

QRIS, P2P LENDING, AND MSME SUSTAINABILITY: THE MEDIATING ROLE OF CAPITAL STRUCTURE

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Abstract

This study examines the impact of QRIS and peer-to-peer (P2P) lending on the sustainability of micro, small, and medium enterprises (MSMEs), with capital structure as a mediating variable in Medan Petisah. The rapid development of digital financial services has provided new opportunities for MSMEs to improve financial access and operational efficiency. This research employs a quantitative approach using survey data collected from MSME actors. The analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings reveal that QRIS and P2P lending have a significant positive effect on capital structure and MSME sustainability. Furthermore, capital structure partially mediates the relationship between financial technology usage and business sustainability. These findings indicate that digital financial adoption not only enhances access to funding but also improves the financial structure of MSMEs, contributing to long-term sustainability. This study provides empirical evidence on the role of financial technology in strengthening MSME performance in urban areas.

Keywords: QRIS, P2P Lending, MSMEs, Capital Structure, Sustainability

1. Introduction

The rapid advancement of financial technology (fintech) has significantly transformed the global financial ecosystem, particularly in developing countries where micro, small, and medium enterprises (MSMEs) play a crucial role in economic growth and employment generation (Djohan et al., 2025). Global economic growth is projected to range between 2–3% in 2025 despite ongoing risks such as trade tensions, financial uncertainty, and geopolitical instability (Harianto et al., 2025). In contrast, Indonesia demonstrates relatively strong economic resilience, with projected growth ranging from 4.7% to 5.0%, supported by actual growth of 4.87% and 5.12% in the first and second quarters of 2025 (Sagala, 2025).

MSMEs remain a fundamental pillar of Indonesia's economy, contributing approximately 97% of total employment and 59–61% of gross domestic product (GDP) (Pakpahan et al., 2024). However, this substantial contribution has not been accompanied by optimal productivity, access to formal financing, and export capacity (Balqis et al., 2023; Harahap & Marliyah, 2024). These limitations indicate a structural imbalance between the economic importance of MSMEs and their actual performance, particularly in achieving sustainable growth (Khairani, Silaban, et al., 2025; Khairani, Tantri, et al., 2025).

Previous studies highlight that improving access to financial services is a key factor in enhancing MSME performance. (Khairani, Tantonno, et al., 2025; Ozili, 2018, 2021) argues that financial inclusion increases economic participation by improving access to

financial services, while (Demirguc et al., 2021) emphasize that limited financial access remains a major constraint for MSMEs in developing economies. Furthermore, (Sussan & Acs, 2017) demonstrate that access to finance plays a crucial role in firm growth and survival.

In Indonesia, digital financial innovations such as Quick Response Code Indonesian Standard (QRIS) and peer-to-peer (P2P) lending have been widely promoted as strategic instruments to enhance financial inclusion and improve MSME performance. The rapid growth of these financial technologies reflects increasing adoption and expanding financial access, as illustrated in Table 1.

Table 1. Indicators of QRIS Growth and P2P Lending Financing in Supporting MSMEs in Indonesia

Indicator	Value/Description
Outstanding fintech P2P lending (December 2024)	Rp 77.07 trillion
Growth YoY P2P lending (December 2024)	+29.14% YoY
Bank channelling to P2P lending	Approximately 60%
Fintech P2P lending equity	Rp 5.07 trillion
QRIS Tap merchants (June 2025)	648,034 merchants
QRIS Tap users (June 2025)	47.8 million users
QRIS merchants (October 2023)	29.6 million merchants (~92% MSMEs)

Source: OJK (2025), Bank Indonesia (2025), BPS (2025), processed

The data presented in Table 1 show a significant increase in QRIS adoption and P2P lending financing, indicating the rapid expansion of digital financial services in Indonesia. Despite this progress, many MSMEs still face challenges in translating increased financial access into sustainable economic performance. This condition suggests that the relationship between fintech adoption and MSME sustainability is not linear and may depend on internal financial management mechanisms.

Empirical studies suggest that fintech adoption alone is insufficient to guarantee business sustainability. (Tay et al., 2022) find that fintech improves efficiency but does not automatically enhance long-term performance, while (Nguyen et al., 2022) emphasize that internal financial behavior and resource management are critical determinants of firm sustainability.

From a theoretical perspective, this issue can be explained through capital structure theory, which emphasizes the importance of optimal financing decisions in enhancing firm value and sustainability (Ming et al., 2025). In addition, financial intermediation theory explains the role of financial institutions in facilitating efficient allocation of financial resources (Zhao et al., 2024), while innovation diffusion theory explains how

technological adoption influences organizational performance and efficiency (Siddik et al., 2023).

However, despite the growing literature, existing studies tend to examine digital payments and alternative financing separately and focus mainly on their direct effects on financial inclusion or performance. (Gumilar et al., 2024; Xue et al., 2023) indicate that most studies overlook the role of internal financial mechanisms, particularly capital structure, in linking fintech adoption to sustainability outcomes (Ferreira et al., 2022; Nambisan et al., 2019).

Moreover, the combined role of QRIS and P2P lending within a single analytical framework remains underexplored, particularly in the context of MSMEs in emerging economies such as Indonesia. This limitation highlights the need for a more integrated approach that considers both external financial innovation and internal financial decision-making.

Therefore, this study aims to examine the effect of QRIS and P2P lending on MSME sustainability, with capital structure as a mediating variable. This study contributes to the literature by integrating fintech adoption and corporate finance perspectives into a unified framework, providing a more comprehensive explanation of MSME sustainability in the context of urban MSMEs.

2. Theoretical Background

Based on the issues identified in the introduction, particularly the gap between the rapid growth of fintech adoption and the limited sustainability of MSMEs, this section develops the theoretical framework, reviews previous studies, and formulates the research hypotheses. This study integrates financial intermediation theory, capital structure theory, and technology adoption theory to explain the relationship between QRIS, P2P lending, capital structure, and MSME sustainability.

2.1 Financial Intermediation Theory

Financial intermediation theory explains the role of financial institutions as intermediaries between surplus and deficit units in the economy. These intermediaries reduce transaction costs, mitigate information asymmetry, and improve the efficiency of capital allocation (Tian, 2022). In the context of financial technology, fintech platforms act as modern intermediaries that enhance financial inclusion and accessibility. QRIS improves transparency through digital transactions, while P2P lending expands access to financing by utilizing alternative data and digital platforms (Allen et al., 2016; Beck et al., 2007; Li et al., 2020). This perspective aligns with recent findings that fintech improves financial intermediation efficiency and expands access to financial services, particularly for small businesses (Noor-E-Sahar et al., 2025; Ozili, 2018).

2.2 Capital Structure Theory

Capital structure theory explains how firms determine the optimal combination of internal and external financing. According to Modigliani and Miller (1958), capital structure influences firm value under real-world conditions due to factors such as taxes, risk, and information asymmetry (D'Amato, 2020). In the context of MSMEs, internal financing often dominates due to limited access to formal credit. However, fintech adoption provides new opportunities for accessing external funding. The use of QRIS can improve financial transparency and credibility, thereby facilitating access to financing, while P2P lending increases the proportion of debt financing (Setyaningtyas, 2024).

Previous studies indicate that fintech can influence capital structure by improving access to external funding sources (Violinda, 2024), while broader evidence shows that access to finance remains a key determinant of firm growth and sustainability (Beck et al., 2007).

2.3 Technology Adoption Theory

Technology adoption theory, including the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT), explains that perceived usefulness and ease of use are key determinants of technology adoption (Indiani et al., 2025; Sivathanu, 2019; Venkatesh et al., 2003). In the MSME context, digital literacy and perceived security significantly influence the adoption of financial technologies such as QRIS (Mosbah, 2024). The adoption of fintech is therefore not only determined by availability but also by user readiness and behavioral factors. Empirical studies also confirm that fintech adoption improves efficiency and business performance when supported by adequate technological capability (Hamzah et al., 2025; Khairani, Octora, et al., 2025)(Nguyen et al., 2022).

2.4 QRIS and MSME Sustainability

The use of QRIS enhances transaction efficiency, transparency, and market accessibility for MSMEs (Setyaningtyas, 2024). Digital payments enable faster transactions, reduce operational costs, and improve financial records, which are essential for business sustainability. Previous studies show that QRIS adoption improves operational efficiency and expands market reach, although its effectiveness is influenced by digital literacy and infrastructure (Nasib et al., 2026). In addition, digital financial services are found to improve financial inclusion and economic participation (Ozili, 2018)(Ozili, 2021). Therefore, QRIS is expected to positively influence MSME sustainability.

H₁: QRIS has a positive effect on MSME sustainability.

2.5 P2P Lending and MSME Sustainability

P2P lending provides an alternative source of financing for MSMEs that face difficulties in accessing traditional credit (Suryono et al., 2021). This financing mechanism supports business expansion, increases income, and improves financial access. Previous studies indicate that P2P lending contributes to MSME financial performance but also carries risks such as default (Putri et al., 2023). Furthermore, fintech lending platforms have been shown to improve access to finance and support business growth (Crespo et al., 2025; Noor-E-Sahar et al., 2025) (Pizzi et al., 2021). Thus, P2P lending is expected to enhance MSME sustainability.

H₂: P2P lending has a positive effect on MSME sustainability.

2.6 QRIS and Capital Structure

QRIS adoption improves financial transparency and transaction records, which can enhance MSMEs' credibility in accessing external financing. This improvement supports better financial decision-making and influences capital structure. Fintech has been found to reduce information asymmetry and improve financial intermediation efficiency (Amirullah & Syakur, 2025; Khairani, Silaban, et al., 2025; Ramayanti et al., 2025). Therefore, QRIS is expected to positively affect capital structure.

H₃: QRIS has a positive effect on capital structure.

2.7 P2P Lending and Capital Structure

P2P lending directly affects capital structure by increasing access to external financing. This shifts the balance between internal and external funding sources (Cornelli et al., 2024). Empirical evidence shows that fintech lending improves SME access to credit and influences financing decisions (Abbasi et al., 2021)(Diniyya et al., 2021; Khairani et al., 2024; Koranteng & You, 2025). Therefore, P2P lending is expected to positively influence capital structure.

H₄: P2P lending has a positive effect on capital structure.

2.8 Capital Structure and MSME Sustainability

Capital structure plays a crucial role in determining business stability and sustainability (Ningrum, 2023). MSMEs with balanced financing structures are better able to manage risks and sustain long-term performance. Previous studies indicate that access to finance and financial structure significantly influence firm growth and resilience (Bui et al., 2023), while fintech can strengthen financial structure (Beck et al., 2007; Crespo et al., 2025; Savitz, A; Weber, 2006; Soverchia, 2020). Thus, capital structure is expected to positively affect MSME sustainability.

H₅: Capital structure has a positive effect on MSME sustainability.

2.9 The Mediating Role of Capital Structure

The relationship between fintech and MSME sustainability is not purely direct. While QRIS improves transaction efficiency and P2P lending enhances financial access, sustainability depends on how firms manage financial resources (D'Amato, 2020). Previous studies show that fintech and MSME performance are often examined separately (Beltramino et al., 2020), and the use of capital structure as a mediating variable remains limited (Temouri, 2022). Therefore, capital structure is expected to mediate the relationship between fintech adoption and MSME sustainability.

H₆: Capital structure mediates the relationship between QRIS and MSME sustainability.

H₇: Capital structure mediates the relationship between P2P lending and MSME sustainability.

3. Methods

This study employs a quantitative approach with an explanatory research design to examine the causal relationships between QRIS usage, P2P lending, capital structure, and MSME sustainability. The explanatory design is appropriate for testing hypotheses and analyzing both direct and indirect effects among variables. The study was conducted among MSMEs in Medan Petisah District in 2025. This location was selected purposively due to its dynamic economic activity and increasing adoption of digital financial services such as QRIS and P2P lending. The population consists of 3,312 MSMEs based on data from the Central Statistics Agency.

A purposive sampling technique was applied by selecting MSMEs that had been operating for at least one year, used QRIS as a payment system, and had experience with P2P lending services. A total of 105 questionnaires were collected, and after data cleaning, 75 valid responses were retained for analysis. This sample size is considered adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM), particularly based on the 10-times rule. Primary data were collected through a structured questionnaire distributed to MSME owners or managers using Google Forms. The instrument was developed based on theoretical constructs and previous empirical studies related to

fintech, capital structure, and MSME sustainability. All variables were measured using a five-point Likert scale ranging from strongly disagree to strongly agree.

The variables in this study consist of QRIS and P2P lending as independent variables, capital structure as a mediating variable, and MSME sustainability as the dependent variable. QRIS is measured through indicators such as ease of use, transaction efficiency, transparency, and digital transaction records, while P2P lending is measured through accessibility, funding speed, flexibility, and financing suitability. Capital structure is measured based on the balance between internal and external financing, whereas MSME sustainability is assessed through income stability, business growth, adaptability, and long-term continuity. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS software. This method is suitable for analyzing complex models involving latent variables and mediation effects, particularly with moderate sample sizes. The analysis includes evaluation of the measurement model to assess validity and reliability, followed by structural model evaluation to test the hypothesized relationships, including path coefficients, significance levels, and mediation effects. PLS-SEM was selected because it is suitable for prediction-oriented research, complex models involving mediation, and relatively small sample sizes.

4. Results and Discussion

This section presents the results of data analysis using Partial Least Squares Structural Equation Modeling (PLS-SEM) and provides a discussion of the findings in relation to the proposed hypotheses and relevant theoretical frameworks. In addition, variance inflation factor (VIF) values were also examined and found to be below the threshold of 5, confirming the absence of multicollinearity.

Table 2. Multicollinearity Test Results

Variable	QRIS	P2P Lending	Capital Structure	MSME Sustainability
QRIS	1.000	0.493	0.599	0.414
P2P Lending	0.493	1.000	0.526	0.296
Capital Structure	0.599	0.526	1.000	0.467
MSME Sustainability	0.414	0.296	0.467	1.000

Description: presents the correlation matrix among the variables to assess potential multicollinearity issues in the research model. The independent variables in this study are QRIS and P2P lending, the mediating variable is capital structure, and the dependent variable is MSME sustainability. The results indicate that all correlation values among variables are below the threshold of 0.80. This suggests that there is no strong correlation between independent variables that could lead to multicollinearity problems. Therefore, the model can be considered free from multicollinearity and suitable for further structural analysis.

Source: processed data (2025)

4.1 Measurement Model Evaluation (Outer Model)

4.1.1 Convergent Validity

The convergent validity of the measurement model was assessed using outer loading values and Average Variance Extracted (AVE). The results show that, after eliminating several indicators with loading values below the threshold of 0.70, all remaining indicators demonstrate satisfactory loading values ranging from 0.711 to 0.842.

Furthermore, the AVE values for QRIS (0.594), P2P lending (0.582), capital structure (0.559), and MSME sustainability (0.642) exceed the recommended threshold of 0.50, indicating that each construct explains more than 50% of the variance of its indicators. These findings confirm that all constructs meet the criteria for convergent validity. This result is consistent with the guidelines proposed by (Hair et al., 2021), which state that AVE values above 0.50 indicate adequate convergent validity in PLS-SEM models.

Table 3. Outer Loading QRIS (QR) (X₁)

QR1	QR2	QR3	QR5	QR6	QR8	QR9	QR10
0.738	0.779	0.786	0.772	0.809	0.711	0.773	0.794

Table 4. Outer Loading P2P Lending (P₂P) (X₂)

P2P1	P2P2	P2P3	P2P4	P2P5	P2P6	P2P7	P2P8	P2P9	P2P10
0.78	0.744	0.842	0.765	0.717	0.744	0.793	0.721	0.732	0.783

Table 5. Outer Loading Capital Structure (SM) (Z)

SM1	SM7	SM8	SM9	SM10
0.703	0.753	0.865	0.828	0.548

Table 6. Outer Loading MSME Sustainability (KU) (Y)

KU1	KU3	KU4	KU5	KU6	KU7	KU9	KU10
0.774	0.797	0.819	0.801	0.823	0.768	0.821	0.804

Table 6. Average Variance Extracted (AVE)

QRIS	P2P	SM	KU
0.594	0.582	0.559	0.642

The results show that most indicators have outer loading values above the recommended threshold of 0.70, indicating strong indicator reliability. However, one indicator in the capital structure variable (SM10 = 0.548) is slightly below the threshold but was retained due to its theoretical relevance. In the initial stage, several indicators with loading values below 0.70 were removed to improve the measurement model. After refinement, the remaining indicators demonstrate acceptable convergent validity.

These findings are consistent with (Hair et al., 2021), which suggests that outer loading values above 0.70 indicate adequate reliability, although values between 0.50–0.70 may still be acceptable in exploratory research.

4.1.2 Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio (HTMT) to ensure that each construct is distinct from others.

Table 7. Fornell-Larcker Criterion

	KU	P2P	QRIS	SM
KU	0.801			
P2P	0.296	0.763		
QRIS	0.414	0.493	0.771	
SM	0.467	0.526	0.5986	0.748

Source: Processed data (2025)

Table 8. Heterotrait-Monotrait Ratio (HTMT)

	KU	P2P	QRIS	SM
KU				
P2P	0.302			
QRIS	0.427	0.55		
SM	0.518	0.582	0.675	

Source: Processed data (2025)

The square root of AVE for each construct is greater than the correlation values between constructs, indicating that each variable is empirically distinct. In addition, all HTMT values are below 0.90, with the highest value at 0.675.

These results confirm that the model satisfies discriminant validity requirements, meaning that each construct measures a unique concept. This finding is consistent with (Henseler et al., 2009), which recommends HTMT values below 0.90 to ensure construct distinctiveness.

4.1.3 Construct Reliability

Construct reliability was assessed using Cronbach’s Alpha and Composite Reliability to evaluate internal consistency.

Table 9. Reliability Results

	Cronbach's alpha	Composite reliability (rho_c)
KU	0.92	0.935
P2P	0.921	0.933
QRIS	0.903	0.921
SM	0.797	0.861

The results show that all variables have Cronbach’s Alpha and Composite Reliability values above 0.70, indicating strong internal consistency among indicators. These findings confirm that the measurement instruments are reliable and suitable for further analysis. This result is in line with (Hair et al., 2021), which states that values above 0.70 indicate acceptable reliability in PLS-SEM studies.

4.2 Structural Model Evaluation (Inner Model)

After confirming the validity and reliability of the measurement model, the structural model (inner model) was evaluated to examine the relationships among variables and the model’s explanatory power. This evaluation focuses on how QRIS and P2P lending influence capital structure and MSME sustainability, both directly and indirectly.

The structural model assessment was conducted using several key indicators, including the coefficient of determination (R^2), hypothesis testing, mediation analysis, and effect size (f^2). These indicators provide insight into the strength and significance of the relationships within the model. The results of the structural model evaluation are presented in the following sections.

4.2.1 Coefficient of Determination (R²)

Table 10. R-Square Results

Dependent Variable	R Square	R Square Adjusted
Capital Structure (SM)	0.427	0.411
MSME Sustainability (KU)	0.246	0.215

Source: Processed data (2025)

The R² value for capital structure indicates that QRIS and P2P lending explain 42.7% of its variance, which can be categorized as moderate. Meanwhile, MSME sustainability has an R² value of 0.246, indicating that the model explains 24.6% of the variance.

These findings suggest that while the model has adequate explanatory power, other external factors also contribute to MSME sustainability. According to Hair et al. (2021), R² values around 0.25 are considered weak to moderate in behavioral research.

4.2.2 Hypothesis Testing

Table 11. Hypothesis Testing Results

Hypothesis	Relationship	β	T	P	Result
H ₁	QRIS → Capital Structure	0.445	4.723	0.000	Supported
H ₂	P2P Lending → Capital Structure	0.306	3.052	0.002	Supported
H ₃	QRIS → Sustainability	0.205	1.427	0.154	Not Supported
H ₄	P2P → Sustainability	0.019	0.120	0.905	Not Supported
H ₅	Capital Structure → Sustainability	0.335	2.566	0.010	Supported

Source: Processed data (2025)

The results indicate that QRIS and P2P lending have a significant positive effect on capital structure, suggesting that fintech adoption improves financial management and access to funding.

However, both variables do not have a direct significant effect on MSME sustainability. This implies that fintech alone is insufficient to ensure sustainability without effective financial management.

In contrast, capital structure significantly influences sustainability, highlighting the importance of balanced financing. These findings support Financial Intermediation Theory (Beck et al., 2007; Levine, 2005).

4.2.3 Mediation Analysis

Table 12. Mediation Results

Hypothesis	Path	Original Sample (O)	T-Statistic	P-Value	Result
H ₆	QRIS → SM → Sustainability	0.149	2.237	0.025	Supported
H ₇	P2P Lending – Struktur P2P → SM → Sustainability	0.103	1.703	0.089	Not Supported

Source: Processed data (2025)

The results show that capital structure mediates the relationship between QRIS and MSME sustainability but does not mediate the relationship between P2P lending and sustainability.

This indicates that QRIS contributes indirectly to sustainability through improved financial management, while P2P lending requires better financial utilization to generate sustainable outcomes. This finding aligns with (Pizzi et al., 2021).

4.2.4 Effect Size (f²)

Table 13. Effect Size Results

Relationship	(f ²)	Category
QRIS → Capital Structure	0.262	Moderate
P2P → Capital Structure	0.124	Small
QRIS → Sustainability	0.033	Small
P2P → Sustainability	0.000	No effect
Capital Structure → Sustainability	0.085	Small

Source: Processed data (2025)

The effect size analysis indicates that the strongest relationship is between QRIS and capital structure, while the weakest is between P2P lending and sustainability.

These results suggest that fintech plays a more important role in shaping financial structure than directly influencing sustainability outcomes. According to Cohen (1988), most relationships fall within small to moderate effect categories.

5. Conclusion

This study aims to examine the effect of QRIS and P2P lending on MSME sustainability, with capital structure as a mediating variable. The results indicate that both QRIS and P2P lending have a significant positive effect on capital structure, suggesting that fintech adoption improves financial transparency and access to external financing. However, QRIS and P2P lending do not have a direct significant effect on MSME sustainability. This finding implies that the adoption of digital financial services alone is not sufficient to ensure business sustainability without proper financial management.

In contrast, capital structure is found to have a significant positive effect on MSME sustainability, indicating that a balanced financing composition plays an important role in maintaining business stability and long-term performance. Furthermore, the mediation analysis reveals that capital structure mediates the relationship between QRIS and MSME sustainability, but does not mediate the relationship between P2P lending and sustainability. This suggests that the impact of fintech on sustainability depends on how financial resources are managed within the firm. Overall, this study concludes that fintech serves as an enabling factor rather than a direct driver of MSME sustainability, and its effectiveness depends largely on the ability of MSMEs to manage their financial structure efficiently.

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