Islamic Fintech Adoption and MSME Financial Inclusion in Indonesia

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Abstract

Despite the rapid growth of Islamic financial technology (Islamic fintech), the access of micro, small and medium enterprises (MSMEs) to formal financial services continues to remain restrictive. This issue is important in Indonesia, where Islamic fintech offers Shariah-compliant digital access, yet MSMEs still face barriers of literacy, trust, and usability. This research examines how perceived usefulness and perceived ease of use influence MSMEs' adoption of Shariah-compliant fintech and whether such adoption improves the financial inclusion of Indonesian MSMEs. Through a quantitative design, data were collected from 203 MSME owners and managers who had previous experience of Islamic fintech. The study tested both direct effects and the mediating role among constructs through Partial Least Squares Structural Equation Modelling (PLS-SEM). The results reveal that perceived usefulness and perceived ease of use can significantly encourage Islamic fintech adoption, with perceived ease of use being the strongest factor. Adoption, in turn, improves financial inclusion and partially mediates the relationship between technology-related perceptions and inclusive outcomes. The findings of this study enhance the Technology Acceptance Model in the Islamic fintech context and highlight that adoption serves as an important behavioural pathway for digital innovation to be used and participate financially. The key novelty of this study lies in positioning Islamic fintech adoption as a mediating mechanism between TAM-based perceptions and MSME financial inclusion. This study contributes to Islamic fintech literature by highlighting adoption as a novel mediating pathway through which technology-related perceptions enhance MSME financial inclusion.

Keywords: islamic fintech, financial inclusion, MSMEs, technology acceptance model, fintech adoption

Introduction

Fintech is rapidly reshaping the global economic landscape by expanding access to financial services and improving efficiency, including through artificial intelligence. Over the past decade, innovations such as mobile banking, digital wallets, peer-to-peer (P2P) lending, open banking APIs, and blockchain-based infrastructures have reduced transaction frictions and widened participation in formal finance. In many markets, the most visible transformation has occurred in retail payments: account-based and mobile-enabled transactions increasingly substitute cash, supported

by QR payments, fast-payment rails, and interoperable wallet ecosystems that shorten settlement times and reduce merchant costs. Globally, the diffusion of digital payments has been strongly associated with improved financial participation in developing economies; for instance, World Bank reporting on Global Findex 2021 highlights that the share of adults making or receiving digital payments in developing economies rose markedly between 2014 and 2021, reflecting an acceleration of digital finance adoption beyond simple account ownership (World Bank, 2022).

This shift intensified during the COVID-19 pandemic, when mobility restrictions increased reliance on digital channels and accelerated electronic transactions and online financing (Badra et al., 2025; Setiawan et al., 2025). Beyond behavioural substitution away from in-person banking, the pandemic period also intensified institutional experimentation: governments expanded digital disbursement of social assistance, firms moved procurement and payroll online, and many small merchants adopted e-payment acceptance as a survival strategy. Evidence from the Global Findex Database 2021 underscores that COVID-19 catalysed growth in digital payment usage, including for routine obligations such as utility payments and transfers, reinforcing the view that crises can act as "forced adoption" moments that permanently change financial behaviour for households and firms (Demirguc-Kunt et al., 2021)

In developing economies, fintech is widely viewed as a bridge between formal institutions and underserved groups. Empirical evidence links fintech to improved access, entrepreneurship, income diversification, and economic resilience among low-income populations (Del Sarto & Ozili, 2025; Ha et al., 2025). The mechanism is not only convenience: fintech can lower onboarding and servicing costs via digital identity, e-KYC, and automated decisioning, while alternative data (e-commerce histories, payment behaviour, mobile usage proxies) can partially substitute for missing collateral or thin credit files. These developments are increasingly intertwined with machine-learning credit models and automated risk scoring, which, when properly governed, can expand credit supply to previously excluded borrowers (Bazarbash, 2019). Yet the same data-intensive models raise concerns about opacity, privacy, and bias; recent review work emphasizes that digital inclusion gains can be undermined by cybersecurity threats, predatory lending practices, and structural disparities in digital capability (Mandić et al., 2025).

These benefits are particularly salient for micro, small, and medium enterprises (MSMEs), which often face collateral constraints, high transaction costs, limited credit histories, geographic barriers, and restricted access to mainstream banking (Amnas et al., 2023; Nugraha et al., 2022). MSMEs are also informationally "costly" for conventional lenders: loan sizes are small relative to underwriting effort, business records are frequently informal, and cash flows are volatile. Consequently, many MSMEs rely on internal funds, supplier credit, or informal lenders, which can constrain investment, productivity upgrading, and resilience to shocks. Digital credit, electronic payments, and data-driven risk assessment can therefore support MSME financial inclusion, but outcomes depend on digital capability, trust, perceived security, and regulatory support (Ali et al., 2021; Rahadian & Thamrin, 2023). In practice, the inclusion effect is conditional: fintech reduces barriers only if users can access devices and connectivity, understand product features, manage digital risks, and resolve disputes effectively. Without adequate institutional and educational support, digital innovation may reproduce rather than reduce exclusion, particularly when the "new costs" of participation (data plans, device

quality, cybersecurity exposure, app literacy) fall disproportionately on smaller and less formal firms.

Alongside conventional fintech, Islamic fintech has emerged as a fast-growing segment that complies with Shariah principles, including prohibitions on interest, excessive uncertainty, and speculation. In conceptual terms, Islamic fintech extends the ethical-finance proposition: it aims to deliver financial intermediation while embedding governance constraints linked to fairness, transparency, and asset-backing. As research at the intersection of Islamic finance and fintech has expanded, reviews map the field into themes such as Shariah-compliant business models, governance and regulation, digital Islamic social finance (zakat/waqf), and adoption behaviour (Alshater et al., 2022; Qudah et al., 2023). Despite overall sector growth, Islamic fintech remains a small share of the global market, including in Muslim-majority settings where potential demand is high (Maniam, 2024; Rabbani et al., 2020). Prior studies suggest Islamic fintech can facilitate Shariah-based crowdfunding, Islamic microfinance, and the digitalization of zakat and waqf to advance inclusive and sustainable development (Alrasyid et al., 2023; Khan et al., 2022). However, technology availability alone does not ensure inclusion; adoption and sustained use are decisive, and they depend on perceived value, perceived legitimacy (Shariah compliance), and perceptions of risk and consumer protection.

Indonesia is a relevant context because MSMEs contribute more than 60% of GDP and employ over 97% of the workforce, yet many remain outside formal financial services (OJK & BPS, 2024). The overwhelming majority of enterprises in Indonesia are MSMEs, which also absorb most of the labour within the country. Many different national and development policy sources highlight this fact at a macro scale. Therefore, inclusion in this respect is more a macro development issue than a micro one. All sharia-compliant fintech regulated by OJK has instruments that are different from conventional finance. For example, equity-based crowdfunding and profit-and-loss sharing contracts such as *mudharabah* and *musyarakah*. In principle, the establishment of Shariah-based platform rules should be aimed at achieving economic empowerment objectives (Zakaria, 2025). Licensed providers, including Ethis, Alami, and Dana Syariah, have introduced financing products positioned as consistent with Islamic values (OJK, 2024a). At the industry level, OJK also regularly publishes directories of licensed P2P/fintech lending operators, reflecting an active supervisory posture and a broader push to steer users toward regulated platforms. MSME financial inclusion in Indonesia is still uneven, both regarding access to formal financial services and the effective use of formal financial services with available financing, payments, and financial management tools. Islamic fintech is relevant as it provides digital financial access in accordance with Shariah principles, which can be more appropriate for Muslim MSMEs who need functional and religious legitimacy.

Nonetheless, low Islamic financial literacy (39.11%), uneven digital infrastructure, and limited public trust continue to hinder adoption and may weaken inclusion impacts (Hudaefi et al., 2023; Muryanto, 2023). The National Survey on Financial Literacy and Inclusion (SNLIK) reported by OJK and Statistics Indonesia indicates that while overall financial literacy and inclusion have improved, Sharia financial literacy and especially Sharia financial inclusion remain substantially lower—creating a “double gap” for MSMEs that prefer Sharia-compliant services but also face digital adoption constraints (OJK, 2024b). This gap matters for two reasons. First, low literacy can reduce perceived usefulness and increase perceived complexity, weakening adoption even when products are available. Second, limited inclusion in Sharia channels can push firms toward

conventional or informal financing that may not match their preferences, potentially reduce welfare and limiting participation in the halal value chain ecosystem.

Despite extensive research on fintech adoption, evidence is still limited in regards Islamic fintech adoption for MSMEs financial inclusion. A lot of the literature focuses on either intention or usage and regards adoption as an outcome rather than as a mechanism generating socio-economic benefits. A strong 'download' or 'registering' rate doesn't mean MSMEs are essentially included. Inclusion means gaining reliable access to appropriate products (services), their repeat use, and the resultant improved business capability (liquidity management, stability of working capital, capacity to invest). Furthermore, the adoption of Islamic fintech is likely to be subject to layered evaluations that are more sophisticated than merely the assessments of digital finance users. Users look at functional performance (speed, convenience, cost) but also consider Sharia legitimacy. In addition, users may assess governance credibility, as well as dispute-resolution assurance, plus reputational trust rooted in religious, as well as social, norms. Trust and perceived Sharia compliance can therefore shape adoption by reducing uncertainty and strengthening perceived value, consistent with evidence that risk-benefit trade-offs and trust are central in Islamic fintech uptake (Alfarizi & Ngatindriatun, 2022; Ali et al., 2021; Amnas et al., 2023; Majid, 2024).

The Technology Acceptance Model (TAM) identifies perceived usefulness (PU) and perceived ease of use (PEOU) as central determinants of adoption (Davis, 1989; Venkatesh et al., 2012), yet few studies integrate these perceptions with financial inclusion in a unified model. This gap is important because adoption does not guarantee inclusion unless sustained and effective use improves access to and utilization of services. However, prior studies have not sufficiently examined adoption as a mediating mechanism between TAM constructs and financial inclusion in Islamic fintech contexts. In MSME settings, "usefulness" should be interpreted in business-process terms (e.g., faster payment settlement, easier reconciliation, improved cash-flow tracking, access to appropriate financing contracts), while "ease of use" includes not only interface simplicity but also the perceived effort required to onboard, learn product rules, provide documentation, and resolve operational issues.

Islamic fintech adoption also involves ethical and religious assessments. Trust, perceived Shariah compliance, and religiosity can enhance perceived value and reduce uncertainty, thereby encouraging adoption (Alfarizi & Ngatindriatun, 2022; Ali et al., 2021; Amnas et al., 2023; Majid, 2024). Perceived security and digital literacy remain key enablers among MSMEs (Ha et al., 2025; Rahadian & Thamrin, 2023). However, MSME-focused research rarely tests adoption as a mediator linking PU and PEOU to financial inclusion outcomes, despite its theoretical and policy relevance, especially in environments where literacy constraints and trust deficits are empirically salient. Therefore, this study addresses this gap by examining Islamic fintech adoption as a behavioural pathway through which perceived usefulness and perceived ease of use may enhance MSME financial inclusion.

Accordingly, this study applies TAM and extends it to Islamic fintech by conceptualizing adoption as the behavioural pathway through which PU and PEOU influence financial inclusion (Davis, 1989). In this setting, PU reflects MSMEs' beliefs that Shariah-compliant fintech enhances business performance, including access to financing, transaction speed, and financial management. In contrast, PEOU captures perceived learnability and operational simplicity. Since the sample includes MSMEs with prior

Islamic fintech exposure and AFSI training participants, it may overrepresent digitally literate MSMEs. Thus, the findings should be interpreted within the context of MSMEs with some degree of digital readiness. This study therefore strengthens the TAM framework by positioning Islamic fintech adoption as a mediating mechanism through which perceived usefulness and perceived ease of use are translated into MSME financial inclusion. The study subsequently tests hypotheses on these relationships:

H_1: Perceived usefulness (PU) has a positive effect on Islamic fintech adoption (IFA).
H_2: Perceived ease of use (PEOU) has a positive effect on Islamic fintech adoption (IFA).
H_3: Perceived usefulness (PU) has a positive effect on financial inclusion (FI).
H_4: Perceived ease of use (PEOU) has a positive effect on financial inclusion (FI).
H_5: Islamic fintech adoption (IFA) has a positive effect on financial inclusion (FI).
H_6: Islamic fintech adoption (IFA) mediates the effect of perceived usefulness (PU) on financial inclusion (FI).
H_7: Islamic fintech adoption (IFA) mediates the effect of perceived ease of use (PEOU) on financial inclusion (FI).

Research Method

This study applied a quantitative, cross-sectional survey design to test the relationships among perceived usefulness (PU), perceived ease of use (PEOU), Islamic fintech adoption (IFA), and financial inclusion (FI) for micro, small, and medium enterprises (MSMEs) in Indonesia. The observation period was January to April 2025. The conceptual model is grounded in the Technology Acceptance Model (TAM), which posits PU and PEOU as key antecedents of technology adoption behavior (Davis, 1989). Building on this logic, the model was extended to the Islamic fintech setting by incorporating financial inclusion as an outcome and by specifying IFA as a behavioral mechanism through which technology perceptions may translate into inclusion-related benefits.

The population of this study was Indonesian MSME owners or managers with prior exposure to Shariah-compliant fintech services, rather than all MSMEs in Indonesia. Respondents were selected using purposive sampling. The criteria were: (1) being an MSME owner or manager, (2) having participated in Islamic fintech-related training or seminar activities, and (3) having used or been familiar with Shariah-compliant peer-to-peer financing platforms, such as Ethis, Alami, and/or Dana Syariah. The Asosiasi Fintech Syariah Indonesia (AFSI) facilitated access to eligible respondents. A total of 203 valid questionnaires were obtained. This sample size was considered adequate for Partial Least Squares Structural Equation Modelling (PLS-SEM), which is suitable for prediction-oriented models with multiple constructs and mediation paths (Hair et al., 2019; Henseler et al., 2015).

Data was collected through a structured questionnaire distributed online and direct methods by AFSI. The instrument contained respondent and business profile items and reflective measurement items for the four latent constructs. All construct items were assessed using a five-point Likert scale from 1 (strongly disagree) to 5 (agree). The questionnaire was adapted from prior validated studies and modified to fit the MSME and Islamic fintech context, rather than being developed independently from scratch.

Islamic fintech is operationally defined as digital financial services delivered in accordance with Shariah principles, including the avoidance of *riba, gharar,* and *maysir*, and the use of Shariah-compliant contracts and financing mechanisms. Unlike

conventional fintech, Islamic fintech is not only digital in form but also governed by Shariah contractual, ethical, and compliance requirements (Aysan & Unal, 2023).

PU was interpreted as the belief that Islamic fintech improves business performance and financial management (such as access to financing, transaction efficiency, cash-flow control, and productivity). PEOU is defined as a perceived effortlessness in learning and using the Islamic fintech platform, including interface simplicity, procedural clarity, flexibility and compatibility with routine business practices. Measurements of both variables were taken from studies (Chuttur, 2009; Davis, 1989; Rahadian & Thamrin, 2023; Setyawati, 2020; Venkatesh et al., 2003).

IFA captured the extent of MSMEs' engagement with Islamic fintech, including actual use, continuance intention, and recommendation intention, based on (Amnas et al., 2023; Rahim et al., 2023; Venkatesh et al., 2012, 2016). FI was operationalized as MSMEs' ability to access, use, and benefit from formal Shariah-compliant financial services delivered via Islamic fintech. Consistent with multidimensional inclusion perspectives, FI encompassed access, usage, perceived service quality, and welfare-related outcomes such as business stability and resilience, with indicators adapted from (Bongomin et al., 2017).

Model estimation was performed using SmartPLS (version 4.0), given its suitability for PLS-SEM with complex models, non-normal data tendencies, and mediation testing. A two-stage evaluation procedure was followed. First, the measurement model was assessed for indicator reliability, internal consistency, and construct validity. Indicator reliability was evaluated through standardized outer loadings, with values above 0.70 indicating acceptable reliability. Internal consistency was assessed using composite reliability, applying a threshold above 0.70–0.80 as evidence of satisfactory reliability (Hair et al., 2019; Henseler et al., 2015). Convergent validity was examined via average variance extracted (AVE), with values exceeding 0.50 indicating that constructs explain more than half of the variance of their indicators (Fornell & Larcker, 1981). Discriminant validity was evaluated using the heterotrait–monotrait ratio (HTMT), adopting < 0.90 as the criterion for adequate distinctiveness between toggle constructs (Henseler et al., 2015).

Second, the structural model was assessed by examining path coefficients, coefficients of determination (R^2), and the significance of direct and indirect (mediated) effects. Statistical inference relied on nonparametric bootstrapping with 5,000 resamples to obtain robust standard errors and confidence intervals, a standard practice in PLS-SEM hypothesis testing and mediation analysis (Hair et al., 2019). This analytical strategy enables a rigorous test of the hypothesized relationships among PU, PEOU, IFA, and FI, while ensuring that participants' prior experience with Shariah-compliant fintech strengthens the interpretability and practical relevance of the perceptual measures and adoption outcomes.

Result and Discussion

This section presents the empirical findings and discusses their relevance to Islamic fintech adoption and MSME financial inclusion. The results should be interpreted based on MSMEs who have been exposed to Islamic fintech through AFSI-related activities, and not broadly applied to all MSMEs in Indonesia. A total of 203 MSME owners and managers who participated in AFSI's Islamic fintech training were analysed. As seen in Table 1, the profile of the respondents showed that women entrepreneurs (65%) were the majority and young adults in the age group 18-25 years (58.1%) and 26-30 years (22.2%). Most

respondents had high school education (57.1%) or undergraduate education (34.0%). In terms of business characteristics, most respondents operated in trade/retail (44.8%) and services (32.0%). Many businesses had operated for 1–3 years (45.8%) or less than one year (29.1%). Most respondents had also used Islamic fintech for less than three years, consisting of less than one year (38.9%) and 1–3 years (41.9%).

This profile suggests that Islamic fintech is used mainly by relatively young MSME actors who are still in the early stage of business and digital financial engagement. These users might be receptive to digital products, but their short-term business tenure and lack of fintech experience suggest sensitivity to learning curves, onboarding processes and process clarity. For a TAM point of view, this means that perceived ease of use is important, since users who are in the early stages of adoption might be more sensitive to operational complexity. This is consistent with prior MSME and fintech studies showing that adoption is shaped not only by perceived benefits, but also by digital readiness, user capability, and service simplicity.

Table 1. Respondent Profile (N = 203)

Variable	Category	n	%
Gender	Male	71	35.0
	Female	132	65.0
Age group	18–25	118	58.1
	26–30	45	22.2
	31–40	26	12.8
	> 40	14	6.9
Education level	High school	116	57.1
	Undergraduate (S1)	69	34.0
	Postgraduate (S2/S3)	18	8.9
Type of business	Trade/Retail	91	44.8
	Services	65	32.0
	Halal product/Food	47	23.2
Business duration	< 1 year	59	29.1
	1–3 years	93	45.8
	> 3 years	51	25.1
Experience using Islamic fintech	< 1 year	79	38.9
	1–3 years	85	41.9
	> 3 years	39	19.2
Total		203	100.0

Source: Data Processed (2025)

Findings based on the measurement model indicate that the constructs were captured reliable and valid. As shown in Table 2 all outer loadings of the items were above 0.70. The results of Cronbach's alpha and the composite reliability being greater than conventional thresholds indicate satisfactory levels of internal consistency across constructs, and the AVE values indicate satisfactory validity as AVE values are greater than 0.50. These findings are consistent with the traditional approach used to assess the

reflective measurement model in PLS-SEM, thus allowing the interpretation of structural relationships.

Table 2. Measurement Model Summary (Reliability and Convergent Validity)

Construct	Indicators (loadings)	Cronbach's α	rho_A	CR	AVE	Status
PU	PU1=0.839; PU2=0.872; PU3=0.845; PU4=0.792; PU5=0.789	0.885	0.887	0.916	0.685	Reliable & valid
PEOU	PEOU1=0.806; PEOU2=0.842; PEOU3=0.796; PEOU4=0.767; PEOU5=0.829	0.867	0.868	0.904	0.654	Reliable & valid
IFA	IFA1=0.778; IFA2=0.841; IFA3=0.835; IFA4=0.782	0.825	0.831	0.884	0.656	Reliable & valid
FI	FI1=0.856; FI2=0.856; FI3=0.871; FI4=0.826	0.875	0.875	0.914	0.727	Reliable & valid

Note. PU = perceived usefulness; PEOU = perceived ease of use; IFA = Islamic fintech adoption; FI = financial inclusion.

Source: Data Processed (2025)

The Fornell–Larcker criterion was used to assess discriminant validity (Table 3). The square roots of the AVE were greater than the corresponding inter-construct correlations, indicating that PU, PEOU, IFA, and FI are empirically distinct. Although correlations involving PEOU were relatively high, particularly with PU (0.805) and FI (0.791), these values remained below the diagonal values. This implies that ease of use, usefulness and inclusion are interrelated but not synonymous. This is theoretically consistent with TAM as ease of use can enhance perceived usefulness. For MSMEs, a platform can only be beneficial if it does not create a lot of operational hassle. Therefore, constructs are reliable, valid, and appropriate for further structural analysis.

Table 3. Fornell–Larcker Discriminant Validity (Diagonal = √AVE)

Construct	IFA	FI	PEOU	PU
IFA	0.810			
FI	0.768	0.853		
PEOU	0.777	0.791	0.808	
PU	0.732	0.746	0.805	0.828

Note. PU = perceived usefulness; PEOU = perceived ease of use; IFA = Islamic fintech adoption; FI = financial inclusion.

Source: Data Processed (2025)

The structural estimates provide consistent support for all hypothesized relationships (Table 4). The perceived usefulness was found to positively predict the Islamic fintech adoption (PU→IFA: β=0.302; p=0.003) and perceived ease of use had more significant impact (PEOU→IFA: β=0.534; p<0.001). Both PU and PEOU also had direct positive effects on financial inclusion (PU→FI: β=0.211; p=0.019; PEOU→FI: β=0.364; p<0.001). In addition, Islamic fintech adoption significantly enhanced financial inclusion (IFA→FI: β=0.330; p=0.002).

These findings indicate that MSMEs are more likely to adopt Islamic fintech when they perceive it as useful and easy to use. The greater influence of PEOU implies that usability remains the primary motivator for adoption, especially when MSMEs are limited in time, may lack overall digital skills, and are prone to operational mistakes. MSMEs that

find Islamic fintech helpful and convenient are more likely to adopt digital payments, keep transaction records, and believe in Shariah-compliant financing instruments, thus enhancing access and usage aspects of financial inclusion.

This pattern contributes to the central tenets of the Technology Acceptance Model that usefulness and ease of use are key determinants of adoption (Davis, 1989; Venkatesh et al., 2012). It also extends TAM by demonstrating that PU and PEOU could affect financial inclusion in the context of Islamic fintech adoption rather than the adoption of the technology. In the MSME Islamic fintech context, ease of use includes not only interface simplicity, but also clear onboarding, transparent procedures, understandable contracts, and accessible support.

The specification of Islamic fintech is that MSMEs consider not just about digital ease but whether the platform offers Sharia-compliant banking mechanisms, clear contract constructions, and trustworthy management. Therefore, ease of use in Islamic fintech includes the ability of users to understand financing contracts, avoid ambiguity, and feel confident that the service is consistent with Islamic financial principles.

This interpretation aligns with the evidence that shows effort-expectancy-type considerations are frequently more influential than others in the early-stage uptake of fintechs (Idrees & Ullah, 2024). It also aligns with studies showing that simplified digital processes and reduced learning barriers are important for micro-entrepreneurs in emerging markets (Maharseni et al., 2022; Nugraha et al., 2022), and that Islamic fintech adoption improves when compliance requirements are translated into user-friendly workflows (Alsmadi et al., 2024).

Table 4. Structural Model Results (Direct Effects, R^2, f^2, and Mediation)

Relationship / Statistic	β	t	p	Decision / Note	f^2
PU → IFA	0.302	3.024	0.003	Supported	0.088
PEOU → IFA	0.534	6.059	0.000	Supported	0.275
PU → FI	0.211	2.361	0.019	Supported	0.048
PEOU → FI	0.364	3.592	0.000	Supported	0.122
IFA → FI	0.330	3.073	0.002	Supported	0.132
PU → IFA → FI (indirect)	0.100	2.535	0.012	Partial mediation	—
PEOU → IFA → FI (indirect)	0.176	2.562	0.011	Partial mediation	—
R^2 (IFA)	0.635			Substantial	—
R^2 (FI)	0.699			Substantial	—

Note. PU = perceived usefulness; PEOU = perceived ease of use; IFA = Islamic fintech adoption; FI = financial inclusion; β = standardized coefficient; R^2 = coefficient of determination; f^2 = effect size.

Source: Data Processed (2025)

Model explanatory power was substantial. PU and PEOU jointly explained 63.5% of the variance in IFA (R^2=0.635), while PU, PEOU, and IFA explained 69.9% of the variance in FI (R^2=0.699). These values indicate that the proposed TAM-based mechanism captures a meaningful share of the differences in adoption and inclusion outcomes among the sampled MSMEs. The effect size diagnostics provide a more granular view of what drives these outcomes. For adoption, PEOU's contribution was large (f^2=0.275), whereas PU's contribution was smaller (f^2=0.088). For financial inclusion, PEOU (f^2=0.122) and IFA (f^2=0.132) were moderate contributors, while PU's incremental effect was relatively small (f^2=0.048). This suggests that ease of use and adoption are stronger practical levers for inclusion than perceived usefulness alone. The impact of perceived usefulness on inclusion is likely mediated by the usability and the actual adoption, and it is still a relevant

factor from a TAM perspective. This aligns with previous studies, which found that inclusive outcomes did not necessarily follow from perceived benefits alone unless users were able to access and maintain the digital financial services easily.

The mediation results are central to the study's contribution because they clarify that adoption operates as a behavioural conduit through which technology perceptions become inclusion outcomes. The indirect effect of PU on FI via IFA was positive and significant (β=0.100; p=0.012), and the indirect effect of PEOU on FI via IFA was also positive and significant (β=0.176; p=0.011). Because the direct effects of PU and PEOU on FI remained significant, the mediations are partial rather than complete. This finding reinforces the novelty of the study by showing that Islamic fintech adoption mediates the relationship between TAM-based perceptions and MSME financial inclusion. This structure is theoretically informative. It suggests that positive perceptions can influence inclusion by increasing the likelihood of adoption (thereby strengthening engagement with Shariah-compliant services) and by shaping predispositions and confidence in formal financial participation more broadly. In practical terms, inclusion outcomes are stronger and more reliable when favourable beliefs about usefulness and ease of use translate into actual adoption and sustained engagement, rather than remaining at the level of positive attitudes.

The stronger indirect pathway for PEOU further underscores the pivotal role of ease of use in translating perceptions into sustained behaviour and, ultimately, inclusion. MSMEs can acknowledge that a platform is beneficial. Still, if they perceive it as difficult to operate—due to complicated onboarding, unclear procedures, or burdensome steps—they may delay adoption or discontinue use after initial trials. When ease of use is high, MSMEs are more likely to integrate Islamic fintech into routine operations, enabling repeated transactions and access to appropriate financing services. This aligns with broader evidence that digital technologies enhance inclusion benefits when they complement users' capacity to participate effectively, rather than assuming away capability gaps (Del Sarto & Ozili, 2025; Mohd Daud et al., 2024).

The discussion strengthens the explanatory logic of TAM by showing that MSMEs' appraisals of utility and usability are not merely attitudinal antecedents, but formative conditions shaping how Islamic fintech becomes embedded in day-to-day business routines (Davis, 1989; Venkatesh et al., 2012). The prominence of PEOU implies that MSMEs treat Islamic fintech adoption as an operational decision under constraints, reinforcing that usability is not a superficial design concern but a condition of participation. Conceptually, "ease" in Islamic fintech also implies that Shariah compliance features—such as contract structures, profit-and-loss-sharing logic, and documentation requirements—must be translated into workflows that remain understandable and manageable for small businesses. This contextual reading explains why PEOU simultaneously affects adoption and inclusion: it reduces perceived effort and uncertainty, helps prevent operational disruptions, and makes formal Shariah-compliant services feel accessible. This pattern is consistent with findings that simplified digital processes and low learning barriers are pivotal for micro-entrepreneurs in emerging markets (Maharseni et al., 2022; Nugraha et al., 2022) and with Islamic fintech evidence suggesting adoption is reinforced when compliance requirements are operationalized in user-friendly ways (Alsmadi et al., 2024).

At the same time, the significance of PU indicates that MSMEs still anchor adoption in concrete performance value—efficiency gains, improved financial

management, and better access to Shariah-compliant funding channels (Dharmastuti et al., 2022; Hanif & Santosa, 2023). This reinforces the classic TAM proposition that instrumental benefits shape technology uptake, but with a practical nuance for MSMEs: usefulness becomes persuasive when it can be converted into observable improvements in business processes and outcomes. Prior evidence similarly indicates that fintech engagement deepens when value is visible in business continuity and routine operational benefits (Hanif & Santosa, 2023; Nurfadilah & Samidi, 2021). The relatively smaller effect size of PU on FI compared with PEOU and IFA further suggests that perceived benefits alone may not secure inclusion unless the platform is usable and adoption is sustained.

Finally, the results clarify why financial inclusion should not be assumed to follow automatically from digital availability. Inclusion emerges through a layered pathway in which favourable perceptions facilitate adoption, and adoption translates those perceptions into sustained engagement with formal financial services. This mechanism is consistent with research positioning fintech as an inclusion enabler only when it is actively used to reduce access frictions, broaden participation, and improve service utilization among underserved groups (Aloulou et al., 2023; Amnas et al., 2023). It also reflects the broader argument that digital technology strengthens inclusion outcomes when it complements user capacity rather than substituting for capability gaps (Del Sarto & Ozili, 2025; Mohd Daud et al., 2024). Taken together, the findings extend TAM in the Islamic fintech setting by foregrounding adoption as a practical conduit linking value perceptions to inclusion outcomes, rather than treating adoption as an endpoint (Davis, 1989; Venkatesh et al., 2012). This interpretation is consistent with cross-country evidence that Islamic fintech development can strengthen digital financial inclusion and support sustainable development objectives when adoption is broad and meaningfully embedded in financial behaviour (Mohamed & Otake, 2025).

From a practical perspective, the findings suggest that human-centred design is a key component of inclusion infrastructure that providers and regulators need to include in their effort to enhance the inclusion of MSMEs in Islamic finance: clarity in onboarding, intuitive navigation, error-tolerant processes, explanations of Shariah compliant mechanisms and responsive customer support. This implication is supported by the empirical finding that ease of use and Islamic fintech adoption have a significant impact on financial inclusion. Complementary MSME-facing capabilities—peer learning, assisted onboarding, and targeted training—are likely to be especially valuable for users with varying levels of digital literacy (Maharseni et al., 2022; Rahadian & Thamrin, 2023). However, explanations concerning the behaviour of MSME should be considered as theoretical interpretation because psychological factors were not measured directly. From this perspective investment in usability and procedural clarity should not just be considered as a product improvement, but strategic interventions to reduce the actual costs of participating in the formal Sharia-compliant digital economy, and as such support adoption and adoption in turn financial inclusion.

The results should be interpreted with caution. This study has a cross-sectional design and was self-reported, thus restricting causal inferences and possible response bias. Furthermore, the sample also includes MSMEs who have previously participated in training activities related to Islamic finance and Islamic fintech. Thus, the outcome does not reflect the picture of Indonesia's overall MSME population but more closely aligns with MSMEs already with some level of digital readiness and experience using Sharia compliant fintech services.

Conclusion

This study finds that the Islamic fintech can positively impact MSME financial inclusion if the perceived usefulness and perceived ease of use result in actual adoption. The findings show that MSMEs are more likely to engage with Shariah-compliant fintech when they view it as beneficial for business operations and simple to use in daily financial activities. The most significant result is that the relationship between the technology-related perceptions and financial inclusion of MSMEs is partially mediated by Islamic fintech adoption, suggesting that Islamic fintech adoption acts as the main channel through which perceived usefulness and perceived ease of use brings financial inclusion outcomes. Therefore, financial inclusion is not only about the existence of Islamic fintech, but also about the capacity and readiness of the MSMEs to integrate Sharia-compliant fintech into their daily operations.

The major contribution of this study is the shift from technology acceptance to technology adoption as a mediating mechanism in the Islamic fintech context. This contribution is relevant because Islamic fintech differs from conventional fintech by combining digital access with Shariah-compliant principles, contract transparency, and ethical financial intermediation. For providers, inclusion-oriented strategies should prioritize practical adoption support, including simplifying onboarding into fewer steps, providing guided onboarding tutorials, reducing documentation complexity, and ensuring that the user journey remains manageable for MSMEs with limited time and administrative capacity. Policy attention for regulators and industry associations should be given to clear product communication, service consistency, complaint handling and training to ensure and improve the readiness of MSMEs in the field of Shariah-compliant digital finance.

This study has several limitations. First, the sample consisted of MSMEs with prior exposure to Islamic fintech and AFSI-related training activities; therefore, the findings should not be generalized to all MSMEs in Indonesia. Second, the cross-sectional design accounts for relationships at a single time and is unable to explain how perceptions, adoption, and inclusion outcomes change over time. Third, the use of self-reported data may introduce response bias. Future research should examine broader MSME segments, compare regional and platform-based differences, and use longitudinal designs to assess whether Islamic fintech adoption leads to sustained financial inclusion. Other potential variables for further research could also encompass Shariah compliance perception, trust, digital literacy, risk perception, and consumer protection, which could help to explain the role of Islamic fintech in inclusive economic activities.

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Appendix 1. Measurement Indicators

Variable	Code	Indicator	Measurement Item	Source
Perceived Usefulness	PU1	Business performance	Islamic fintech improves my MSME's performance.	Davis (1989); Venkatesh et al. (2003); Setyawati (2020)
	PU2	Access to financing	Islamic fintech eases access to Shariah-compliant financing.	
	PU3	Transaction efficiency	Islamic fintech makes transactions more efficient.	
	PU4	Cash-flow control	Islamic fintech helps manage cash flow.	
	PU5	Productivity	Islamic fintech increases financial activity productivity.	
Perceived Ease of Use	PEOU1	Ease of learning	Islamic fintech is easy to learn.	Davis (1989); Venkatesh et al. (2003); Rahadian & Thamrin (2023); Setyawati (2020)
	PEOU2	Interface simplicity	Islamic fintech is clear and easy to understand.	
	PEOU3	Procedural clarity	Islamic fintech procedures are simple and clear.	
	PEOU4	Flexibility	Islamic fintech is flexible for MSME financial needs.	
	PEOU5	Compatibility	Islamic fintech fits my MSME's routine practices.	
Islamic Fintech Adoption	IFA1	Actual use	I use Islamic fintech for MSME financial activities.	Venkatesh et al. (2012, 2016); Amnas et al. (2023); Rahim et al. (2023)
	IFA2	Usage intensity	I frequently use Islamic fintech in business operations.	
	IFA3	Continuance intention	I intend to keep using Islamic fintech.	
	IFA4	Recommendation intention	I would recommend Islamic fintech to other MSMEs.	
Financial Inclusion	FI1	Access	Islamic fintech improves access to formal Shariah-compliant finance.	Bongomin et al. (2017)
	FI2	Usage	Islamic fintech increases use of formal financial services.	

FI3	Service quality	Islamic fintech services are convenient and reliable.
FI4	Welfare-related outcome	Islamic fintech improves business stability and resilience.