

## The Interplay of Halal Operations Management and Supply Chain Integration on Logistics Performance in West Java's SMEs

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### ABSTRACT

The global expansion of the halal industry has placed considerable pressure on food supply chains, particularly among small and medium enterprises (SMEs) in West Java's food sector. This research examines the interplay between halal operations management practices and supply chain integration to determine their combined effects on logistics performance, addressing persistent gaps in halal logistics efficiency. A quantitative approach employing partial least squares structural equation modeling (PLS-SEM) analyzes survey responses from 186 food SMEs across West Java, treating halal operations management and supply chain integration as key independent constructs, with logistics performance as the dependent variable; mediation effects were tested through bootstrapping procedures. Halal operations management significantly improves logistics performance, while supply chain integration fully mediates this relationship — West Java SMEs show measurable gains in on-time delivery and inventory efficiency when halal practices are structurally aligned with supply chain coordination. The cross-sectional design limits causal inference, and findings may not generalize beyond food SMEs in West Java; future research should examine longitudinal effects and multi-sector applications across Indonesia. This study is among the first to connect halal operations management with supply chain integration in explaining logistics performance among Indonesian SMEs, addressing theoretical gaps between Islamic business practices and modern supply chain theory while offering a practical framework for West Java's halal sector development.

### ABSTRAK

Eksistensi industri halal secara global telah memberikan tekanan yang cukup besar terhadap rantai pasok pangan, khususnya pada usaha kecil dan menengah (UKM) di sektor pangan Jawa Barat. Penelitian ini mengkaji keterkaitan antara praktik manajemen operasi halal dan integrasi rantai pasok untuk menentukan pengaruh gabungannya terhadap kinerja logistik, sekaligus menjawab kesenjangan yang masih terjadi dalam efisiensi logistik halal. Pendekatan kuantitatif dengan PLS-SEM digunakan untuk menganalisis respons survei dari 186 UKM pangan di Jawa Barat, dengan manajemen operasi halal dan integrasi rantai pasok sebagai konstruk independen utama serta kinerja logistik sebagai variabel dependen; efek mediasi diuji melalui prosedur bootstrapping. Manajemen operasi halal terbukti meningkatkan kinerja logistik secara signifikan, sementara integrasi rantai pasok memediasi hubungan tersebut secara penuh — UKM di Jawa Barat menunjukkan peningkatan nyata dalam ketepatan waktu pengiriman dan efisiensi inventaris ketika praktik halal diselaraskan secara struktural dengan koordinasi rantai pasok. Desain potong lintang membatasi inferensi kausal dan temuan mungkin tidak dapat digeneralisasikan di luar UKM pangan Jawa Barat; penelitian selanjutnya perlu mengkaji efek longitudinal dan aplikasi lintas sektor di Indonesia. Studi ini termasuk yang pertama menghubungkan manajemen operasi halal dengan integrasi rantai pasok dalam menjelaskan kinerja logistik UKM Indonesia, menjawab kesenjangan teoretis antara praktik bisnis Islam dan teori rantai pasok modern, sekaligus menawarkan kerangka praktis bagi pengembangan sektor halal Jawa Barat.

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## 1. Introduction

The global expansion of the halal industry has placed considerable pressure on the operational integrity of food supply chains, particularly within the food sector of West Java. For small and medium enterprises (SMEs), maintaining religious compliance while simultaneously achieving high logistics performance represents a dual mandate carrying both academic and practical weight (Nugroho *et al.*, 2024; Tumiwa *et al.*, 2023). Efficient halal operations management is no longer merely a regulatory requirement — it has become a strategic necessity that directly confronts existing gaps in halal logistics efficiency. As markets grow more competitive, the capacity of these enterprises to align Islamic business protocols with logistical precision serves as a primary driver for regional halal sector development (Karudin *et al.*, 2024; Saidah & Lestari, 2021). What makes this challenge particularly acute for West Java's SMEs is the combination of resource constraints, fragmented supply networks, and the increasing stringency of national halal regulations — conditions that demand more than certification alone can provide.

Despite the rising importance of this sector, a significant theoretical gap persists in understanding the nexus between Islamic business practices and modern supply chain theory. Established paradigms in supply chain governance — particularly those emphasizing standardized integration and operational efficiency (e.g., Agus, 2011; Sukati *et al.*, 2012) — offer useful general management insights, yet they consistently fail to address the religious protocols and traceability mandates specific to halal operations management. Even within specialized halal literature, prior studies have tended to position halal certification as the primary determinant of performance (e.g., Tieman *et al.*, 2012; Zailani *et al.*, 2017), producing inconsistencies in how firms actually achieve on-time delivery and inventory efficiency through dynamic capabilities like supply chain integration. The gap, in other words, is not merely empirical — it is conceptual. Certification confers legitimacy; it does not, by itself, generate operational efficiency. This study addresses that distinction directly by asking whether supply chain integration serves as the mechanism through which halal practices are translated into superior logistical outcomes — a question that prior research has left largely unresolved.

The primary objective of this research is to examine the combined effects of halal operations management and supply chain integration on the logistics performance of 186 food SMEs across West Java. Using a quantitative approach and partial least squares structural equation modeling (PLS-SEM), mediation effects were tested through bootstrapping procedures. Three hypotheses are proposed and empirically evaluated: whether halal operations management directly affects logistics performance, whether it shapes the degree of supply chain integration, and whether integration fully mediates the path between halal rigor and logistical outcomes. Together, these questions position the study at the intersection of Islamic business ethics and operational management — a space that, despite its practical relevance, remains undertheorized in the existing literature.

## 2. Literature Review

The theoretical foundations of this research sit at the intersection of Institutional Theory and Dynamic Capabilities Theory. Institutional theory clarifies the coercive pressures imposed by the Indonesian regulatory environment — primarily Law No. 33 of 2014 regarding Halal Product Assurance — which mandates a structural shift toward sharia-compliant operations for food enterprises (Iswanto & Koeswinarno, 2021; Wahyuni *et al.*, 2024). These external mandates confer formal legitimacy, but they do not inherently generate operational efficiency. Dynamic Capabilities Theory, by contrast, explains how SMEs must internalize such mandates by developing adaptive capabilities — supply chain integration and traceability among them — to reconfigure their resources and achieve superior performance in a volatile market (Latuconsina *et al.*, 2023; Teece *et al.*, 1997). Beyond the technical fulfillment of religious dietary laws, robust Halal Operations Management (HOM) functions as a catalyst for broader organizational process refinement. While halal certification is a primary institutional driver, empirical evidence suggests that its direct impact on immediate financial gains can be modest; HOM must therefore be understood as a strategy for pursuing competitive advantage through operational excellence rather than as a mere administrative milestone (Tamam, 2020). This internal rigor compels firms to apply strict measures across

procurement, storage, handling, and transportation, ensuring that sharia-compliant protocols are embedded deeply in the firm's functional routines (Ziegler *et al.*, 2022).

### 2.1 Halal Operations Management

Halal Operations Management (HOM) refers to the systematic application of sharia-compliant protocols throughout a firm's internal value chain, covering procurement, handling, storage, and distribution. Beyond religious compliance, HOM incorporates the concept of *thayyib* (purity and wholesomeness), which aligns sharia law with contemporary food safety and quality standards — a pairing that is more consequential than it might initially appear, since it positions halal not as a constraint but as a quality assurance mechanism in its own right. For SMEs, internalizing these practices functions as a normative mechanism where values-based motivations — such as fairness and honesty — substitute for formal structures in shaping compliance behavior. Research indicates that sound internal operations management is a prerequisite for broader supply chain performance, as it ensures that "halal critical points" are strictly monitored before external integration occurs (Anwar *et al.*, 2024; Jamil & Ibrahim, 2025).

### 2.2 Supply Chain Integration

Supply Chain Integration (SCI) in the halal context represents the strategic collaboration and information sharing between a firm and its certified partners to maintain product integrity from upstream to downstream. Scholarly evidence suggests that Halal Supply Chain Integration (HSCI) substantially reinforces the execution of internal production practices; conventional SCI frameworks, however, often fail to address the traceability mandates and religious protocols specific to the halal industry — a gap that remains undertheorized in the broader operations management literature. In this study, SCI is treated as a dynamic capability that draws on technological tools — blockchain or RFID, for instance — to create a transparent record of compliance, thereby reducing information asymmetry and building trust among stakeholders (Apani & Ibrahim, 2025; Ghalih *et al.*, 2025). The operationalization of SCI within a halal framework increasingly depends on the relationship between stakeholder collaboration and the adoption of digital technologies. Specifically, the deployment of Halal Traceability Systems (HTS) allows for the creation of an immutable record of Halal Critical Points (HCPs) from upstream to downstream, addressing the information asymmetry common in fragmented SME networks and transforming SCI into a dynamic capability that reinforces internal production practices (Ali *et al.*, 2021, 2023).

### 2.3 Logistics Performance

Logistics Performance (LP) is operationalized as a multidimensional construct encompassing on-time delivery, inventory efficiency, and operational cost reduction. In the competitive food sector, achieving high LP requires the alignment of halal protocols with logistical speed and reliability — two demands that are often treated as separate concerns but are, in practice, deeply interdependent. Where established literature often treats sharia compliance as a moral obligation, this research positions it as a driver of measurable operational gains. Integrated halal practices have been shown to reduce process errors and cross-contamination risks, which directly improves delivery reliability and inventory management effectiveness (Chow *et al.*, 1994; Rashid & Bojei, 2019). For small-scale enterprises, achieving superior LP requires that halal-specific routines — segregation of halal and non-halal products, strict hygiene protocols — be translated into structured logistical procedures. Empirical results confirm that when halal logistics practices are effectively aligned, they significantly mediate the relationship between regulatory compliance and operational efficiency (Rizki *et al.*, 2023; Talib *et al.*, 2016).

### 2.4 Context of West Java's SMEs

The food SME sector in West Java functions as a vital economic engine, yet it faces persistent gaps in halal logistics efficiency due to resource constraints and the complexity of the national regulatory environment. These enterprises frequently struggle with the initial investment costs and technical expertise required for advanced traceability systems, and West Java's diverse culinary landscape creates additional challenges for maintaining segregation between halal and non-halal products in shared logistical spaces — a problem that is operationally more demanding than the certification literature tends to acknowledge (Adnani *et al.*, 2022; Aziz *et al.*, 2021). The institutional pressures stemming from Law No. 33 of 2014, which mandates a comprehensive halal-based shift for all consumable products, are felt acutely at the

SME level. While West Java serves as a strategic hub for Indonesian culinary clusters, local enterprises often encounter significant practical gaps due to limited technical expertise and high certification costs. In this context, certification functions more as a legitimating mechanism than as an inherent operational capability, making the adoption of adaptive tools such as QR codes or mobile applications essential for day-to-day survival. By testing the proposed model within this specific regional cluster, the research addresses gaps in halal logistics efficiency and offers a framework for how localized Islamic business practices can be scaled to meet modern supply chain standards, ultimately supporting the region's halal sector development (Ruangsriroj & Suvittawat, 2022; Voak *et al.*, 2023).

### 2.5 Hypotheses Synthesis and Critical Inquiry

Prior research presents a notable controversy regarding the direct impact of halal protocols on performance. Some studies suggest that halal certification and integration directly improve operational results; others — notably Setyani *et al.* (2025) — found that integration alone does not produce a direct significant effect on quality performance among SMEs. This points to a theoretical gap: the relationship between halal rigor and performance is likely not direct but mediated by operational constructs like SCI. The present study challenges the traditional institutional view by proposing that certification functions primarily as a legitimating mechanism, while technical capabilities like traceability act as the actual drivers of efficiency. Three hypotheses are proposed to test this argument empirically:

- 1) H1: Halal operations management practices significantly and positively influence the logistics performance of SMEs in West Java.
- 2) H2: Halal operations management practices significantly and positively influence the degree of supply chain integration among SMEs.
- 3) H3: Supply chain integration fully mediates the relationship between halal operations management and logistics performance.

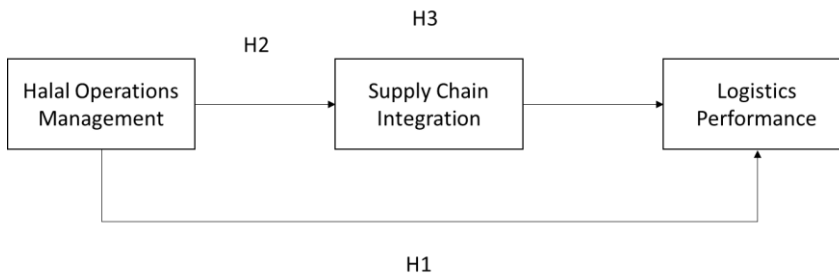


Figure 1. Research Model

## 3. Methodology

### 3.1 Data Collection

This research adopts a positivist paradigm, employing a quantitative methodology to examine the structural relationships between halal operations management, supply chain integration, and logistics performance. The study concentrates on food sector SMEs in West Java as the primary unit of analysis — enterprises selected for their central role in regional economic growth and their direct exposure to the demands of Indonesia's expanding halal regulatory environment. A cross-sectional temporal framework was adopted to capture how integrated halal practices shape operational outcomes in a highly competitive regional market. Data were collected through a structured questionnaire covering the three core constructs: halal operations management practices, supply chain integration, and logistics performance, with particular attention to on-time delivery and inventory efficiency. Measurement items were adapted from recognized scales in the existing literature and refined through a pilot test with a limited sample of food SMEs to confirm clarity and contextual relevance. The survey employed a five-point Likert scale, ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Non-probability purposive sampling was applied to identify a final sample of 186 food SMEs, targeting owners, managers, or senior executives with direct knowledge of their firm's halal protocols and logistical workflows — respondents whose positional expertise is difficult to replicate

through random selection. Questionnaires were distributed via online platforms and in-person visits over a three-month period to improve response rates and data quality. The collected data were subsequently analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS software, an approach well-suited for testing complex mediation effects and assessing the predictive power of structural models. Table 1 presents the respondent profile.

Table 1. Respondents' Profile

Parameters		Number	Percentage
Business Size	Micro-sized Businesses	89	47.84
	Small-sized Businesses	64	34.41
	Medium-sized Businesses	33	17.65
Total		186	100%
Position	CEO/Owner	96	51.61
	Manager/Supervisor	24	12.91
	Employee	66	35.48
Total		186	100%

Source: Author's works (2026).

### 3.2 Operationalization of Variables and Measurement Scales

A five-point Likert scale was used to assess respondent consensus across all constructs. Measurement instruments were adapted and synthesized from established literature to ensure content validity and contextual relevance for West Java's food SMEs. The research model is operationalized through three primary constructs. *Logistics Performance (LP)* serves as the endogenous construct, measuring the effectiveness and efficiency of an SME's logistical processes in securing competitive advantage. Measurement items cover (1) the reduction of overall operational costs, (2) improvements in delivery reliability and speed, and (3) gains in inventory management effectiveness (Sandberg & Abrahamsson, 2011; Sugiono *et al.*, 2023).

*Halal Operations Management (HOM)* functions as the primary independent variable, representing the internal rigor and religious compliance of the firm. It is measured through three dimensions (Jamil & Ibrahim, 2025; Karudin *et al.*, 2024): *Halal Certification*, referring to the possession of valid certificates from accredited bodies such as BPJPH/MUI and their influence on market trust; *Adherence to Islamic Principles*, capturing corporate commitment to Shariah-compliant ethics and employee awareness of Islamic business standards; and *Halal Risk Management*, covering the systematic identification and mitigation of potential *najis* (contamination) risks alongside the availability of contingency plans. *Supply Chain Integration (SCI)* serves as the mediating variable, assessing the level of external collaboration and transparency within the supply network. Measurement criteria are drawn from two dimensions (Ali *et al.*, 2021; Rajendran *et al.*, 2024): *Halal Logistics Practices*, referring to the application of segregation protocols between halal and non-halal products during warehousing and transportation; and *Supply Chain Traceability*, capturing the capacity to authenticate product origins through real-time data and digital technologies such as blockchain or RFID.

### 3.3 Data Analysis Technique

Empirical data were analyzed using PLS-SEM via SmartPLS version 3.3.3. This approach was selected for its suitability in analyzing complex, multi-stage relationships and for its applicability in predictive research models where data may not conform to a strict multivariate normal distribution — a condition that frequently characterizes survey-based SME research. The analytical procedure began with a Confirmatory Factor Analysis (CFA) to validate the measurement model, ensuring that all constructs met requisite thresholds for indicator reliability, internal consistency, and convergent and discriminant validity. Following measurement model validation, the structural model was evaluated to determine the significance of both direct and indirect effects of halal operations management on logistics performance. Mediation effects of supply chain integration were tested through bootstrapping procedures using 5,000 sub-samples, yielding findings with direct relevance for SME managers and regional policymakers seeking to strengthen West Java's halal sector.

### 4. Results

To evaluate the quality of the measurement model, a rigorous assessment of psychometric properties was conducted using several established criteria. Statistical evidence in Table 2 confirms that standardized outer factor loadings for all items substantially exceed the requisite 0.70 threshold ( $p < 0.001$ ), providing strong support for convergent validity. Internal reliability was also established, as evidenced by Composite Reliability (CR) values exceeding 0.7 and Cronbach's Alpha (CA) values surpassing the 0.6 benchmark across all variables. The Average Variance Extracted (AVE) score of 0.627 — and higher across other constructs — comfortably exceeds the 0.5 cut-off recommended by prior scholarship, confirming compliance with convergent validity standards. The model further demonstrated strong discriminant validity based on the Fornell and Larcker (1981) criterion, confirming that each latent construct is statistically distinct within the research framework. Recognizing that self-report questionnaire data from specialized sectors can be susceptible to measurement bias, the study conducted a comprehensive evaluation of Common Method Bias (CMB) through a Variance Inflation Factor (VIF) assessment. Following the thresholds established by Kock (2015), VIF scores exceeding 5 would indicate problematic collinearity and the presence of technique bias. All VIF values remained at or below 5, with specific results ranging from 1.372 to 4.338, confirming that the model is unaffected by common method bias or multicollinearity and validating the integrity of the survey-based data for structural analysis.

Table 2. Factor Loading

Items	Logistics Performance	Halal Operations Management	Supply Chain Integration
LP1	0.721		
LP2	0.778		
LP3	0.836		
HM1		0.831	
HM2		0.755	
HM3		0.796	
SI1			0.791
SI2			0.742
SI3			0.802

Source: Author's works (2026).

Table 3. Measurement Model

Construct	Item	Composite Reliability	Cronbach Alpha	AVE	VIF
Logistics Performance	LP1	0.882	0.890	0.724	1.372
	LP2				1.468
	LP3				1.709
Halal Operations Management	HM1	0.936	0.715	0.627	4.257
	HM2				4.072
	HM3				4.338
Supply Chain Integration	SI1	0.838	0.783	0.741	1.876
	SI2				1.712
	SI3				1.586

Source: Author's works (2026).

To assess the predictive relevance of the structural model, Stone-Geisser's  $Q^2$  was employed alongside  $R^2$ , given that the latter primarily reflects in-sample explanatory power. A positive  $Q^2$  value signals minimal disparity between observed and predicted values, validating the precision of the model's forecasts. Following the interpretive thresholds proposed by Hair *et al.* (2017),  $Q^2$  values exceeding 0.00, 0.25, and 0.50 denote poor, moderate, and high predictive relevance, respectively. The PLS-SEM analysis revealed that endogenous variables attained  $R^2$  values between 0.301 and 0.424, classifying the model's explanatory power as moderate. Logistics Performance yielded a  $Q^2$  of 0.327, indicating moderate-to-strong predictive capacity within the path model, while Supply Chain Integration returned a  $Q^2$  of 0.264,

also confirming adequate predictive relevance. These outcomes are presented in Table 4.

Table 4. Predictive Relevance Based on R<sup>2</sup> and Q<sup>2</sup>

	R Square	R Square Adjusted	Q <sup>2</sup> = (1-SSE/SSO)	Predictive Relevance
Logistics Performance	0.424	0.387	0.327	Yes
Supply Chain Integration	0.301	0.288	0.264	Yes

Source: Author's works (2026).

To evaluate the statistical significance of the structural path coefficients, a bootstrapping procedure utilizing 5,000 sub-samples was applied. All three research hypotheses were statistically confirmed at a significance level of 0.05 ( $p < 0.05$ ). The empirical results, including path coefficients and significance values, are detailed in Table 5.

Table 5. Hypothesis Testing Results

Hypotheses		Original Sample/ $\beta$	p-Value	Decision
H1	Halal operations management → logistics performance	0.329	0.001*	Accepted
H2	Halal operations management → supply chain integration	0.138	0.001*	Accepted
H3	Halal operations management → logistics performance (mediated by supply chain integration)	0.268	0.001*	Accepted

\*Note(s): significant  $p < 0.05$ .

## 5. Discussion

The empirical results provide strong support for the proposed structural model, confirming that halal operations management (HOM) serves as a foundational driver of logistics performance (LP) among food SMEs in West Java. The confirmation of Hypothesis 1 ( $\beta=0.329$ ) and Hypothesis 2 ( $\beta=0.138$ ) shows that internal sharia-compliant rigor not only improves operational outcomes directly but also strengthens the degree of supply chain integration (SCI). Most notably, the finding that SCI fully mediates the relationship between HOM and LP ( $\beta=0.268$ ) signals that religious compliance achieves its maximum operational impact only when paired with collaborative partner relationships — a finding that carries more weight than it might initially seem, given how often certification is treated as an endpoint rather than a starting condition. This aligns with and extends prior research by showing that the implementation gap frequently observed in halal logistics can be bridged through strategic integration, offering a more specific claim than traditional studies which position certification as the sole determinant of performance.

Theoretically, these findings offer a synthesis of Institutional Theory and Dynamic Capabilities Theory within the Indonesian SME context. While institutional pressures — such as Law No. 33 of 2014 — provide the coercive mandate for halal certification, this research reveals that such mandates function primarily as legitimating mechanisms that do not inherently generate efficiency. The results instead support the dynamic capabilities perspective: SMEs must transform external mandates into adaptive capabilities — specifically supply chain integration and digital traceability — to achieve measurable gains in on-time delivery and inventory efficiency. By identifying SCI as the mechanism that translates internal religious protocols into external logistical value, this study addresses a theoretical gap regarding the nexus between Islamic business ethics and modern supply chain optimization. What the results do not show is equally telling — direct certification alone, without structural integration, appears insufficient to produce the logistical gains that regulators and managers often expect from compliance programs.

The managerial implications are direct. SME owners and managers in West Java must shift their

strategic orientation — from viewing halal certification as a mere administrative task toward treating it as a catalyst for operational improvement. Achieving tangible improvements in logistics performance requires prioritizing the alignment of halal protocols with supply chain partners, drawing on real-time data and traceability systems to reduce cross-contamination risks and operational errors. For regional regulators and policymakers, these findings point to the necessity of developing targeted certification incentives that reward not only individual firm compliance but also collaborative supply chain alignment across the value chain. Such measures are critical for addressing persistent gaps in halal logistics efficiency and ensuring the sustainable development of West Java's food sector.

## 6. Conclusion and Recommendations

This study concludes that halal operations management is a primary determinant of logistics performance within the food SME sector of West Java. The empirical results demonstrate that supply chain integration functions as a full mediator — the mechanism through which internal sharia-compliant rigor is translated into measurable improvements in on-time delivery and inventory efficiency. By bridging the theoretical divide between Islamic business practices and modern supply chain theory, this research confirms that developing dynamic capabilities — digital traceability and collaborative partner alignment among them — is more consequential for operational excellence than institutional compliance with certification mandates alone. Certification, in other words, sets the floor; integration determines how high firms can actually go.

Several limitations point to avenues for further inquiry. The cross-sectional design restricts the ability to draw definitive causal inferences regarding the long-term evolution of these relationships — a constraint that is worth taking seriously, given that supply chain integration is not a static condition but one that shifts as partner relationships mature and regulatory demands evolve. Because the study focused exclusively on food SMEs in West Java, the findings may not generalize to other industrial sectors or geographic regions within Indonesia. Future research should adopt longitudinal frameworks to observe these dynamics over time and expand the analytical scope to include multi-sector applications — the pharmaceutical or cosmetic industries, for instance — to offer a more complete picture of the national halal sector.

Based on these findings, SME managers are advised to treat the alignment of halal protocols with supply chain partners as a strategic priority, rather than an isolated administrative task. Achieving tangible logistics gains requires the adoption of real-time data and traceability systems to minimize operational risks and information asymmetry across the supply network. Regulators and policymakers, in turn, should design certification incentives that reward collaborative integration across the entire value chain — not merely individual firm compliance. The distinction matters: a firm can be certified and still operate in a fragmented, inefficient supply network. Addressing that gap is where the real work of halal logistics development begins.

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