

Beyond Fintech Adoption: Examining How Financial Literacy and Fintech Capabilities Enhance MSME performance Through Technology Acceptance and Financial Inclusion

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Abstract

This study examines the influence of financial literacy, financial technology, and financial innovation on the performance of micro, small, and medium enterprises (MSMEs) in East Java, Indonesia, with financial inclusion as a mediating variable and the Technology Acceptance Model (TAM) as a moderating variable. The study employed an explanatory quantitative design using survey data collected from MSMEs listed in the Bank Indonesia East Java MSME database. From a target sample of 271 MSMEs selected through stratified proportional random sampling, 256 usable responses were obtained. Data were collected using a five-point Likert-scale questionnaire and analyzed using partial least squares structural equation modeling (PLS-SEM). The findings show that financial literacy, financial technology, financial innovation, and financial inclusion have positive and significant effects on MSME performance. Financial literacy, financial technology, and financial innovation also positively and significantly influence financial inclusion. Financial inclusion has the strongest direct effect on MSME performance and significantly mediates the effects of the three financial capability variables on MSME performance. However, TAM does not significantly moderate the relationship between financial inclusion and MSME performance. These results indicate that MSME performance is driven more by financial capability, financial access, and effective use of financial services than by general technology acceptance alone. The study contributes to MSME performance literature by positioning financial inclusion as a central transmission mechanism between internal financial capabilities and business outcomes.

Keywords: Financial Literacy; Financial Technology; Financial Innovation; Financial Inclusion; MSME Performance; Technology Acceptance Model.

1. Introduction

Micro, small, and medium enterprises (MSMEs) are a central component of the Indonesian economy because they represent a large proportion of business units, absorb labor, and support local economic resilience. In East Java, MSMEs have a particularly strategic position because the province contains a wide distribution of enterprises across urban and rural areas, diverse business sectors, and different scales of operation.(1) However, the strategic contribution of MSMEs is not automatically followed by optimal business performance. Many MSMEs remain concentrated in micro-scale activities, operate with narrow margins, and face limitations in expanding markets, improving productivity, and adopting modern financial practices. This creates a performance paradox: MSMEs are numerous and socially important, but many of them still struggle to translate business activity into sustainable growth.(2).

The performance challenges faced by MSMEs in East Java are closely related to financial management and digital transformation. Many business owners still depend on informal financial practices, limited bookkeeping, and short-term cash-flow decisions. Al-shami et al., (2024) These constraints reduce their ability to evaluate profitability, prepare bankable financial reports, access formal financing, and allocate resources for expansion. (4) In addition, the transition toward digital finance has created both opportunities and barriers. (5) Digital payment systems, mobile banking, peer-to-peer lending, and accounting applications can improve transaction efficiency and financial visibility, yet not all MSMEs have the knowledge, confidence, and capability to use such tools effectively.(6)

This study responds to these issues by examining three financial capability variables: financial literacy, financial technology, and financial innovation.(7) Financial literacy refers to the knowledge, attitudes, and behaviors that enable business owners to understand financial products, manage cash flow, evaluate risk, and make informed financial decisions. Financial technology refers to the adoption of technology-based financial services, including digital payments, online transactions, and digital financial platforms. Financial innovation refers to the development or adoption of new financial practices, processes, products, or systems that improve the way an enterprise manages its financial resources.(8)

The study also positions financial inclusion as a mediating variable. (9) Financial inclusion is not merely the availability of financial services; it also includes the ability of MSMEs to access, use, and benefit from formal financial products such as savings accounts, credit, payment systems, insurance, and other financial services. (10) Financial inclusion is expected to connect internal financial capabilities with actual performance outcomes. A business owner may possess financial knowledge or digital financial tools, but these capabilities will have stronger effects on performance when they lead to broader access to formal and productive financial services. (11)

Furthermore, the study includes the Technology Acceptance Model (TAM) as a moderating variable. TAM explains technology adoption through perceived usefulness and perceived ease of use. (12) In the MSME context, the model is important because digital finance cannot improve performance if business owners do not perceive it as useful or easy to operate. TAM was therefore tested to determine whether the acceptance of technology strengthens the effect of financial inclusion on MSME performance.

The novelty of this study lies in its integrated model. Prior studies often examine financial literacy, financial technology, innovation, financial inclusion, or performance separately. This study combines those constructs into a model that includes both mediation and moderation. The model is theoretically grounded in the Theory of Planned Behavior, Resource-Based View, Balanced Scorecard, and Technology Acceptance Model. Empirically, the study uses MSME data from East Java and applies PLS-SEM to evaluate measurement quality, structural effects, mediation, and moderation simultaneously.

The objectives of this study are to analyze the effects of financial literacy, financial technology, and financial innovation on MSME performance; examine their effects on financial inclusion; test the mediating role of financial inclusion; and evaluate whether TAM moderates the relationship between financial inclusion and MSME performance. The findings are expected to contribute to the development of MSME financial-management literature and provide practical insights for policymakers, financial institutions, and MSME development agencies.

1.1. Theoretical foundation

The Theory of Planned Behavior (TPB) explains that behavior is shaped by attitudes, subjective norms, and perceived behavioral control. (13). In the context of MSME financial behavior, attitudes toward bookkeeping, budgeting, credit management, and digital transactions can influence the intention to adopt sound financial practices. Subjective norms may emerge from market pressure, bank requirements, peer influence, or government programs that encourage business owners to formalize their financial systems. Perceived behavioral control reflects the confidence of MSME owners that they can learn, adopt, and maintain financial practices despite limited resources.

The Resource-Based View (RBV) argues that firms obtain superior performance when they possess valuable, rare, inimitable, and non-substitutable resources. (14). Within this perspective, financial literacy can be understood as an intangible managerial resource, financial technology as a technological capability, and financial innovation as a dynamic capability. These resources help MSMEs reduce transaction costs, improve financial planning, increase market responsiveness, and build credibility with external stakeholders. Financial inclusion complements RBV because access to financial services can transform internal resources into productive business expansion.

MSME performance in this study is interpreted broadly rather than only as profit. The Balanced Scorecard perspective emphasizes that performance should include financial outcomes, customer-related outcomes, internal business processes, and learning and growth. (15). This perspective is relevant because many MSMEs may show modest short-term profit but still improve performance through better customer service, digital transactions, operational efficiency, product development, and managerial learning. Therefore, the study treats MSME performance as a multidimensional construct. (16).

The Technology Acceptance Model provides a behavioral explanation for the use of digital financial services. Perceived usefulness describes the belief that a technology improves business tasks, while perceived ease of use reflects the belief that the technology can be used without excessive effort. (17). TAM is relevant for MSMEs because the availability of financial technology does not guarantee utilization. Business owners may avoid digital finance if they perceive it as complicated, risky, or unrelated to their daily business needs. (18).

1.2. Financial literacy, financial technology, financial innovation, and financial inclusion

Financial literacy is expected to improve MSME performance because it strengthens the ability of owners to prepare budgets, separate personal and business money, calculate cost of goods sold, monitor cash flow, and evaluate financing decisions. (7) A financially literate owner is more likely to detect inefficiency, manage debt responsibly, and identify feasible investment options. (19) In small enterprises where owners frequently perform multiple managerial functions, financial literacy becomes a core capability that directly affects daily decisions and long-term survival. (20)

Financial literacy is also expected to improve financial inclusion. (21). Formal financial institutions generally require business information, repayment capacity, and financial documentation. MSMEs with better financial literacy are more prepared to meet these requirements because they understand the importance of transaction records, credit history, bank accounts, and financial statements. (22). Consequently, literacy may create readiness for formal financial access. Without literacy, access to financial services may be underutilized or used in ways that do not support business growth. (23).

Financial technology can improve MSME performance through faster payment settlement, easier transaction records, broader customer reach, and more efficient financial administration. (6) Digital payments and mobile banking reduce the dependence on cash transactions and can create transaction data that support financing applications. (24). Online financial platforms may also reduce geographic barriers and help MSMEs interact with customers and suppliers more efficiently. (25) However, fintech adoption requires digital readiness and trust, and its performance impact depends on the extent to which the technology is used in business processes. (26).

Financial technology can also strengthen financial inclusion because digital financial services expand the channels through which MSMEs access formal financial products. (27). Mobile banking, e-wallets, payment gateways, and online lending platforms allow enterprises to interact with financial institutions even when conventional bank branches are difficult to reach. In this sense, fintech functions as an inclusion accelerator. (28). Nevertheless, the benefit of fintech remains limited if MSMEs do not understand the products, fail to maintain digital transaction records, or remain concerned about data security. (29).

Financial innovation refers to new practices or systems that improve the way MSMEs manage financial activities. (8) Examples include digital bookkeeping, alternative financing arrangements, QR-code payments, integrated financial reporting applications, and new mechanisms for managing working capital. Financial innovation is expected to affect performance because it encourages enterprises to move from reactive survival practices to proactive financial management. (30) Innovation also helps MSMEs respond to changes in customer behavior, market uncertainty, and digital competition. (31)

Financial innovation is likewise expected to influence financial inclusion. Innovative financial practices can make MSMEs more visible and credible to external financial providers (32). Digital records, structured reports, and non-cash transactions produce data that reduce information asymmetry between MSMEs and lenders. Pasaribu et al. (2024) When the information gap is reduced, the probability of

obtaining formal financing or using other formal services becomes higher. Nanda & Yunus (2024). Thus, financial innovation is not only a managerial tool but also a mechanism for connecting MSMEs with the broader financial ecosystem.

Financial inclusion is expected to have a direct positive effect on MSME performance because it improves the ability to obtain working capital, manage liquidity, conduct secure transactions, save for future investment, and mitigate business risks. (9) Access to credit may support expansion, while access to payment systems may increase sales efficiency. Access to formal accounts and records may also improve business discipline. Septiani & Wuryani (2020); Ratnawati & Yuana (2022). Therefore, inclusion is expected to be a central pathway through which financial capabilities are converted into measurable business outcomes.

1.3. Hypotheses development

Based on TPB, RBV, and the Balanced Scorecard perspective, financial literacy is expected to strengthen MSME performance because it improves planning, recordkeeping, decision-making, and risk evaluation. Financial technology is expected to improve performance because it reduces transaction costs and supports digital business processes. Financial innovation is expected to improve performance because it introduces more adaptive financial practices and creates opportunities for efficiency and growth. Financial inclusion is expected to improve performance because it expands access to productive financial resources. Eniola & Entebang (2015) Tuffour et al. (2022) H. Baker et al., (2023) Wang & Bo, (2024) (Chauvet & Jacolin, 2017) Ratnawati & Yuana, (2022)

The mediating role of financial inclusion is based on the argument that financial literacy, fintech, and financial innovation may not be sufficient unless they enable MSMEs to access and use formal financial services. Literacy creates financial readiness, fintech provides digital channels, and innovation improves financial systems. These three capabilities are therefore expected to influence performance indirectly through financial inclusion. Buchdadi et al. (2020), Priyantoro et al. (2023), Barokah et al. (2024), Rosalia Margijoyo & Ratnawati Siti Aisjah (2024), Lee et al. (2020). The moderating role of TAM is based on the assumption that financial inclusion will produce stronger performance when business owners perceive technology as useful and easy to use.

Table 1: Research Hypotheses

Code	Hypothesis statement
H1	Financial literacy has a positive effect on MSME performance.
H2	Financial technology has a positive effect on MSME performance.
H3	Financial innovation has a positive effect on MSME performance.
H4	Financial inclusion has a positive effect on MSME performance.
H5	Financial literacy has a positive effect on financial inclusion.
H6	Financial technology has a positive effect on financial inclusion.
H7	Financial innovation has a positive effect on financial inclusion.
H8	Financial inclusion mediates the effect of financial literacy on MSME performance.
H9	Financial inclusion mediates the effect of financial technology on MSME performance.
H10	Financial inclusion mediates the effect of financial innovation on MSME performance.
H11	TAM moderates the effect of financial inclusion on MSME performance.

Note. Prepared from the processed survey and PLS-SEM output reported in the seminar-result draft.

2. Methods

2.1. Research design

This study used an explanatory quantitative design. The design was selected because the study aimed to test causal relationships among latent variables and evaluate direct, indirect, and moderating effects. The quantitative approach was also appropriate because the constructs were measured using standardized questionnaire indicators and analyzed statistically. The research model included three exogenous variables, namely financial literacy, financial technology, and financial innovation; one mediating variable, namely financial inclusion; one moderating variable, namely TAM; and one endogenous variable, namely MSME performance.

The design followed a cross-sectional survey approach. Data were collected at one point in time from MSME owners or representatives who were considered knowledgeable about the financial management and operational conditions of their businesses. A cross-sectional design is suitable for examining perceptions, capabilities, and current practices across a relatively large sample. Although this design cannot establish causality in a longitudinal sense, it allows the study to test theoretically grounded associations and identify the relative strength of each determinant in the proposed model.

2.2. Population, sample, and sampling technique

The population consisted of 837 MSMEs listed in the Bank Indonesia MSME database for East Java. The population covered MSMEs located in several regencies and cities and represented a range of business sectors. The use of this database was appropriate because the listed MSMEs had identifiable business profiles and were relevant to the study of financial literacy, fintech adoption, financial innovation, inclusion, and performance.

The sample size was determined using the Slovin formula with a 5% margin of error. The calculation produced a target sample of 271 MSMEs. Stratified proportional random sampling was used to ensure representation by business scale. The resulting target sample consisted of 207 micro enterprises, 59 small enterprises, and 5 medium enterprises. After the questionnaire distribution process, 256 usable responses were obtained. This number was sufficient for PLS-SEM because the model contained multiple latent variables and the usable sample exceeded the minimum requirements commonly recommended for variance-based structural equation modeling (Hair et al., 2022). The sampling approach was selected to preserve proportionality across MSME categories. In the East Java MSME context, micro enterprises dominate the population, while small and medium enterprises represent smaller proportions. Without proportional stratification, the sample could overrepresent or underrepresent specific business scales. Stratified proportional random sampling therefore supported representativeness and reduced sampling bias within the limits of the available population frame.

2.3. Measurement of variables

Data were collected using a structured questionnaire with five-point Likert-scale responses. The questionnaire measured six constructs: financial literacy, financial technology, financial innovation, financial inclusion, TAM, and MSME performance. Financial literacy was measured using indicators of financial knowledge, financial behavior, financial attitude, and application of financial understanding in business decisions. These indicators were intended to capture both cognitive and behavioral aspects of financial literacy.

Financial technology was measured through the use of digital payment systems, online transactions, digital financial services, and financial applications. The indicators assessed whether MSMEs used technology to support business transactions, financial recording, and access to financial services. Financial innovation was measured through new financial practices, digital recordkeeping, alternative financing mechanisms, and improvements in financial processes. These indicators reflected the extent to which MSMEs adopted or developed more adaptive financial management approaches.

Financial inclusion was measured through access to formal financial services, actual use of financial products, perceived quality or suitability of financial services, and continuity of financial-service utilization. TAM was measured through perceived usefulness, perceived ease of use, attitude toward technology, and intention or tendency to use technology in business activities. MSME performance was measured using a multidimensional perspective that included financial performance, customer-related performance, internal process improvement, and learning or growth aspects.

2.4. Data collection procedure and ethical considerations

The questionnaire was distributed online using Google Forms. Respondents were informed about the purpose of the study, the voluntary nature of participation, and the confidentiality of their responses. The online method was selected because it facilitated distribution across geographically dispersed MSMEs in East Java. The data collection process emphasized completeness of responses and suitability of respondents as representatives of the enterprise.

For journal submission, the author should insert the official ethical approval information from the relevant institutional review board or ethics committee. If the institution classifies this survey as minimal-risk social research, the manuscript should still include a statement explaining the ethical clearance or exemption. The current manuscript retains a placeholder for the approval number and date so that it can be completed before submission.

2.5. Data analysis

The data were analyzed using descriptive statistics and PLS-SEM. Descriptive statistics were used to summarize respondent characteristics and respondent perceptions of each construct. PLS-SEM was selected because the study aimed to predict MSME performance, test a relatively complex model, and estimate mediation and moderation effects simultaneously. PLS-SEM is suitable for exploratory and predictive models involving latent variables measured by multiple indicators (33)

The measurement model was evaluated using convergent validity, discriminant validity, Cronbach's alpha, composite reliability, and average variance extracted (AVE). The structural model was evaluated using R-square, adjusted R-square, f-square, Q-square, variance inflation factor (VIF), and bootstrapping results. Hypotheses were assessed using path coefficients, t-statistics, and p-values. Mediation effects were tested through indirect paths, while moderation was examined through the interaction between TAM and financial inclusion.

3. Results

3.1. Respondent characteristics

The final dataset consisted of 256 usable responses. The respondent profile shows that male respondents represented 69.1% of the sample, while female respondents represented 30.9%. Most respondents were above 41 years old, indicating that many MSME owners or representatives in the sample had substantial business experience. In terms of education, senior high school graduates represented the largest group, followed by respondents with bachelor's degrees. Most respondents reported monthly revenue between IDR 0 and IDR 25,000,000, which is consistent with the dominance of micro-scale enterprises in the MSME population.

The demographic pattern is important for interpreting the study findings. The dominance of older respondents may indicate accumulated experiential knowledge, but it may also influence the speed and confidence with which new financial technology is adopted. The high proportion of respondents with senior high school and bachelor-level education suggests that financial literacy interventions should be designed at different levels of complexity. The concentration of revenue in the lowest category further confirms that financial inclusion and access to working capital remain highly relevant for business development.

Table 2: Respondent Characteristics

Characteristic	Category	n	%
Gender	Male	177	69.1
Gender	Female	79	30.9
Age	20-30 years	2	0.8
Age	31-40 years	77	30.1
Age	>41 years	177	69.1
Education	Junior high school	7	2.7
Education	Senior high school	139	54.3
Education	Diploma 3	8	3.1
Education	Bachelor degree	102	39.8
Monthly revenue	IDR 0-25,000,000	197	76.9
Monthly revenue	IDR 25,000,000-200,000,000	55	21.5
Monthly revenue	> IDR 200,000,000	4	1.6

Note. Prepared from the processed survey and PLS-SEM output reported in the seminar-result draft.

3.2. Descriptive results of research variables

The descriptive analysis showed that respondents generally assessed the main constructs positively. Financial literacy indicators ranged from 3.61 to 3.64, indicating that respondents tended to agree that they possessed financial knowledge, financial attitudes, and financial practices relevant to their businesses. Financial technology indicators ranged from 3.50 to 3.65, showing that the use of digital financial services was present but still varied across respondents. Financial innovation indicators ranged from 3.55 to 3.70, indicating that MSMEs had begun to adopt new financial practices, although adoption intensity differed by business capacity.

Financial inclusion indicators ranged from 3.51 to 3.67, suggesting that MSMEs had access to financial services but still faced differences in the quality and usefulness of those services. TAM indicators ranged from 3.55 to 3.67, showing that respondents generally perceived technology as useful and reasonably easy to use. MSME performance indicators ranged from 3.57 to 3.66, indicating that respondents perceived positive business performance, particularly in relation to financial outcomes, customer activities, internal processes, and learning or growth.

These descriptive results suggest that East Java MSMEs in the sample were not entirely excluded from digital and formal financial systems. However, the moderate-to-high means also indicate that there remains room for strengthening applied literacy, deeper fintech utilization, and more systematic innovation. The results also support the relevance of the structural model because all constructs showed meaningful variation and were theoretically connected to performance outcomes.

Table 3: Summary of Descriptive Construct Tendencies

Construct	Mean range	Interpretation
Financial literacy	3.61-3.64	High tendency
Financial technology	3.50-3.65	Moderate-to-high tendency
Financial innovation	3.55-3.70	High tendency
Financial inclusion	3.51-3.67	Moderate-to-high tendency
Technology Acceptance Model	3.55-3.67	Moderate-to-high tendency
MSME performance	3.57-3.66	High tendency

Note. Prepared from the processed survey and PLS-SEM output reported in the seminar-result draft.

3.3. Measurement model

The measurement model met the required criteria for validity and reliability. All outer loading values were above the recommended threshold of 0.70, indicating that the observed indicators adequately represented their latent constructs. The AVE values were greater than 0.50, confirming convergent validity. Cronbach's alpha and composite reliability values were also above the required thresholds, demonstrating internal consistency reliability.

The strongest reliability values appeared in the financial technology construct, with Cronbach's alpha of 0.906 and composite reliability of 0.934. Other constructs also showed strong reliability, including financial literacy, financial innovation, financial inclusion, TAM, and MSME performance. These results indicate that the questionnaire indicators were sufficiently stable for structural-model interpretation. The validity and reliability evidence supports the conclusion that the model's subsequent path estimates can be interpreted with confidence.

Table 4: Measurement Model Results

Construct	Indicators	Outer loading range	AVE	Cronbach alpha	Composite reliability
Financial literacy	LK1-LK4	0.871-0.879	0.764	0.897	0.928
Financial technology	FT1-FT4	0.863-0.901	0.780	0.906	0.934
Financial innovation	IK1-IK4	0.844-0.893	0.759	0.894	0.927
Financial inclusion	INC1-INC4	0.847-0.884	0.751	0.889	0.923
TAM	TAM1-TAM4	0.857-0.879	0.760	0.896	0.927
MSME performance	FP1-FP4	0.859-0.885	0.765	0.897	0.929

Note. Prepared from the processed survey and PLS-SEM output reported in the seminar-result draft.

3.4. Structural model

The structural model produced moderate explanatory power. The R-square value for financial inclusion was 0.598, indicating that financial literacy, financial technology, and financial innovation jointly explained 59.8% of the variance in financial inclusion. The R-square value for MSME performance was 0.610, indicating that financial literacy, financial technology, financial innovation, financial inclusion, TAM, and the interaction term jointly explained 61.0% of the variance in performance. These values demonstrate that the model has meaningful predictive relevance for the study context.

The Q-square values for financial inclusion and MSME performance were 0.442 and 0.453, respectively. These values indicate predictive relevance because they are greater than zero. The f-square results showed that financial literacy had the largest effect on financial inclusion, while financial inclusion had the largest effect on MSME performance. VIF values were below critical thresholds, indicating that multicollinearity was not a serious problem in the structural model.

Table 5: Structural Model Summary

Indicator	Financial inclusion	MSME performance
R-square	0.598	0.610
Adjusted R-square	0.593	0.600
Q-square	0.442	0.453
Largest f-square effect	Financial literacy -> financial inclusion = 0.484	Financial inclusion -> MSME performance = 0.242
Multicollinearity check	VIF values below critical threshold	VIF values below critical threshold

Note. Prepared from the processed survey and PLS-SEM output reported in the seminar-result draft.

3.5. Hypothesis testing

The bootstrapping results show that ten of the eleven hypotheses were supported. Financial literacy, financial technology, financial innovation, and financial inclusion had positive and significant direct effects on MSME performance. Financial inclusion had the largest direct

effect, indicating that access to and use of financial services were central to explaining performance differences among MSMEs in the sample. Financial literacy, financial technology, and financial innovation also positively and significantly affected financial inclusion. The mediation tests showed that financial inclusion significantly mediated the effects of financial literacy, financial technology, and financial innovation on MSME performance. These results confirm that internal financial capabilities and digital or innovative practices not only influence performance directly but also operate through improved financial access and service utilization. In contrast, the interaction between TAM and financial inclusion was not significant. Therefore, TAM did not strengthen the effect of financial inclusion on MSME performance in this dataset.

Table 6: Hypothesis Testing Results

Hypothesis	Path	beta	t-statistic	p-value	Decision
H1	Financial literacy -> MSME performance	0.156	2.762	0.006	Supported
H2	Financial technology -> MSME performance	0.138	2.478	0.013	Supported
H3	Financial innovation -> MSME performance	0.130	2.750	0.006	Supported
H4	Financial inclusion -> MSME performance	0.494	8.273	<0.001	Supported
H5	Financial literacy -> Financial inclusion	0.484	11.649	<0.001	Supported
H6	Financial technology -> Financial inclusion	0.304	6.006	<0.001	Supported
H7	Financial innovation -> Financial inclusion	0.215	4.527	<0.001	Supported
H8	Financial literacy -> Financial inclusion -> MSME performance	0.239	6.867	<0.001	Supported
H9	Financial technology -> Financial inclusion -> MSME performance	0.150	5.077	<0.001	Supported
H10	Financial innovation -> Financial inclusion -> MSME performance	0.106	3.697	<0.001	Supported
H11	TAM x Financial inclusion -> MSME performance	-0.036	0.970	0.332	Not supported

Note. Prepared from the processed survey and PLS-SEM output reported in the seminar-result draft.

4. Discussion

4.1. Financial literacy and MSME performance

The results confirm that financial literacy has a positive and significant effect on MSME performance. This finding indicates that MSME owners who understand financial concepts, record business transactions, separate personal and business finances, and evaluate financial risks are more capable of improving business outcomes. Financial literacy creates a foundation for better planning and control. In small enterprises, where the owner often performs operational, marketing, and financial functions simultaneously, literacy becomes an essential managerial resource rather than a secondary skill. (34–38).

From the TPB perspective, financial literacy may strengthen perceived behavioral control. When MSME owners understand financial information, they are more confident in making financing decisions, evaluating costs, and managing obligations. From the RBV perspective, financial literacy is an intangible resource that improves decision quality and business resilience. The performance effect is therefore theoretically consistent: knowledge and behavior related to finance help MSMEs use limited resources more efficiently and avoid decisions that may threaten survival. (37–39)

The significant effect of financial literacy on financial inclusion further strengthens this interpretation. MSMEs with better literacy are more prepared to interact with banks and financial-service providers because they understand documentation, repayment obligations, interest, digital records, and the importance of creditworthiness. This finding indicates that financial literacy programs should not stop at general knowledge. They should train MSME owners to prepare business reports, calculate costs, monitor cash flow, and evaluate financing products in practical ways. (23,40–42)

4.2. Financial technology and MSME performance

Financial technology was found to have a positive and significant effect on MSME performance. This indicates that the use of digital financial services can improve transaction efficiency, reduce dependence on cash, support broader payment options, and create more reliable transaction records. For MSMEs, fintech is not simply a technological accessory; it can support daily operational routines such as receiving payments, transferring funds, paying suppliers, and recording transactions. (43,44)

The positive effect of fintech on financial inclusion is also important. Digital channels can reduce distance and time barriers that traditionally limit access to financial services. MSMEs that use mobile banking, QR-code payments, or e-wallets may become more connected to the formal financial system. Their transaction history may also support future financing evaluation. This means fintech can be an entry point to formalization, especially for enterprises that previously relied only on cash or informal lending. (45,46)

However, the effect size of fintech on performance was smaller than the effect of financial inclusion. This suggests that technology alone is not enough. Fintech must be embedded in broader financial behavior and linked to actual financial-service use. MSMEs may use digital payment tools without fully utilizing financing, savings, insurance, or business-planning services. Therefore, fintech training should be integrated with financial literacy and inclusion programs so that digital tools lead to strategic financial decisions.

4.3. Financial innovation and MSME performance

Financial innovation had a positive and significant effect on MSME performance. This result demonstrates that new financial practices, systems, and mechanisms are relevant to business improvement. Innovation may include digital bookkeeping, alternative financing, new payment methods, structured budgeting, or more systematic financial planning. Such practices can improve internal efficiency and support better responses to market change. (47–49).

The positive effect of financial innovation on financial inclusion indicates that innovative financial practices can make MSMEs more visible and credible to external financial institutions. For example, enterprises that maintain digital records or use structured payment systems may provide better information to lenders. This reduces information asymmetry and can improve the possibility of obtaining formal credit or other services. In this sense, innovation acts as a bridge between internal financial management and external financial access. (25,46)

From the RBV perspective, financial innovation can be interpreted as a dynamic capability. It enables MSMEs to reconfigure their financial processes in response to environmental change. In a digital economy, enterprises that remain attached to traditional manual practices may

lose opportunities for efficiency and market expansion. Financial innovation therefore contributes not only to short-term performance but also to long-term adaptability.

4.4. Financial inclusion as the strongest direct predictor

Financial inclusion produced the strongest direct effect on MSME performance. This result highlights the central role of access to and use of formal financial services. Financial inclusion allows MSMEs to obtain working capital, manage liquidity, conduct secure transactions, save for investment, and reduce financial vulnerability. Even when MSMEs possess literacy, technology, or innovation, performance improvement is likely to be limited if they cannot access suitable financial services. (9,50,51).

This finding has important managerial implications. Many MSMEs may already possess basic knowledge or use digital tools, but they still require financial services that match their scale, risk profile, and business needs. Financial institutions should design MSME-friendly products with simplified documentation, flexible collateral requirements, and business-assistance components. Government and development agencies should also ensure that inclusion programs measure not only account ownership but also productive use of financial services. (51).

Financial inclusion also provides a practical explanation for the persistence of MSME performance gaps. Enterprises with better access to financial services can finance inventory, invest in equipment, adopt digital tools, and respond to market demand more effectively. Enterprises without access may be forced to operate only with internal funds and may be vulnerable to cash-flow shocks. Therefore, inclusion is not merely a social policy goal but a performance mechanism.

4.5. Mediating role of financial inclusion

The mediation results show that financial inclusion significantly mediates the effects of financial literacy, financial technology, and financial innovation on MSME performance. This finding provides an integrated explanation of how internal capabilities and digital practices become business outcomes. Financial literacy improves readiness; fintech provides channels; financial innovation improves systems; and financial inclusion converts these elements into access, use, and benefits from financial services. (9,50)

The strongest indirect effect was found in the path from financial literacy to performance through financial inclusion. This indicates that literacy is particularly important for enabling MSMEs to use formal financial services productively. Business owners who understand financial concepts are more likely to interpret product information correctly, fulfill documentation requirements, and use financing for productive purposes rather than only for short-term consumption or emergency needs. (51)..

The indirect effect of financial technology through financial inclusion also confirms the role of fintech as an inclusion accelerator. Digital financial tools facilitate access and produce transaction records that can support financial visibility. However, fintech contributes more strongly when it is connected to formal financial services rather than used only as a payment convenience. The indirect effect of financial innovation further confirms that new financial practices can strengthen the quality of financial access and produce performance gains.

4.6. Non-significant moderating role of TAM

The moderating effect of TAM was not significant. This means that perceived usefulness and perceived ease of use did not strengthen the relationship between financial inclusion and MSME performance in the tested model. The result does not imply that TAM is irrelevant to MSMEs. Rather, it suggests that once financial inclusion is achieved, its effect on performance may depend more on the suitability, affordability, and productive use of financial services than on general technology acceptance perceptions. (18) (7),

Several interpretations are possible. First, the MSMEs in the sample may already have a relatively similar level of technology acceptance, resulting in insufficient variation to create a moderating effect. Second, financial inclusion may involve both digital and non-digital services, so technology acceptance may not fully capture the conditions that determine performance outcomes. Third, the most important barrier may not be whether technology is perceived as useful or easy, but whether financial products are accessible, affordable, trusted, and aligned with business needs. (52).

This finding suggests that future research should consider more specific technology-related moderators, such as digital financial literacy, trust in digital finance, perceived security, platform reliability, or intensity of fintech usage. TAM remains a useful theoretical lens, but the MSME financial inclusion-performance relationship may require a more context-specific technology framework.

4.7. Theoretical implications

This study contributes to the literature in several ways. First, it extends the use of TPB in MSME financial behavior by showing that financial literacy, fintech adoption, and innovation are associated with both financial inclusion and performance. These variables can be interpreted as behavioral manifestations of intention, control, and adaptation in the financial domain. Second, the study supports RBV by demonstrating that intangible financial capabilities and technology-related resources can improve MSME performance when they are connected to financial access.

Third, the study strengthens the role of financial inclusion as a mediating construct. Rather than treating financial inclusion only as an outcome of policy, this study positions it as a mechanism that transmits internal capabilities into business performance. Fourth, the non-significant moderation of TAM enriches theoretical understanding by showing that technology acceptance may not always intensify the benefits of inclusion. This finding encourages more nuanced models that separate technology adoption, technology acceptance, financial-service quality, and productive financial behavior.

4.8. Practical and policy implications

The findings suggest that MSME development programs should integrate financial literacy, fintech adoption, financial innovation, and financial inclusion instead of treating them as separate interventions. Financial literacy training should be practical and business-based, covering cash-flow management, cost calculation, simple financial statements, loan evaluation, and risk management. Training that remains conceptual may not be sufficient to change daily practices.

Financial technology assistance should focus on applied use. MSMEs need support in selecting appropriate digital payment systems, maintaining transaction records, using mobile banking safely, and integrating digital tools with bookkeeping. Financial innovation programs

should encourage simple but systematic improvements such as digital recordkeeping, inventory-linked cash planning, and structured financing strategies. These innovations do not need to be highly complex; they must be suitable for MSME scale and capacity. Financial institutions should design inclusive products that are accessible to micro and small enterprises. Simplified documentation, flexible collateral alternatives, transaction-data-based credit assessment, and business mentoring can improve the effectiveness of inclusion. Government agencies should also monitor whether inclusion leads to productive use, not merely account ownership or registration. The strongest path in this study indicates that performance improvement depends heavily on whether MSMEs can actually use financial services for business growth.

4.9. Limitations and future research

This study has several limitations. First, the data were cross-sectional, so causal interpretation should be made carefully. Future studies may use longitudinal designs to observe how changes in literacy, fintech use, innovation, and inclusion influence performance over time. Second, the study relied on questionnaire responses, which may be affected by self-report bias. Future research may combine survey data with objective indicators such as sales, profit, transaction records, or credit history. Third, the sample was drawn from MSMEs listed in the Bank Indonesia database for East Java. While this source was relevant and structured, the findings may not fully represent MSMEs that are not included in the database or those operating in more informal settings. Future studies may compare registered and unregistered MSMEs or examine differences across provinces. Fourth, TAM was tested as a general moderating construct. Future studies may test more specific digital-finance variables such as perceived security, digital trust, platform quality, or intensity of use.

5. Conclusion

This study concludes that financial literacy, financial technology, financial innovation, and financial inclusion have positive and significant effects on MSME performance in East Java. Financial literacy, financial technology, and financial innovation also positively and significantly affect financial inclusion. These findings indicate that MSME performance is shaped by a combination of internal financial capability, digital financial practices, innovative financial management, and access to formal financial services.

Financial inclusion significantly mediates the effects of financial literacy, financial technology, and financial innovation on MSME performance. This confirms that inclusion is a central mechanism through which financial capabilities are converted into business outcomes. The strongest direct effect was financial inclusion on performance, while the strongest indirect pathway was financial literacy through financial inclusion. Therefore, MSME development policies should prioritize the productive use of financial services in addition to financial education and fintech adoption.

The moderating effect of TAM was not significant. This suggests that technology acceptance did not strengthen the effect of financial inclusion on performance in the tested model. The finding implies that the performance benefit of inclusion may depend more on the actual accessibility, affordability, and productive use of financial services than on general perceptions of technology usefulness and ease. Future studies should explore more specific digital-finance moderators and use longitudinal data to confirm these relationships.

Ethical Considerations

Ethical Approval:

This study has obtained ethical approval from the Ethics Committee of Universitas Islam Kadiri, with ethical clearance number 01/040.1.6/TU.00.11/VI/2026. The confidentiality of respondents' data and responses was maintained throughout the study.

Originality Statement

The author confirms that this manuscript is original, has not been published previously, and is not currently under consideration by any other journal.

Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this manuscript.

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