSME performance, with financial literacy as a moderating variable. The data were collected by distributing structured questionnaires to 300 MSME actors in Kendari City. The survey method is used to obtain information on the behavior, perceptions, and levels of utilization of digital financial services and financial management among business actors. The sampling technique used is purposive sampling, which involves selecting respondents who meet certain criteria, such as MSME actors who have used or are familiar with digital payment services such as mobile money and QR Codes. This technique was chosen so that the data obtained would be relevant to the research objectives. Before the full distribution of the questionnaire, the research instrument was first tested on a number of respondents to ensure its validity and reliability. The validity test was carried out by looking at the outer loading and convergent validity values, while the reliability test used Cronbach's alpha and composite reliability with the help of SmartPLS software. The data analysis in this study uses Structural

Equation Modeling–Partial Least Squares (SEM-PLS) with the SmartPLS application. This method was chosen because it can analyze relationships among complex variables, including moderation effects, and is suitable for predictive research.

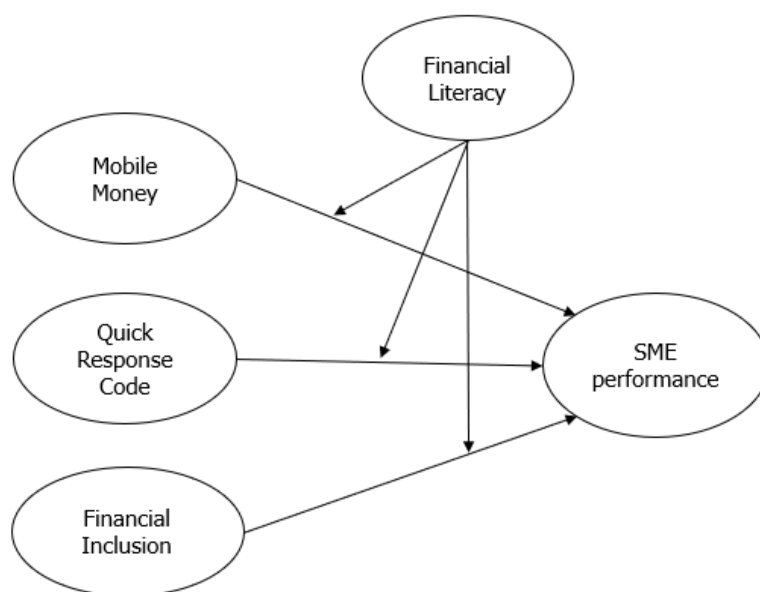


Figure 1. Research Model

Result

The characteristics of the respondents in this study are based on 300 MSME actors in Kendari City. By gender, respondents comprised 126 men (42.0%) and 174 women (58.0%), indicating that the majority of MSME actors in this study were women. This indicates that women have a fairly dominant role in running micro, small, and medium businesses in Kendari City. This dominance reflects that MSMEs are an important means of women's economic empowerment, both to support family income and to increase economic independence. Meanwhile, male involvement remains significant, indicating that the MSME sector is inclusive and open to all groups. In addition, respondents' characteristics can be observed through their use of digital financial services in business activities. Of the 300 respondents, 110 MSME actors (36.7%) use mobile banking, 75 (25.0%) use DANA, 65 (21.7%) use OVO, and 50 (16.6%) use GoPay for business transactions. This distribution shows that the majority of MSME actors still rely on digital banking services, but the use of e-money applications also continues to increase. This reflects the shift from cash to non-cash payment systems and demonstrates the readiness of MSME actors in Kendari City to adopt digital financial technology to improve transaction efficiency and business performance.

Table 1. Measurement Model Assessment

Variables	Items	Loadin g	Cronbach's alpha	Composite reliability	Average variance extracted
Financial Literacy	FL.1	0,992	0,991	2,413	0,966
	FL.2	0,969			

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	FL.3	0,972			
	FL.4	0,996			
	FL.5	0,966			
	FL.6	0,985			
Mobile Money	MM.1	0,961	0,978	0,979	0,938
	MM.2	0,961			
	MM.3	0,924			
	MM.4	0,928			
Quick Response Code	QRS.1	0,963	0,968	0,970	0,888
	QRS.2	0,949			
	QRS.3	0,946			
Financial Inclusion	FI.1	0,954			
	FI.2	0,979			
	FI.3	0,961	0,982	0,982	0,932
	FI.4	0,976			
	FI.5	0,958			
SME Performance	SP.1	0,956			
	SP.2	0,948			
	SP.3	0,947	0,970	0,970	0,892
	SP.4	0,938			
	SP.5	0,933			

The results of the measurement model test showed that all constructs in this study had a very good level of convergent validity. This is evident from the outer loading values for each indicator, which are above the minimum limit of 0.70 and mostly close to 1, indicating that each item strongly represents its construct. In addition, the Average Variance Extracted (AVE) values for all variables are well above the 0.50 threshold, including financial literacy (0.966), mobile money (0.938), quick response code (0.888), financial inclusion (0.932), and SME performance (0.892). This value indicates that the latent variable explains most of the variance in its indicators, so the model has a very high degree of validity.

In terms of reliability, Cronbach's alpha and composite reliability values for all variables were excellent, exceeding the minimum standard of 0.70. This indicates that the research instrument has a strong internal consistency in measuring each construct. However, the composite reliability for the financial literacy variable appears unusual, so it is necessary to recheck to ensure there are no calculation or transcription errors. In general, these results indicate that all variables in the study meet the criteria for reliability and validity, making them suitable for further analysis to test relationships among variables.

Table 2. Discriminant validity of constructs

	1	2	3	4	5
Financial Inclusion					
Financial Literacy	0,085				
Mobile Money	0,097	0,047			
Performance	0,511	0,028	0,553		
Quick Response Code	0,095	0,094	0,103	0,536	

Based on Table 2, the discriminant validity between constructs appears to be quite good, as the values of the relationships between variables are relatively low to moderate, indicating that each construct represents a distinct concept. Financial Inclusion had a very weak association with Financial Literacy (0.085), Mobile Money (0.097), and Quick Response Code (0.095), but showed a stronger association with Performance (0.511). Similarly, Mobile Money shows a fairly strong correlation with Performance (0.553), while its correlations with other constructs remain low. Financial Literacy also showed only a low relationship with Mobile Money (0.047), Performance (0.028), and Quick Response Code (0.094). Overall, this pattern indicates that there is no excessive overlap among the constructs, so the measurement model is adequately able to distinguish each research variable.

Table 3. R Square and Q²predict

	R-square	Q ² predict
Performance	0,740	0,716

The R-square value of 0.740 in the SME Performance variable shows that 74% of the variation in MSME performance in Kendari City can be explained by the variables in the model, namely Mobile Money, Quick Response Code, Financial Inclusion, and Financial Literacy moderation interaction, so that it is included in the strong category in the SEM-PLS approach. Meanwhile, a Q²predict value of 0.716 indicates that the model has excellent predictive capabilities, as it is well above zero, meaning it not only explains the relationship between variables substantively but also accurately predicts MSME performance.

Table 4. Results of Hypothesis Test

	Original sample	P values
Financial Inclusion -> Performance	0,395	0,000
Financial Literacy -> Performance	0,108	0,001
Mobile Money -> Performance	0,437	0,000
Quick Response Code -> Performance	0,429	0,000
Financial Literacy x Quick Response Code -> Performance	0,091	0,018
Financial Literacy x Mobile Money -> Performance	0,120	0,000
Financial Literacy x Financial Inclusion -> Performance	0,129	0,000

The results of the hypothesis test showed that Financial Inclusion had a positive and significant effect on SMEs' Performance, with a coefficient value of 0.395 and a p-value of 0.000 (<0.05). This indicates that the higher the level of financial inclusion, the better the

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performance of MSMEs in Kendari City. Access to formal financial services enables businesses to secure funding, increase liquidity, and manage finances more effectively. Furthermore, Financial Literacy also has a positive and significant effect on SMEs' Performance, with a coefficient value of 0.108 and a p-value of 0.001. Although the influence is relatively small compared to other variables, financial literacy remains an important factor in improving the ability to make more rational and planned financial decisions.

The test results also showed that Mobile Money had a positive and significant influence on SMEs' performance, with a coefficient value of 0.437 and a p-value of 0.000. This is one of the biggest influences on the model, showing that the use of digital payment technology can improve transaction efficiency, accelerate cash flow, and support business growth. In addition, the Quick Response Code (QR Code) has a positive and significant effect on SMEs' performance, with a coefficient value of 0.429 and a p-value of 0.000. This shows that the adoption of QR Code-based payment systems can increase transaction ease for customers and expand the reach of the MSME market. In the moderation role, Financial Literacy was shown to strengthen the relationship between Quick Response Code and SMEs' Performance, with a coefficient of 0.091 and a p-value of 0.018. This means that the higher the financial literacy of MSME actors, the more effective QR Codes will be at improving business performance. Furthermore, Financial Literacy positively and significantly moderated the relationship between Mobile Money and SMEs' Performance, with a coefficient of 0.120 and a p-value of 0.000. This shows that a good understanding of finance enables business actors to use mobile money more effectively to support their business activities. Finally, Financial Literacy moderated the relationship between Financial Inclusion and SMEs Performance, with a coefficient value of 0.129 and a p-value of 0.000. These results confirm that although access to financial services is important, without adequate financial literacy, the benefits will not be maximized. Therefore, the combination of inclusion and financial literacy is a key factor in improving MSME performance.

Discussion

The study's results show that the use of mobile money positively affects MSME performance in Kendari City. These findings indicate that the adoption of mobile-based financial technology can improve business operational efficiency, especially in payment transactions, cash flow management, and the speed of customer service (Ledi et al., 2023). Mobile money enables MSME actors to conduct transactions more conveniently, reduce transaction costs, and minimize dependence on cash (Muñoz-Murillo et al., 2020; G. Okello Candiya Bongomin & J. M. Ntayi, 2020; Sarlawa & Azis, 2025). This condition directly contributes to increased productivity and business effectiveness, ultimately improving MSME performance. These findings are in line with research that states that the use of mobile money can improve business performance through transaction efficiency and better financial management (G. Okello, Candiya Bongomin, & J. Ntayi, 2020).

In addition, the use of mobile money also contributes to expanding MSME market access. By providing digital payment methods, business actors can reach a wider range of

consumers, including consumers who prefer non-cash transactions (Gunawan et al., 2023; Sarlawa & Azis, 2025). This is supported by research showing that the adoption of mobile money increases payment inclusivity and expands customer networks. Furthermore, mobile money affects not only transactions but also the quality of financial decision-making. Digitally recorded transaction data provides information that MSME actors can use for business evaluation, financial planning, and cost control. Previous research has shown that using digital transaction data from mobile money can improve the quality of financial management and support more accurate decision-making. This strengthens the role of mobile money as a strategic tool in business management.

However, the effectiveness of mobile money in improving MSME performance is also influenced by environmental conditions and the characteristics of business actors (Ratnawati, 2020). Several studies have shown that the benefits of mobile money can vary with the level of infrastructure, service costs, and users' readiness to adopt the technology (Zikrillah & Sartika, 2024). In the context of MSMEs in Kendari City, this shows that although mobile money has great potential, optimizing its benefits still requires adequate ecosystem support, including technology networks and digital literacy.

Overall, the results of this study reinforce previous empirical findings that mobile money is an important factor in improving MSME performance. This technology not only improves operational efficiency and transaction ease but also supports better financial management and expanded market access. Therefore, the adoption of mobile money by MSMEs in Kendari City can be seen as a relevant strategy in facing digital transformation and increasing business competitiveness in the digital economy era.

Conclusion

This study concludes that the performance of MSMEs in Kendari City is influenced by the use of financial technology, such as mobile money and quick response codes, as well as by the level of financial inclusion among business actors. In addition, financial literacy plays an important role in increasing the effectiveness of technology use and access to finance. MSME actors with good financial literacy tend to be better at managing transactions, cash flow, and financial decisions, thereby improving business performance. These findings confirm that the success of MSMEs is determined not only by access to technology and financial services but also by their effective use.

However, this research still has limitations, including the use of cross-sectional data, which cannot capture dynamic changes, and a scope limited to MSMEs in Kendari City. In addition, the variables used remain limited, so they do not capture all factors affecting MSME performance. Therefore, further research is recommended to expand the research area using a longitudinal approach and to add variables such as innovation, digital capabilities, and entrepreneurial orientation to obtain more comprehensive and in-depth results.

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