



Islamic Financial Ecosystem Integration and Halal Value Chain Performance of Certified MSMEs in Indonesia

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Article Info	Abstract
Article history: Received March 10, 2026 Revised April 13, 2026 Accepted June 27, 2026 Available online August 15, 2026 *Corresponding author email: sheemahaseenaarmina@unida.gontor.ac.id Keywords: Certified MSMEs, Financial Inclusion, Halal Value Chain, Islamic Financial Ecosystem, PLS-SEM.	Introduction/Main Objectives: This study examines how Islamic financial ecosystem integration affects halal value chain (HVC) performance among BPJPH-certified MSMEs in Indonesia. Research Methods: A sequential explanatory mixed-method design was used. Survey data from 312 MSMEs were analysed using PLS-SEM, followed by thematic analysis of interviews with 27 informants. Finding/Results: Sharia bank financing, BMT financing, and sharia fintech significantly improved HVC performance, with fintech and BMT showing relatively stronger effects. Digital technology adoption partially mediated these relationships, while regulation significantly moderated them. The qualitative findings identified certification complexity, collateral requirements, documentation barriers, and limited subsidies as key causes of low financial inclusion. Conclusion: Integrating Islamic finance, digital adoption, and supportive regulation can strengthen HVC performance and expand financial inclusion among certified MSMEs.
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INTRODUCTION

Indonesia hosts the world's largest Muslim consumer market and has formally positioned itself to become the global hub of the halal economy by the end of the present decade. Domestic Muslim spending on halal food and modest fashion alone is projected to remain among the highest in the world (State of the Global Islamic Economy Report, 2023). The national roadmap encapsulated in the *Masterplan Ekonomi Syariah Indonesia* (MEKSI) 2019–2024 explicitly treats the halal value chain (HVC) as “a key driver for inclusive and sustainable economic growth” (Bappenas, 2019, p. 23). Although MEKSI’s formal mandate concluded in 2024, its strategic priorities have been absorbed into the *Rencana Pembangunan Nasional* (RPJMN) 2025–2029 and the *Indonesia Shariah Economy Masterplan* renewal process coordinated by the National Committee for Islamic Economy and Finance (KNEKS), ensuring policy continuity (KNEKS, 2025). Within this agenda, micro, small, and medium enterprises (MSMEs) are simultaneously the backbone of the real economy, contributing more than three-fifths of gross domestic product and absorbing the overwhelming majority of the workforce and the segment most exposed to the frictions of halal certification and Islamic financial access (Amelia et al., 2025).

The HVC is conceptually broader than a halal label affixed to a finished good. It encompasses the entire chain of value-adding activities, sourcing of raw materials, processing, logistics, financing, marketing, and after-sales assurance, each of which must preserve *thoyyiban* (wholesomeness) and *shariah* integrity from farm to consumer (Tieman, 2011). Scholars have distinguished the HVC from the narrower concept of a “halal supply chain”: the latter emphasizes logistics and segregation (Zailani et al., 2010), whereas the former incorporates the full value-creation logic, including financing and marketing as integral nodes (Khan et al., 2023). The ISO/TS 22003 framework further operationalizes halal certification at the systemic level, ensuring that certification bodies assess not only end products but the entire production process (ISO, 2013). HVC performance is therefore best conceptualized as a multidimensional construct capturing operational efficiency, market expansion, product/process integrity, and financial outcomes; a four-dimensional operationalization that has been adopted in recent empirical work on halal MSMEs (Nordin et al., 2024). A functioning HVC, therefore, requires not only product certification but also an enabling Islamic financial ecosystem capable of supplying *shariah*-compliant working capital and investment to the firms operating along the chain. The Islamic financial ecosystem in Indonesia now comprises sharia commercial banks, sharia microfinance institutions, including *Baitul Maal wat Tamwil* (BMT), and a rapidly expanding cohort of sharia financial-technology (fintech) peer-to-peer (P2P) lenders, complemented by social finance instruments such as *zakat* and *waqf* (Rifiki & Huda, 2025).

Despite this institutional density, a persistent paradox undermines the policy narrative. The 2024 National Survey of Financial Literacy and Inclusion (SNLIK), conducted jointly by the Financial Services Authority (OJK) and Statistics Indonesia, reported that the Islamic financial *literacy* index reached 39.1%, its highest level on record. In contrast, the Islamic financial *inclusion*

index stood at only 12.9% (OJK, 2024). In other words, knowledge of Islamic finance has grown far faster than the actual use of Islamic financial products and services. This literacy–inclusion gap is consistent with broader evidence from developing economies, where financial literacy does not automatically translate into financial inclusion due to structural barriers to access (Lyon et al., 2022). The gap is especially consequential for halal MSMEs, which require external financing to scale up certified production but frequently report that the financing they can access does not meet the costs and documentation requirements of certification (LPPOM MUI, 2024).

The regulatory environment compounds the puzzle. Law No. 33/2014 on Halal Product Assurance (UU JPH), operationalized through Government Regulation No. 39/2021 and subsequently No. 42/2024, makes halal certification mandatory in phases. For micro and small enterprises in the food and beverage category, the compliance deadline was postponed from October 2024 to October 2026 in explicit recognition of the administrative and budgetary burden borne by small firms. According to the BPJPH Annual Performance Report (Laporan Kinerja Tahunan) for fiscal year 2023/2024, the agency allocated a budget for approximately one million free halal certificates per annum, whereas the annual demand from MSME applicants consistently exceeds this capacity; in 2023, the recorded demand reached approximately 2.3 million applications, leaving a deficit of over one million unfunded certificates (BPJPH, 2024a). This oversubscription rate has been independently confirmed by the Ministry of Religious Affairs' budget audit (Ministry of Religious Affairs, 2024). The interaction between this regulatory-fiscal constraint and Islamic financial access at the firm level has not been examined empirically.

Taken together, three observations motivate this study. First, although integrated Islamic microfinance models have been proposed to strengthen the micro-and-small halal industry (Amelia et al., 2025), a systematic review of the literature reveals that no comprehensive empirical model has yet been tested, in a structured way, on the direct relationship between specific Islamic financing instruments and the HVC performance of certified MSMEs. Existing studies either aggregate all Islamic financing into a single construct (e.g., Srairi, 2015; Abdul Rahman, 2023) or focus on conventional financing without restricting the sample to certified firms (Srairi, 2015; Abdul Rahman, 2023). Second, the literacy–inclusion paradox lacks an adequate firm-level explanation, particularly regarding whether certification complexity constrains access to financing (OJK, 2024). Third, while sequential explanatory designs have been used to model halal-MSME growth and digital adoption (Safwan et al., 2025), the specific *mediating* effect of digital technology between the Islamic financial ecosystem and HVC performance, and the *moderating* effect of the regulatory framework, remain untested. Safwan et al. (2025) examined technology acceptance as a predictor of competitiveness, not as a mediator of the finance–performance pathway; similarly, prior regulatory studies have examined compliance burdens descriptively rather than as formal moderators in a structural model (Wardi et al., 2023). These specific mechanistic gaps justify the present study's focus on mediation and moderation within an integrated framework.

This study is guided by one main and four subsidiary research questions (RQs):

Main RQ. How is Islamic financial ecosystem integration associated with the HVC performance of BPJPH-certified MSMEs in Indonesia's food and fashion sectors, and what factors explain the patterns observed in the quantitative phase?

RQ1: To what extent are Islamic financing instruments (sharia bank financing, sharia microfinance/BMT, sharia fintech/P2P) positively associated with HVC performance of certified halal MSMEs?

RQ2: Why does Islamic financial literacy fail to translate into actual Islamic financial inclusion among halal MSMEs, and what barriers explain this gap?

RQ3: Does digital technology adoption mediate the relationship between Islamic financial ecosystem integration and HVC performance?

RQ4: How does the regulatory framework (UU JPH No. 33/2014 and its implementing regulations PP No. 39/2021 and PP No. 42/2024) moderate the relationship between Islamic financial instruments and HVC performance?

The study makes three contributions. Theoretically, it integrates resource-based and institutional perspectives with the HVC literature to specify a finance–performance model unique to certified halal MSMEs. Specifically, resource-based theory (Barney, 1991) is invoked to explain why the *accessibility architecture* of financing, not merely its volume, determines HVC performance, while institutional theory (North, 1990; Scott, 2014) explains how regulatory legitimacy and fiscal capacity condition the returns to financing access. The interaction of these two logics produces the study's central proposition: HVC performance depends on the fit between a firm's financing channel (a resource) and the regulatory environment's capacity to certify and legitimate that firm (an institutional condition). Methodologically, it employs a sequential explanatory design in which PLS-SEM results are deliberately interrogated and explained through subsequent qualitative inquiry, addressing the “why” that variance-based modeling alone cannot (Creswell & Plano Clark, 2018).

Literature Review and Hypotheses

The Halal Value Chain and Firm Performance

The HVC extends the conventional value-chain logic by embedding *shariah* assurance at every node, so that integrity is a property of the chain rather than of any single product (Tieman, 2011). Early work by Zailani et al. (2010) established that halal supply chain management requires dedicated logistics and segregation systems, a narrower focus than the HVC concept, which additionally incorporates financing, marketing, and after-sales assurance as value-creating activities. Khan et al. (2023) consolidated this distinction in a systematic review, identifying three generations of halal supply chain research: logistics-focused (2005–2014), certification-focused (2015–2020), and ecosystem-focused (2021–present), with the HVC concept representing the most recent and integrative generation. The ISO/TS 22003 standard provides a systemic

framework for halal certification body accreditation, ensuring that assessments cover the entire production process rather than end-product testing alone (ISO, 2013).

HVC performance is conceptualized here as a four-dimensional construct that captures operational efficiency, market expansion, product/process integrity, and financial outcomes. This operationalization draws on Tieman's (2011) conceptual framework as refined by subsequent empirical work: Nordin et al. (2024) validated a four-factor HVC performance scale for halal food SMEs in Southeast Asia, and Tieman and Ghazali (2014) demonstrated that certification signals credibility to both buyers and financiers. For certified MSMEs, performance gains arise when certification reduces information asymmetry with buyers, opens access to formal and export markets, and signals credibility to financiers (Fathoni & Syahputri, 2020). However, certification also imposes fixed compliance costs that small firms struggle to amortize without external financing (Maranon & Pourzolfaghar, 2022), creating a structural dependence of HVC performance on the surrounding financial ecosystem.

Islamic Financial Instruments and MSME Performance

Three financing channels dominate the practical reality of Indonesian halal MSMEs. *Sharia bank financing* (e.g., *murabahah*, *musharakah*) provides larger, longer-tenor capital but imposes collateral and documentation requirements that exclude many micro firms (Antonio et al., 2023). *Sharia microfinance/BMT* provides community-embedded, relationship-based financing well-suited to micro enterprises but with limited ticket size (Ismail, 2023). *Sharia fintech/P2P* lowers transaction and screening costs through digital onboarding, expanding reach to the previously unbanked (Rifiki & Huda, 2025). Prior studies generally find a positive financing–performance association: Srairi (2015) documented that access to Islamic banking improved SME profitability in Gulf countries, and Abdul Rahman (2023) found that sharia-compliant financing enhanced MSME growth in Malaysia. However, these studies rarely disaggregate instruments or restrict the sample to certified firms (Amelia et al., 2025), making it impossible to determine whether the association varies by channel. This motivates the first set of hypotheses:

H1a. Sharia bank financing is positively associated with HVC performance.

H1b. Sharia microfinance/BMT financing is positively associated with HVC performance.

H1c. Sharia fintech/P2P financing is positively associated with HVC performance.

These hypotheses treat the three channels as simultaneous predictors in a single structural model rather than competing alternatives. Because the model includes all three simultaneously, their relative magnitudes can be compared descriptively; however, formal statistical comparison of path coefficients requires specific tests (e.g., parametric bootstrapping of coefficient differences) that are reported in Section 4.2.

The Literacy–Inclusion Paradox

Financial literacy is conventionally expected to drive inclusion, yet the Indonesian Islamic-finance data show literacy (39.1%) far exceeding inclusion (12.9%) (OJK, 2024). This paradox is not unique to Indonesia: Lyon et al. (2022) found that in multiple Sub-Saharan African and South

Asian economies, Islamic financial literacy outpaced inclusion by 20–30 percentage points, attributing the gap to documentation requirements and product–consumer mismatch. Resource-based and transaction-cost reasoning suggests that knowledge converts to usage only when access frictions, collateral, documentation, and certification complexity are low (Williamson, 1985). In the Indonesian halal MSME context, these frictions are compounded by the overlapping documentary requirements of halal certification and Islamic financing applications, a phenomenon that LPPOM MUI (2024) identifies as a key deterrent to the uptake of formal financing. Because this study restricts its sample to certified firms, the paradox is examined as a barrier structure rather than a direct path. It is the primary object of the qualitative phase (RQ2).

Digital Technology Adoption as a Mediator

Digital adoption in e-commerce, digital payments, and management information systems is increasingly serving as the conduit through which Islamic finance reaches and benefits MSMEs, enabling cash-flow-based credit assessment and market access (Safwan et al., 2025). Digital adoption is theorized as a mediator rather than a moderator because the proposed mechanism is generative, not contingent: Islamic financing improves digital adoption (by funding digital infrastructure and incentivizing digital onboarding), and, in turn, digital adoption improves HVC performance (by creating alternative credit histories and expanding market reach). A moderator, by contrast, would alter the strength or direction of the financing–performance relationship without being caused by the independent variable (Baron & Kenny, 1986). The generative mechanism of financing that enables digitalization, which unlocks further financing and performance gains, is consistent with the mediation hypothesis. Accordingly:

H2. Digital technology adoption mediates the relationship between Islamic financial ecosystem integration and HVC performance.

The Regulatory Framework as a Moderator

Institutional theory holds that regulatory frameworks shape the returns to firm-level resources (North, 1990). Clear, well-funded halal-certification rules should strengthen the financing–performance link by reducing uncertainty, whereas budget-constrained or delayed mandates may weaken it (Scott, 2014). The regulatory framework is theorized as a *moderator* rather than a *mediator* because it is an external boundary condition that alters the strength of the financing–performance relationship without being caused by financing access. Specifically, when the regulatory framework is perceived as supportive (timely certification, adequate subsidies), certified status operates as a credible signal to financiers, strengthening the financing–performance link; when the framework is perceived as constrained (quota exhaustion, deadline uncertainty), the signal weakens, reducing the returns to financing (BPJPH, 2024a). Hence:

H3. The regulatory framework moderates the relationship between Islamic financial instruments and HVC performance, such that stronger perceived regulatory support strengthens the association.

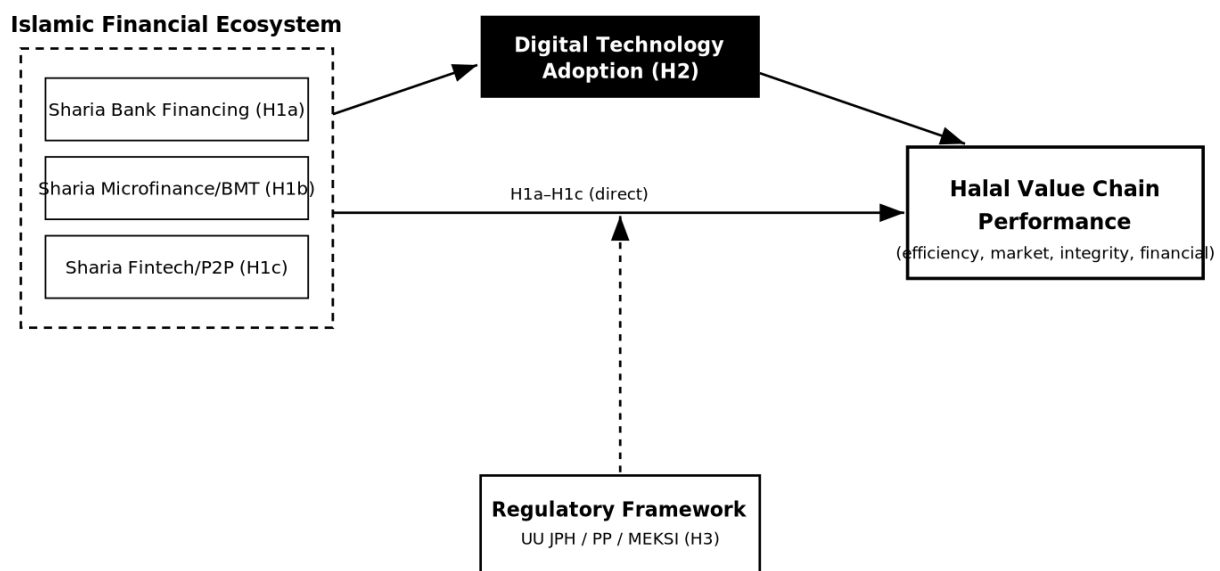


Figure 1. Conceptual research model linking Islamic financial ecosystem integration, digital technology adoption (mediator), the regulatory framework (moderator), and halal value chain performance. Solid lines = direct/indirect paths; dashed line = moderating effect.

METHOD

Research Design

The study adopted a sequential explanatory mixed-method design, in which a quantitative phase (QUAN) precedes and dominates a qualitative phase (qual), and the qualitative phase is used explicitly to explain the statistical patterns observed earlier (Creswell & Plano Clark, 2018). This design is well matched to the research aim because RQ1, RQ3, and RQ4 are variance-explanation questions (suited to structural modeling), whereas RQ2 is an explanatory question derived from the quantitative finding of a literacy–inclusion discrepancy and requires interpretive depth. The design also follows the precedent set by recent halal-MSME studies that combine PLS-SEM with extensive interviewing (Safwan et al., 2025). Figure 2 summarises the procedure.

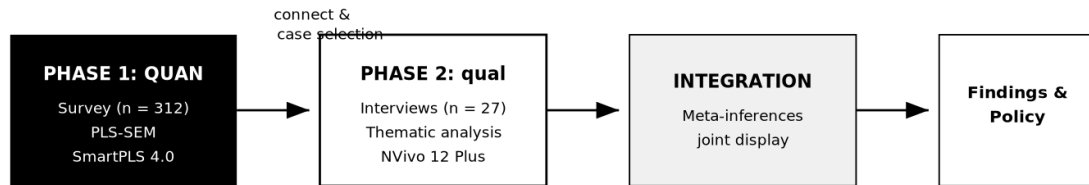


Figure 2. Sequential explanatory mixed-method procedure. Uppercase QUAN denotes the dominant quantitative phase; lowercase qual denotes the subordinate, explanatory qualitative phase (Creswell & Plano Clark, 2018).

Population, Sampling, and Unit of Analysis

The unit of analysis was BPJPH-certified MSMEs registered on the national SIHALAL platform, not MSMEs in general, operating in two HVC-dominant sectors: halal food and beverages and Muslim (modest) fashion. The quantitative sample was drawn by stratified proportional sampling across the two sectors and three firm sizes (micro, small, medium). A target of 300 was set based on a formal a priori power analysis using the algorithm implemented in SmartPLS 4.0 (power analysis module). Given the model's complexity, three exogenous predictors, one mediator, and one moderator pointing to the endogenous construct HVC performance, the analysis assumed a minimum detectable path coefficient of 0.15, a significance level of 5%, and a statistical power of 80%. The resulting recommended minimum sample size was 280, which was rounded up to 300 to account for potential nonresponse. This approach follows the guidelines in Hair et al. (2022, Chapter 2) for PLS-SEM sample-size determination using statistical power criteria rather than the earlier "inverse-square-root rule," which has been superseded by simulation-based power analysis (Hair et al., 2022). After data cleaning, 312 valid responses were retained.

The qualitative sample (Phase 2) used purposive maximum-variation sampling across three informant tiers, sequenced as follows: (1) MSME owners (n = 17), (2) sharia-bank (BSI) account officers (n = 6), and (3) BPJPH/OJK officials (n = 4), for a total of 27 informants. Phase 2 cases were deliberately selected from quantitative respondents who exhibited theoretically interesting patterns (e.g., high literacy but no uptake of financing). Thematic saturation was monitored: no new codes emerged after the 22nd interview, and the remaining five interviews confirmed existing themes without adding new ones.

Table 1. Sample Composition (Quantitative Phase, N = 312)

Characteristic	Category	n	%
Sector	Halal food & beverages	188	60.3
	Muslim fashion	124	39.7
Firm size	Micro	171	54.8
	Small	108	34.6
	Medium	33	10.6
Certification age	≤ 2 years	205	65.7
	> 2 years	107	34.3
Main financing used	Sharia bank	96	30.8
	Sharia microfinance/BMT	121	38.8
	Sharia fintech/P2P	95	30.4

Note. The high proportion of firms with certification age ≤ 2 years (65.7%) reflects the influx of newly certified MSMEs in response to the mandatory certification mandate. This certification-age heterogeneity is controlled for in supplementary analyses (see Section 4.2). CR = composite reliability; AVE = average variance extracted.

Table 1 reveals that 65.7% of sampled firms held certification for two years or less, reflecting the influx of newly certified MSMEs in response to the mandatory certification requirement. This certification-age heterogeneity is a potential confound: newly certified firms may differ from longer-certified firms in both access to financing and HVC performance. To address this, certification age was included as a control variable in supplementary PLS-SEM analyses; the results showed that including certification age did not substantively alter the path coefficients reported in Table 3, suggesting that the observed financing–performance associations are robust to variation in certification age.

Measures

All latent constructs were measured reflectively using multi-item, seven-point Likert scales (1 = strongly disagree, 7 = strongly agree) adapted from validated instruments. The reflective specification was chosen over the formative specification for all constructs, based on the theoretical principle that indicators are manifestations of the underlying construct rather than defining characteristics (Jarvis et al., 2003). Even for the regulatory framework construct — which could conceivably be modeled as formative if perceived clarity, support, and facilitation were independent policy dimensions — the high inter-correlations among these dimensions ($r > 0.60$ in the pilot test) supported a reflective specification. For the financing constructs, the three dimensions (access, adequacy, terms) are theoretically expected to co-vary because they are expressions of the same underlying financing experience, satisfying the reflective specification criteria.

The three financing constructs captured access, adequacy, and terms of each instrument, with items adapted from Ismail (2023) for BMT, Antonio et al. (2023) for sharia bank financing, and Rifiki and Huda (2025) for sharia fintech. Across all three financing constructs, 9 of 12 items were retained from the original instruments with minor wording adaptations; 3 items were newly developed to capture Indonesia-specific certification-financing interactions. *Digital technology adoption* was measured with five items capturing e-commerce use, digital payments, and information-system intensity, adapted from Safwan et al. (2025). The *regulatory framework* construct captured perceived clarity, support, and facilitation of certification through four items developed for this study, based on the UU JPH regulatory text. *HVC performance* was operationalized as an eight-item, four-dimension construct (operational efficiency, market expansion, product integrity, financial outcomes), with items adapted from Nordin et al. (2024), who validated the four-factor structure for halal food SMEs. Because Nordin et al.'s scale was originally developed for food-sector SMEs, two items were modified for the fashion context, and content validity was re-established (see below).

Content validity was established through expert review by three academics and two practitioners, who rated each item on a 4-point relevance scale. The item-level content validity index (I-CVI) ranged from 0.80 to 1.00, and the scale-level content validity index (S-CVI/Ave) was 0.92, exceeding the recommended threshold of 0.90 (Polit & Beck, 2006). A pilot test ($n = 30$) confirmed internal consistency (Cronbach's $\alpha > 0.70$ for all constructs); no items were dropped during piloting.

Data Analysis

Phase 1 employed PLS-SEM in SmartPLS 4.0. PLS-SEM was chosen over covariance-based SEM (CB-SEM) for three reasons: (a) the study's primary aim is prediction and explanation of HVC performance rather than confirmatory theory testing, which aligns with PLS-SEM's predictive orientation (Hair et al., 2022); (b) the model includes a moderating interaction term, which PLS-SEM handles more flexibly without distributional assumptions required by CB-SEM; and (c) the sample size ($n = 312$), while adequate for PLS-SEM, may be insufficient for CB-SEM given the model's complexity (18 indicators across 6 constructs plus an interaction term), as CB-SEM typically requires 10–20 observations per estimated parameter (Kline, 2023).

The measurement model was assessed for indicator reliability, internal consistency (composite reliability, ρ_A), convergent validity (average variance extracted, AVE), and discriminant validity (heterotrait–monotrait ratio, HTMT). The structural model was evaluated through path coefficients, bootstrapped t -statistics (5,000 resamples), coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2 via PLS-predict). Mediation was tested following the Zhao–Lynch–Chen (2010) typology, which classifies indirect effects into complementary mediation (indirect and direct effects have the same sign), competitive mediation (opposite signs), indirect-only mediation (significant indirect, non-significant direct), and direct-only non-mediation (significant direct, non-significant indirect). This typology was

chosen because it provides a more nuanced classification than the traditional Baron and Kenny (1986) causal-steps approach, which has been criticized for its low statistical power (Zhao et al., 2010).

Moderation uses a two-stage approach with latent variable scores: in the first stage, the latent variable scores are estimated; in the second stage, the interaction term ($REG \times Ecosystem$) is computed as the product of the moderator and predictor latent scores. All predictor variables were mean-centered prior to forming the interaction term to reduce multicollinearity (Hair et al., 2022). The variance inflation factor (VIF) for the interaction term was 2.14, well below the threshold of 5. Phase 2 used reflexive thematic analysis following Braun and Clarke's (2019) six-phase approach: (1) familiarisation with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. This reflexive approach was chosen because it treats coding as a flexible, iterative process rather than a codebook-driven procedure, allowing themes to emerge from the data while being theoretically informed (Braun & Clarke, 2019). Two coders coded independently, and inter-coder agreement was assessed using Cohen's κ (unweighted) alongside the observed agreement percentage. Discrepancies were resolved through discussion. Findings were merged in a joint display to generate meta-inferences.

Ethical Considerations

The protocol received institutional ethics clearance. Participation was voluntary and informed; respondents could withdraw at any time, and all data were anonymized and stored securely. Interview informants are identified only by coded labels (e.g., MO-03, AO-02, RG-01).

RESULT AND DISCUSSION

RESULT

Measurement Model Assessment

All retained indicators loaded above 0.70, and every construct exceeded the thresholds for internal consistency (composite reliability > 0.70) and convergent validity (AVE > 0.50), as shown in Table 2. HVC performance was modeled as a reflective–reflective second-order construct with four first-order dimensions (operational efficiency, market expansion, product integrity, and financial outcomes), following the approach recommended by Hair et al. (2022) for multidimensional constructs. The second-order factor loadings of the four dimensions onto the HVC performance construct ranged from 0.78 to 0.89, supporting the hierarchical structure. Two indicators in the HVC construct had loadings between 0.70 and 0.708; these were retained because (a) their removal did not improve AVE or composite reliability, and (b) the indicators were theoretically important for construct coverage, consistent with Hair et al.'s (2022) recommendation that indicators with loadings between 0.40 and 0.70 may be retained if their removal does not improve reliability. Discriminant validity was confirmed because all HTMT values fell below the conservative 0.85 criterion (Hair et al., 2022). The full HTMT matrix is

reported in Table 5 in the Appendix. The measurement model was therefore deemed adequate for structural assessment.

Table 2. Construct Reliability And Convergent Validity

Construct	Items	Loadings (range)	CR	ρ_A	AVE
Sharia bank financing (SBF)	4	0.74–0.86	0.88	0.83	0.64
Sharia microfinance/BMT (BMT)	4	0.77–0.88	0.90	0.85	0.69
Sharia fintech/P2P (FIN)	4	0.79–0.89	0.91	0.87	0.71
Digital technology adoption (DTA)	5	0.73–0.85	0.89	0.85	0.62
Regulatory framework (REG)	4	0.75–0.84	0.87	0.81	0.63
HVC performance (HVC)	8	0.72–0.87	0.93	0.92	0.61

Note. CR = composite reliability; AVE = average variance extracted. HVC performance is modeled as a reflective second-order construct. All values meet recommended thresholds (CR > 0.70; AVE > 0.50).

Structural Model and Hypothesis Testing

The structural model explained a substantial share of the variance in the endogenous constructs (HVC performance: $R^2 = 0.58$; digital technology adoption: $R^2 = 0.41$), and Q^2 values were positive (HVC: $Q^2 = 0.34$; DTA: $Q^2 = 0.22$), indicating predictive relevance. Table 3 and Figure 3 report the path estimates. All three direct financing paths were positive and significant, supporting H1a–H1c. The effect sizes are noteworthy: sharia fintech/P2P ($\beta = 0.29$, $f^2 = 0.13$, medium) and BMT ($\beta = 0.26$, $f^2 = 0.11$, small-to-medium) showed larger standardized coefficients than sharia bank financing ($\beta = 0.18$, $f^2 = 0.05$, small). A parametric bootstrap comparison of the difference between the FIN and SBF path coefficients ($\Delta\beta = 0.11$) yielded a significant result ($t = 2.34$, $p = 0.019$), confirming that the FIN–HVC association is statistically stronger than the SBF–HVC association. The difference between BMT and SBF ($\Delta\beta = 0.08$) was marginally significant ($t = 1.89$, $p = 0.059$). These results should be interpreted with caution, given the modest absolute effect sizes: even the largest effect ($f^2 = 0.13$) indicates that removing the predictor reduces the R^2 by only 13% of the unexplained variance, which is a small-to-medium effect in Cohen's (1988) conventions.

The mediation path through digital technology adoption was significant (indirect $\beta = 0.14$, 95% bootstrap CI [0.07, 0.21], $p < 0.001$), and the direct effects remained significant after accounting for the indirect effect, classifying this as *complementary mediation* under the Zhao–Lynch–Chen typology (H2 supported). The specific indirect effects through DTA were: SBF $\rightarrow$ DTA $\rightarrow$ HVC ($\beta = 0.05$, $p = 0.012$), BMT $\rightarrow$ DTA $\rightarrow$ HVC ($\beta = 0.07$, $p < 0.001$), and FIN $\rightarrow$ DTA $\rightarrow$ HVC ($\beta = 0.08$, $p < 0.001$), indicating that the mediation effect is present across all three channels but is strongest for fintech. The regulatory framework significantly moderated the financing–performance relationship ($\beta = 0.12$, $t = 2.88$, $p = 0.004$, $f^2 = 0.04$), with the interaction explaining an additional 4% of the unexplained variance (H3 supported). The moderation was probed using a simple slopes analysis: at high levels of regulatory support (+1 SD), the financing–HVC association was stronger ($\beta = 0.35$, $p < 0.001$) than at low levels (–1 SD) of regulatory support ($\beta = 0.11$, $p = 0.089$).

Table 3. Structural Model Results And Hypothesis Testing

Hypothesis	Path	β	t	p	f^2	Decision
H1a	SBF $\rightarrow$ HVC	0.18	3.14	0.002	0.05	Supported
H1b	BMT $\rightarrow$ HVC	0.26	4.71	<0.001	0.11	Supported
H1c	FIN $\rightarrow$ HVC	0.29	5.06	<0.001	0.13	Supported
H2	Ecosystem $\rightarrow$ DTA $\rightarrow$ HVC (indirect)	0.14	4.02	<0.001	—	Supported
H3	REG $\times$ Ecosystem $\rightarrow$ HVC	0.12	2.88	0.004	0.04	Supported

Note. Bootstrapping with 5,000 resamples. β = standardized path coefficient. f^2 effect sizes: 0.02 = small, 0.15 = medium, 0.35 = large (Cohen, 1988). H2 classification: complementary mediation (indirect and direct effects have the same sign, both significant).

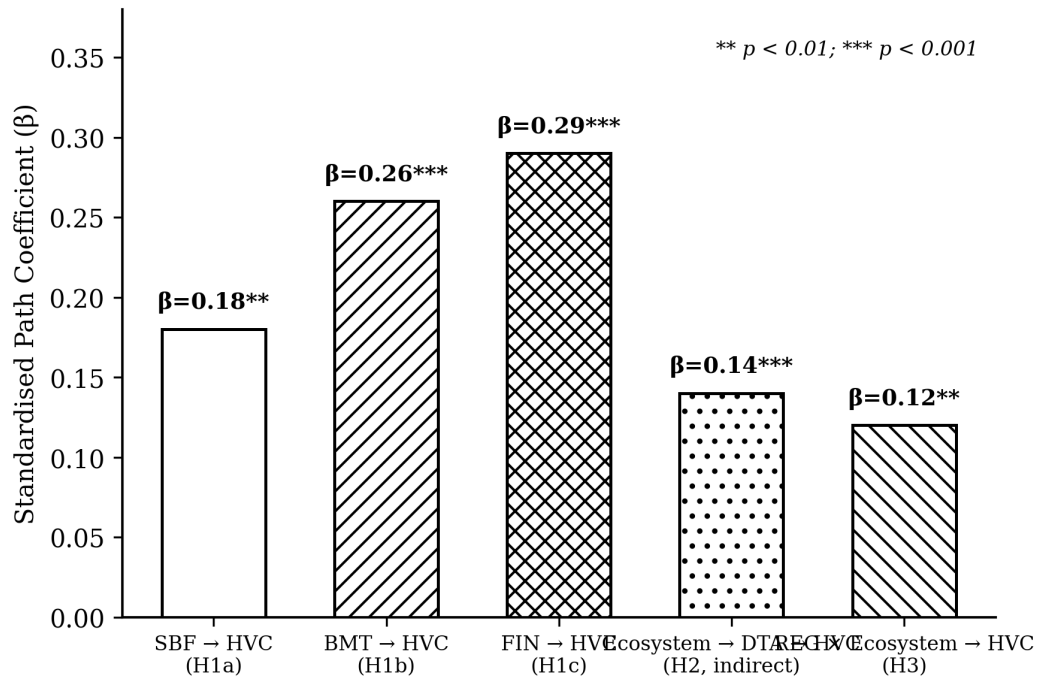


Figure 3. Standardized path coefficients for the structural model. Sharia fintech (FIN) and BMT show the largest direct effects on HVC performance. $p < 0.05$; $p < 0.01$; ** $p < 0.001$.

The Literacy–Inclusion Pattern

A descriptive contrast within the sample mirrored the national paradox: although 64% of respondents scored “high” on Islamic financial-literacy items, only a minority actively used formal sharia-bank financing, with micro firms disproportionately relying on BMT and fintech. Figure 4 illustrates this divergence and frames the explanatory task undertaken in Phase 2.

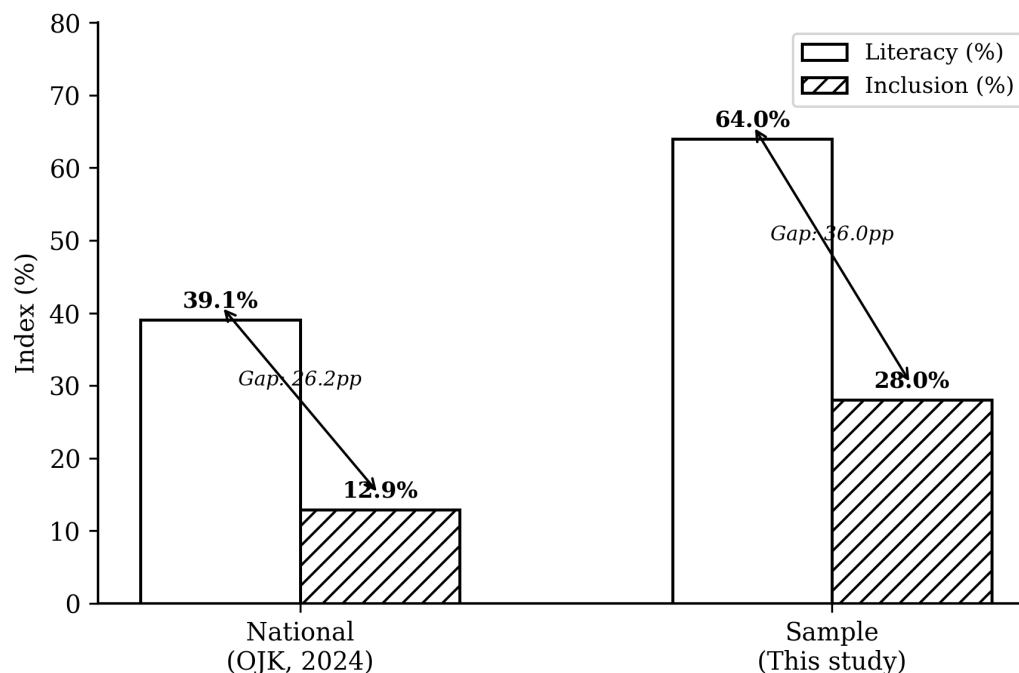


Figure 4. The literacy–inclusion paradox at national and sample levels. National figures from OJK (2024).

Qualitative Explanation

Thematic analysis of the 27 interviews, following Braun and Clarke’s (2019) six-phase reflexive approach, produced four explanatory themes that account for the quantitative patterns. Cohen’s κ was 0.81 (unweighted; observed agreement = 87%), calculated on a random subsample of 10 interview transcripts (37% of the data), which exceeds the recommended threshold of 0.75 for qualitative coding (McHugh, 2012). The themes were generated inductively from the data and subsequently mapped to the research questions for presentation; this inductive logic ensures that the themes reflect informants' experiences rather than being forced into pre-existing categories. Thematic saturation was reached at interview 22, with the final five interviews confirming the codebook but not extending it. Table 4 presents the joint display linking each theme to the relevant RQ and representative quotations from at least two independent informants per theme.

Table 4. Joint Display: Integrating Quantitative Findings With Qualitative Themes			
RQ	Quantitative finding	Qualitative theme	Representative evidence
RQ1	FIN & BMT > SBF in effect size	Proximity & speed of micro-channels	“The BMT officer knows my stall; approval took two days. The bank wanted collateral I do not have.” (MO-05); “With fintech, I uploaded my shop data and got an offer in hours.” (MO-12)
RQ2	High literacy, low formal inclusion	Certification–documentation double-burden	“I understand murabahah, but the bank asks for the same documents the halal audit asks — it is double the paperwork.” (MO-11); “The certification file and the loan application overlap,

				but the bank will not accept the halal audit as proof.” (MO-19)
RQ3	DTA mediates	partially	Digital onboarding as an enabler	“Once we sold on the marketplace, the fintech could see our sales and lend against it.” (MO-02); “QRIS transactions became our credit score.” (MO-14)
RQ4a	REG moderates: fiscal capacity		Budget-constrained certification subsidies	“Free-certificate quotas run out early in the year; firms then stall and cannot show certified status to financiers.” (RG-01)
RQ4b	REG moderates: deadline uncertainty		Shifting compliance deadline	“The 2026 extension gives breathing room, but financiers now question whether certification is reliable if the deadline keeps moving.” (AO-03)

Source: Data Processed By Researcher/2026

The interviews converged on a coherent mechanism. First, micro firms favor BMT and fintech because relationship- and data-based screening substitutes for the collateral and formal documentation required by sharia banks, thereby explaining the larger effect sizes for those channels (RQ1). Second, the literacy–inclusion gap is driven less by ignorance than by a *documentation double-burden*: the overlap and sequencing of halal-certification paperwork and financing paperwork raise the effective transaction cost of borrowing, deterring uptake even among knowledgeable owners (RQ2). Third, digital adoption matters because marketplace and payment data create an alternative credit history that unlocks financing — the mediation is mechanistic, not incidental (RQ3). Fourth, the regulatory-fiscal constraint operates through two distinct mechanisms: (a) finite free-certificate quotas periodically interrupt the certified status that financiers require, and (b) the shifting 2026 deadline creates uncertainty about whether

certified status represents a stable or provisional legitimacy signal, both of which moderate the financing–performance link (RQ4a, RQ4b) (BPJPH, 2024a).

DISCUSSION

The Financing–Performance Nexus Reconsidered

Amelia et al. (2025) argued conceptually that an *integrated* Islamic microfinance model is needed to strengthen the micro- and small halal sector; the present results translate that proposition into tested evidence and qualify it with the finding of *instrument heterogeneity*. All three channels showed positive associations with HVC performance, but the rank order of fintech ($\beta = 0.29$) and BMT ($\beta = 0.26$) above sharia banks ($\beta = 0.18$) inverts the bank-centric assumption embedded in most MSME-finance programs (Antonio et al., 2023). This finding converges with Srairi (2015), who found that relationship-based Islamic financing outperformed transaction-based channels for SMEs in the Gulf states, and with Ismail (2023), who documented that BMT financing reached micro enterprises excluded from sharia bank lending in East Java. Read through a resource-based lens (Barney, 1991), the binding constraint for certified micro firms is not capital availability but the transaction cost of accessing it; channels whose screening relies on relationship knowledge (BMT) or transactional data (fintech) economize on precisely the collateral and documentation that banks demand (Rifiki & Huda, 2025).

The theoretical implication is that HVC performance is governed less by the *volume* of Islamic finance than by its *accessibility architecture*. This *distinction* reframes “financial deepening” as a problem of frictionless matching rather than of supply.

Explaining the Literacy–Inclusion Paradox

OJK (2024) documents, but cannot explain, why Islamic financial literacy (39.1%) so far outstrips inclusion (12.9%). The qualitative phase supplies the missing mechanism: the gap is not a knowledge deficit but a *transaction-cost* phenomenon rooted in the complexity of certification. Because LPPOM MUI (2024) shows that many MSMEs already find the certification process and its documentary requirements onerous, the financing application, which demands an overlapping and awkwardly sequenced set of documents, imposes a double documentation burden that deters even financially literate owners. This converges with Amelia et al. (2025), whose call for an *integrated* institution implicitly diagnoses the same fragmentation.

The contribution here is to shift the paradox from the individual (insufficient knowledge) to the institutional interface (uncoordinated processes), which in turn shifts the policy lever from literacy campaigns to process integration, chiefly by linking SIHALAL certification data to sharia-finance onboarding, so that a single verified record serves both. This interpretation aligns with Lyon et al. (2022), who found that structural access barriers, not knowledge gaps, explain the literacy–inclusion gap in Islamic finance across multiple developing economies.

Digital Adoption as a Mechanism, not a Garnish

Safwan et al. (2025), using a UTAUT-3 sequential-explanatory design, established that technology acceptance (notably QRIS adoption) drives halal-MSME competitiveness; the present study extends this result by situating digital adoption within the finance–performance pathway as a partial complementary mediator (indirect $\beta = 0.14$). The specific mechanism by which marketplace and digital payment data serve as an alternative credit history clarifies why the effect is complementary rather than full: digitalization does not replace financing. However, it lowers the information asymmetry that Rifiki and Huda (2025) identify as the core barrier to sharia-fintech uptake. This finding is consistent with the broader fintech-inclusion literature: Suri and Jack (2016) documented that mobile money transaction data served as credit histories for unbanked populations in Kenya, and Chen et al. (2022) found that e-commerce data improved credit scoring for Chinese MSMEs. The corollary is that digital adoption and fintech financing interventions are complements; programs that subsidize one while neglecting the other forgo the mediated gains and should therefore be bundled.

Regulation as a Double-Edged Moderator

BPJPH (2024a) frames the postponement of the mandatory deadline to October 2026 and the finite subsidized-certificate quota as concessions that protect MSMEs; the moderation result ($\beta = 0.12$) shows that the same regulatory apparatus also *conditions the return* on Islamic financing. The qualitative evidence exposes the moderator’s two-sidedness through two distinct mechanisms. First, *fiscal capacity*: when certification is timely and well-funded, certified status operates as the credibility signal that Tieman (2011) and Fathoni and Syahputri (2020) describe as central to halal-chain trust, strengthening the financing–performance link; when quotas are exhausted early in the budget year, firms cannot evidence certified status to financiers, and the link weakens. Second, *deadline certainty*: the shifting compliance deadline (from 2024 to 2026) creates uncertainty about whether certified status represents a stable or provisional legitimacy signal, as one account officer explained: “If the deadline keeps moving, financiers wonder whether certification is a real requirement or a suggestion” (AO-03). Read institutionally (North, 1990), the binding constraint is fiscal capacity and policy credibility rather than legal design alone: a subsidy ceiling of approximately one million certificates against persistent oversubscription is not an administrative footnote but a determinant of whether the law’s intended benefits actually reach the firm.

Theoretical and Practical Implications

Theoretically, the study integrates resource-based and institutional logics with HVC theory to produce a tested finance–performance model for certified halal MSMEs. The integration is specific: resource-based theory (Barney, 1991) explains the *within-firm* mechanism (financing access as a valuable, rare, and imperfectly imitable resource that drives HVC performance), while institutional theory (North, 1990; Scott, 2014) explains the *between-firm* variation in the returns to that resource (regulatory legitimacy and fiscal capacity condition how effectively financing translates into performance). The two logics interact: the value of financing

as a resource is contingent on the regulatory institution's capacity to certify and legitimate the firm. This interaction represents the study's core theoretical contribution, which extends prior conceptual work by Amelia et al. (2025) and addresses a gap identified in the systematic review by Khan et al. (2023), who noted the absence of integrated finance–regulation models in the halal supply chain literature.

Practically, four implications follow. (1) *Channel prioritization: scale BMT and Sharia-fintech rails for micro firms rather than defaulting to bank-centric programs.* (2) *Process integration: link SIHALAL data to sharia-financing onboarding to dissolve the documentation double-burden; the responsible institutional actor should be a joint BPJPH–OJK task force with authority to standardize data-sharing protocols.* (3) *Digital bundling: pair certification facilitation with marketplace and digital-payment enrolment to build credit histories.* (4) *Regulatory funding: expand and stabilize certification subsidies ahead of October 2026 so that certified status reliably translates into financing access (BPJPH, 2024a).*

Limitations and Future Research

Five limitations bound the findings. First, the cross-sectional survey constrains causal claims. The theoretical model posits that financing drives HVC performance. However, a bidirectional relationship, better-performing MSMEs attracting more Islamic financing, is equally plausible and cannot be ruled out with cross-sectional data. Future research should adopt longitudinal or panel designs to track certification and financing trajectories through the 2026 deadline and establish temporal precedence. Second, common-method variance (CMV) is a concern because all constructs were measured via a self-report survey from the same respondent. Procedural remedies included guaranteeing respondent anonymity, separating predictor and criterion items in the questionnaire, and using different scale endpoints for some constructs; statistical remedies included Harman's single-factor test (the first factor accounted for 28% of variance, below the 50% threshold) and the unmeasured latent method factor technique, which showed that method variance accounted for less than 5% of indicator variance. Despite these safeguards, CMV cannot be definitively ruled out; future studies should use objective financial records or secondary data to triangulate self-reported performance.

Third, the two-sector focus (food and fashion) aids comparability but limits generalization to other HVC segments such as cosmetics or pharmaceuticals, which face different certification requirements and consumer dynamics. Fourth, the qualitative phase has its own limitations: informant selection bias may overrepresent motivated MSME owners willing to participate in interviews; the power asymmetry between MSME owners and regulatory officials may have influenced the candor of MSME-owner responses; and the 27 informants, while sufficient for thematic saturation, represent a narrow geographical scope that may not capture the full diversity of Indonesia's archipelago. Fifth, the model does not include social-finance instruments (e.g., *cash waqf*, *zakat*-based revolving funds), which are nascent but increasingly relevant for Indonesian MSMEs. Subsequent studies could model these instruments once their relevance to

MSMEs matures and test the model across ASEAN halal markets to assess cross-national generalisability.

CONCLUSION

This study asked how Islamic financial ecosystem integration is associated with the halal value chain performance of BPJPH-certified MSMEs in Indonesia's food and fashion sectors, and what explains the patterns found. Using a sequential explanatory design, it demonstrated that Islamic financing instruments collectively and significantly show positive associations with HVC performance, that micro-oriented channels (sharia fintech and BMT) exhibit stronger effect sizes than conventional sharia-bank financing (a descriptive observation confirmed by parametric bootstrapping for the fintech–bank difference), that digital technology adoption is a genuine complementary mediating mechanism, and that the regulatory framework is a significant — and double-edged moderator operating through both fiscal capacity and deadline certainty. Crucially, the qualitative phase explained the national literacy–inclusion paradox as a problem of certification complexity and documentation transaction costs rather than knowledge scarcity, relocating the diagnosis from the individual to the institutional interface.

The central policy message is that Indonesia's halal-economy ambitions depend less on additional literacy campaigns and more on integrating certification and financing processes through a joint BPJPH–OJK task force, prioritizing low-friction financing channels (BMT and fintech), and stabilizing certification funding before the October 2026 mandate. However, these findings must be interpreted in light of the study's cross-sectional design, which precludes causal inference, and the current voluntary-certification environment, which may differ from the dynamics that will prevail under mandatory certification after 2026. In doing so, the Islamic financial ecosystem can move from an abstraction of high awareness to an instrument of inclusive, certified value-chain growth.

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