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# Developing a Halal Certification Implementation Strategy Model Based on MSME Readiness and Ecosystem Support: A Follow-Up Study of Culinary MSMEs in South Tangerang City

**Aries Sundoro [1*], Raden Hasan [2], Sonya Trikandi [3], Ahmad Eko Saputro [4]**
[1*,2] Management Study Program, Faculty of Economics, Universitas Tangerang Raya, Tangerang Regency, Banten Province, Indonesia
[3] Indonesian Language Education Study Program, Faculty of Teacher Training and Education, Universitas Tangerang Raya, Tangerang Regency, Banten Province, Indonesia
[4] Accounting Study Program, Faculty of Economics and Business, Institut Teknologi dan Bisnis Ahmad Dahlan, South Tangerang City, Banten Province, Indonesia

Email: ariessundoro74@gmail.com [1*], hasanraden10@gmail.com [2], sonyatrikandi28@gmail.com [3], ahmadeko23@gmail.com [4]

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## Abstract

Halal certification for culinary micro and small enterprises (MSMEs) is strategically important for consumer protection and competitiveness, yet implementation is constrained by administrative readiness and ecosystem support. This study develops a halal-certification implementation strategy using the Technology-Organization-Environment (TOE) framework. A sequential explanatory mixed-methods design was applied: a survey of 75 culinary MSMEs in South Tangerang was analyzed using PLS-SEM in SmartPLS 4 and then explored through interviews and focus group discussions (FGDs). The structural model indicates positive and significant relationships between technology ($\beta = 0.284$; $p = 0.002$), organization ($\beta = 0.412$; $p < 0.001$), and environment ($\beta = 0.356$; $p < 0.001$) contexts and implementation of the Halal Product Assurance System (SJPH), with $R^2 = 0.685$. Descriptively, 68% of respondents did not adequately understand the 11 SJPH criteria and 82% needed technical assistance. In a mentoring pilot involving 35 MSMEs, administrative readiness increased from 28% to 86% (+58 percentage points); 22 MSMEs reached the document-receipt stage (STTD; 62.8%) and 10 were recorded at the halal-decision/certificate stage (28.6%). The findings inform a four-tier Halal Strategy Model that tailors interventions to internal readiness and ecosystem activity. The model offers practical guidance for local authorities and halal facilitators.

**Keywords**:
Halal Certification; Culinary MSMEs; Organizational Readiness; Ecosystem Support; TOE Framework; PLS-SEM.

## 1. INTRODUCTION

Halal certification has become an important instrument for protecting consumers, strengthening confidence in food products, and supporting the market position of micro and small enterprises (MSMEs) in the food and beverage industry (Fibrianti et al., 2026; Nur Azizah et al., 2025). In Indonesia, the obligation to obtain halal certification is governed by Law No. 33 of 2014 on Halal Product Assurance, which places business operators within a broader national halal-assurance system (Alfarizi, 2023). In South Tangerang City—a major hub for the growth of micro and small culinary businesses in Banten—the acceleration of certification compliance continues to face significant challenges (Izzah & Syabrina, 2025; Sundoro & Annisa Fitri Ramadhani, 2026).

Although the free facilitation scheme (Self-Declare) provided by BPJPH has been implemented, the level of voluntary MSME participation in practice remains highly uneven (Ariska et al., 2024; Moh. Nasrudin & Rahmatullah, 2026). Empirical evaluations indicate a gap between national regulatory requirements and the

operational capacity of business actors. Common internal constraints include limited understanding of the 11 criteria of the Halal Product Assurance System (SJPH), inadequate archiving of raw-material documents, and difficulties in ensuring material traceability (Adilah & Kumalasari, 2023; Ariska et al., 2024).

Recent empirical studies in Indonesia indicate that halal certification should be understood not merely as regulatory compliance, but also as a process of strengthening competitiveness and improving business capacity. Research on the digitalization of halal services highlights MSMEs' readiness to use digital services (Veranita et al., 2025), while studies on competitiveness, mentoring, and facilitation policies emphasize the importance of support that is aligned with business actors' needs (Alfarizi, 2023; Fianto et al., 2026; Ichsan et al., 2024). Local studies on certification assistance in Cimahi City (Hani Handayani et al., 2024) as well as efforts to strengthen product quality in Neglasari Village, provide relevant contextual comparisons for this study (Uswatun Habibah et al., 2024). However, these studies have not directly integrated internal-readiness diagnosis, ecosystem activity, testing of relationships among TOE variables, and a tiered strategy pilot into a single model within the context of culinary MSMEs in South Tangerang However, these studies have not directly integrated internal-readiness diagnosis, ecosystem activity, testing of relationships among TOE variables, and a tiered strategy pilot into a single model within the context of culinary MSMEs in South Tangerang.

In addition to internal factors, certification barriers also arise from suboptimal coordination within the external ecosystem (Anindya Prasetyanti et al., 2025; Mansur et al., 2025). Collaboration among local government agencies (the Office of Cooperatives and MSMEs), Halal Product Process (PPH) Facilitators, Halal Inspection Bodies (LPH), university-based Halal Centers, and the SIHALAL digital platform remain fragmented (Anindya Prasetyanti et al., 2025; Ansyah et al., 2024). Moreover, most previous studies have focused separately on consumer perceptions, individual literacy, or bureaucratic constraints, and have therefore not produced a comprehensive solution model that has been empirically tested (Agustiningsih et al., 2024; Arifin, 2023).

Accordingly, the novelty of this study lies in integrating the TOE framework with a four-cluster strategy matrix that connects MSMEs' internal readiness with the level of activity within the supporting ecosystem, and translates these conditions into differentiated forms of assistance. Literature examining ecosystems as collaborative structures (Anindya Prasetyanti et al., 2025) together with recent studies on halal ecosystems and MSME assistance (Amrizal & Yusriati, 2024; Mansur et al., 2025; Muhammad Bekti Hendrie Anto et al., 2025) provides a basis for viewing certification implementation as the outcome of interactions among stakeholders rather than solely as an individual business capability.

To address this research gap, this study applies the Technology-Organization-Environment (TOE) framework developed by Tornatzky and Fleischer (Tornatzky et al., 1990). The TOE approach examines three main dimensions:

a. Technology Context: includes the relative benefits of halal certification and the complexity of the SIHALAL digitalization process.
b. Organization Context: includes halal literacy, managerial capacity, and the internal administrative readiness of MSMEs.
c. Environment Context: includes local government policy incentives, the effectiveness of PPH assistance, the availability of LPHs, and stakeholder collaboration (Anindya Prasetyanti et al., 2025; Fianto et al., 2026; Mansur et al., 2025).

This study aims to:

a. Map the internal readiness levels (Halal Readiness Level) of culinary MSMEs in South Tangerang City.
b. Measure the effects of internal readiness and ecosystem support on the successful implementation of SJPH.
c. Formulate an adaptive and sustainable Four-Tier Halal Certification Implementation Strategy Model.

Evaluate the effectiveness of the strategy model through structured assistance designed to optimize the halal certification completion rate among MSMEs.

## 2. RESEARCH METHOD

### 2.1. Research Design

A sequential explanatory mixed-methods design was used within a Research and Development (R&D) action framework. (Othman et al., 2020; Skivington et al., 2021). The quantitative phase examined the relationships among the three TOE dimensions and SJPH implementation. Qualitative interviews and focus group discussions (FGDs) followed the survey analysis to clarify the conditions behind the statistical results and to inform the practical design of the proposed strategy. The two phases were therefore used in sequence, with qualitative evidence providing context for interpreting the quantitative findings and developing the intervention model (Bachtiar et al., 2024; Hwang et al., 2025).

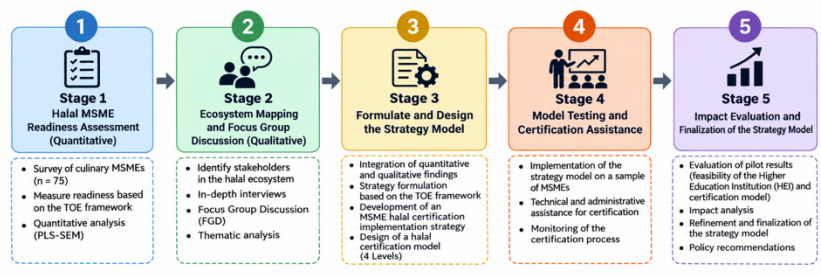


Figure 1. Sequential Explanatory Research Stages

### 2.2. Population, Sample, and Research Subjects

The target population comprised MSMEs in the processed food and beverage sector across the seven sub-districts of South Tangerang City: Serpong, North Serpong, Pamulang, Ciputat, East Ciputat, Pondok Aren, and Setu. Participants for the quantitative phase were recruited through purposive sampling. Eligible businesses operated in the processed culinary sector at micro or small scale, had been active for at least one year, and were willing to take part in halal-certification assistance.

The quantitative sample consisted of 75 culinary MSMEs (N = 75), meeting the requirements for PLS-SEM analysis. Qualitative information was collected from representative subjects, including MSME owners, PPH facilitators from the Halal Center, representatives of the South Tangerang City Office of Cooperatives and MSMEs, and auditors from Halal Inspection Bodies (LPH).

### 2.3. Data Collection Techniques and Instruments

Structured Questionnaire: Used to measure TOE variables using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). In-Depth Interviews and FGDs: Structured interview guidelines were used to explore operational constraints, the availability of local government budgets, and the standardization of assistance. Documentary Study: Involved collecting information on document-submission procedures through the SIHALAL platform, raw-material matrices, and MSME SJPH documents.

The measurement model was examined before the structural relationships were interpreted. Indicator quality was assessed through outer loadings, while convergent validity was evaluated using Average Variance Extracted (AVE). Internal consistency was examined using Cronbach's alpha and composite reliability, and discriminant validity was assessed using the heterotrait–monotrait ratio (HTMT). The reported indicator and construct statistics are presented in the results section. The Fornell–Larcker criterion was also identified as part of the planned assessment procedure; however, the numerical results available in this manuscript are reported for HTMT.

### 2.4. Analysis Techniques

Quantitative data were processed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the assistance of SmartPLS 4 software. The comprehensive model assessment consisted of the following:

a. Outer Model (Measurement Model): Convergent validity was assessed through outer loadings (target > 0.70) and AVE (> 0.50); internal consistency reliability was assessed using Cronbach's alpha and Composite Reliability (target > 0.70); and discriminant validity was assessed using the Fornell–Larcker criterion and HTMT. The final report should include the test values obtained from the SmartPLS 4 output, rather than reporting only the threshold criteria.

b. Inner Model (Structural Model): The evaluation covered predictor collinearity, the coefficient of determination ($R^2$), effect size ($f^2$), and the significance of path coefficients ($\beta$) through bootstrapping with 5,000 resamples and a significance threshold of $p < 0.05$. The coefficients and p-values reported in the results section are based on the structural test results available in the manuscript.

Qualitative data were analyzed using thematic analysis and content analysis to group interview and FGD findings into readiness and ecosystem matrices (Im et al., 2023; Saunders et al., 2023).

## 3. RESULTS AND DISCUSSION

### 3.1. Internal Readiness Profile of Culinary MSMEs in South Tangerang

Based on the quantitative survey and Halal Readiness Level assessment of 75 culinary MSMEs in South Tangerang City, the objective profile of MSMEs' internal readiness was obtained, as presented in Table 1.

Table 1. Summary of MSME Halal Certification Readiness Profile (N = 75)

| Readiness Indicator | Percentage | Frequency (MSMEs) | Meaning and Implications of Findings |
|---|---|---|---|
| Understanding of the 11 SJPH Criteria | 68% | 51 | Do not yet have an in-depth understanding of SJPH criteria; preparing the SJPH manual requires foundational education. |
| Use of Halal-Certified Ingredients | 74% | 55 | The main raw materials are already halal-certified, but traceability records are not yet properly maintained. |
| Need for Technical Assistance | 82% | 62 | Require direct assistance with creating SIHALAL accounts and submitting documents. |

The descriptive analysis identified a readiness paradox: the majority of MSMEs (74%) had, in fact, purchased and used raw materials bearing halal labels available in the market. However, the greatest lack of readiness was found in the administrative and managerial dimensions. Specifically, 68% of businesses did not understand the formal requirements of the 11 SJPH criteria (such as appointing a halal management team, establishing facility-cleaning SOPs, and preparing crisis procedures), while 82% reported difficulties navigating the SIHALAL application system.

### 3.2. Evaluation of the Measurement Model (Outer Model)

#### 3.2.1. Outer Loading

Outer loadings are used to assess how strongly each indicator represents the construct being measured.

Table 2. Outer Loading Results

| Construct | Indicator | Outer Loading | Decision |
|---|---|---|---|
| Technology (TEC) | TEC1 | 0.812 | Valid |
| Technology (TEC) | TEC2 | 0.846 | Valid |
| Technology (TEC) | TEC3 | 0.791 | Valid |
| Organization (ORG) | ORG1 | 0.835 | Valid |
| Organization (ORG) | ORG2 | 0.872 | Valid |
| Organization (ORG) | ORG3 | 0.818 | Valid |
| Environment (ENV) | ENV1 | 0.804 | Valid |
| Environment (ENV) | ENV2 | 0.851 | Valid |
| Environment (ENV) | ENV3 | 0.823 | Valid |
| SJPH Implementation (SJPH) | SJPH1 | 0.831 | Valid |
| SJPH Implementation (SJPH) | SJPH2 | 0.864 | Valid |
| SJPH Implementation (SJPH) | SJPH3 | 0.806 | Valid |

The measurement model results show that all indicators have outer loading values above 0.70. The values range from 0.791 to 0.872, indicating that all indicators meet the indicator validity criteria. These results suggest that the indicators for the technology, organization, environment, and Halal Product Assurance System (SJPH) implementation constructs adequately represent the constructs being measured.

#### 3.2.2. AVE, Cronbach's alpha, dan Composite Reliability

AVE measures convergent validity at the construct level, while Cronbach's alpha and Composite Reliability are used to evaluate internal consistency.

Table 3. Results of Construct Convergent Validity and Reliability

| Construct | AVE | Cronbach's Alpha | Composite Reliability (ρc) | Decision |
|---|---|---|---|---|
| Technology (TEC) | 0.670 | 0.754 | 0.859 | Met |
| Organization (ORG) | 0.710 | 0.798 | 0.880 | Met |
| Environment (ENV) | 0.681 | 0.765 | 0.864 | Met |
| SJPH Implementation (SJPH) | 0.695 | 0.781 | 0.873 | Met |
| General Criteria | > 0.50 | > 0.70 | > 0.70 | — |

The measurement model evaluation shows that all constructs have Average Variance Extracted (AVE) values above 0.50, ranging from 0.670 to 0.710. Therefore, convergent validity at the construct level has been established. In addition, Cronbach's alpha values range from 0.754 to 0.798, while Composite Reliability values range from 0.859 to 0.880. These results indicate that all constructs meet the criteria for internal consistency and reliability.

### 3.2.3. Discriminant Validity (HTMT)

The Heterotrait-Monotrait Ratio (HTMT) is used to ensure that distinct constructs in the model can indeed be differentiated from one another. The commonly applied threshold is an HTMT value below 0.85 or 0.90, depending on the strictness of the selected criterion.

Table 4. HTMT Discriminant Validity Results

| Relationship Between Constructs | HTMT Value | Decision |
|---|---|---|
| Technology – Organization | 0.742 | Met |
| Technology – Environment | 0.698 | Met |
| Technology – SJPH Implementation | 0.781 | Met |
| Organization – Environment | 0.765 | Met |
| Organization – SJPH Implementation | 0.824 | Met |
| Environment – SJPH Implementation | 0.793 | Met |

Based on the measurement model evaluation, all constructs have Average Variance Extracted (AVE) values above 0.50, ranging from 0.670 to 0.710. Thus, convergent validity at the construct level has been established. Furthermore, Cronbach's alpha values range from 0.754 to 0.798, while Composite Reliability values range from 0.859 to 0.880. These results indicate that all constructs meet the criteria for internal consistency and reliability.

## 3.3. Analysis of the TOE Structural Model (PLS-SEM)

The inner model assessment using SmartPLS 4 confirms the significant role of the Technology-Organization-Environment framework in the successful implementation of halal certification through SJPH.

Table 5. Results of Inner Model Hypothesis Testing (PLS-SEM)

| Structural Path | Path Coefficient (β) | t-Statistic | p-Value | Conclusion |
|---|---|---|---|---|
| Technology Context → SJPH Implementation | 0.284 | 3.124 | 0.002 | Accepted (Significant) |
| Organization Context → SJPH Implementation | 0.412 | 4.891 | 0.000 | Accepted (Significant) |
| Environment Context → SJPH Implementation | 0.356 | 3.955 | 0.000 | Accepted (Significant) |

The coefficient of determination ($R^2$) for successful SJPH implementation is 0.685 (68.5%). The statistical findings show that the Organization Context variable (literacy, administrative readiness, and managerial capacity) has the strongest influence ($\beta = 0.412$), followed by the Environment Context ($\beta = 0.356$) and Technology Context ($\beta = 0.284$). Overall, the TOE framework explains 68.5% of the variance in successful halal certification implementation among culinary MSMEs in South Tangerang, while the remaining 31.5% is influenced by other external factors.

## 3.4. Mapping the Regional Halal Ecosystem (FGD Findings)

The qualitative FGDs conducted with stakeholders in the South Tangerang halal ecosystem revealed the following dynamics:

a. PPH Facilitators (Halal Product Process): The number of facilitators in South Tangerang is sufficient; however, the quality standards of assistance vary. Facilitators tend to focus on meeting verification quotas rather than providing MSMEs with continuous education on SJPH.
b. Local Government (Office of Cooperatives and MSMEs): The commitment to allocating budgets for free certification quotas is very high. However, the Office requires a quadrant-based screening mechanism (filtering tool) to ensure that facilitation incentives are appropriately allocated to MSMEs that demonstrate commitment and meet the basic eligibility criteria.
c. Digital Infrastructure (SIHALAL): The digital platform supports transparency, but its user interface and the complexity of document uploads often create technical barriers for micro-business owners with limited digital literacy.

## 3.5. Formulation of the Four-Tier Halal Certification Implementation Strategy Model

By integrating the quantitative findings from the TOE analysis and the FGD results, this study constructs a Four-Tier Halal Strategy Model that maps the intersection between MSMEs' Internal Readiness Levels and the Strength of the Supporting Ecosystem.

Table 6. Four-Tier Halal Strategy Model

| Cluster | Internal Readiness | Ecosystem | Strategy |
|---|---|---|---|
| Cluster A | High Readiness | Active Ecosystem | Independent Acceleration and Self-Declare Direct Submission Strategy |
| Cluster B | Moderate Readiness | Active Ecosystem | Focused Assistance for SJPH Documentation Strategy |
| Cluster C | Low Readiness | Active Ecosystem | Basic Halal Incubation and Production Facility Improvement Strategy |
| Cluster D | Low Readiness | Passive Ecosystem | Community Education and Local MSME Leader Partnership Strategy |

The operational interventions for each cluster are detailed as follows:

a. Cluster A (High Readiness – Active Ecosystem): MSMEs have well-organized documentation and clearly identified raw materials. The strategy focuses on direct submission through the Self-Declare pathway and independent digital monitoring.
b. Cluster B (Moderate Readiness – Active Ecosystem): MSMEs already use halal-certified materials, but their administrative records are disorganized. The strategy focuses on targeted clinical assistance (SJPH Clinic), particularly for document digitalization and the preparation of raw-material matrices.
c. Cluster C (Low Readiness – Active Ecosystem): MSMEs face challenges related to kitchen/production layout and understanding halal requirements. The strategy involves a Halal Incubation Program covering basic sanitation training, the use of halal raw materials, and workplace management.
d. Cluster D (Low Readiness – Passive Ecosystem): MSMEs operate in isolation and have limited access to information. The strategy relies on community-based approaches and partnerships with local business groups (peer-group mentoring).

### 3.6. Impact of the Structured Assistance Pilot

To evaluate the effectiveness of the model, an action research intervention was conducted in the form of an SJPH Workshop and Clinic involving 35 priority MSMEs from Clusters B and C.

Table 7. Progress Achieved through the Model Intervention Assistance (N = 35)

| Evaluation Indicator | Pre-Intervention | Post-Intervention | Improvement (Δ) |
|---|---|---|---|
| Administrative and Raw-Material Matrix Readiness | 28% (10 MSMEs) | 86% (30 MSMEs) | +58 percentage points |
| STTD Issuance on the SIHALAL Application | 0 MSMEs | 22 MSMEs | +62.8% |
| Halal Determination / Certificate Approval | 0 MSMEs | 10 MSMEs (Issued/Review) | +28.5% |

In the assistance pilot involving 35 MSMEs from Clusters B and C, administrative and raw-material matrix readiness increased from 10 MSMEs (28%) to 30 MSMEs (86%), representing an increase of 58 percentage points. A total of 22 MSMEs (62.8% of participants) reached the STTD issuance stage on SIHALAL, while 10 MSMEs (28.6%) were recorded at the halal determination/certificate stage, as summarized in Table 3. These figures represent descriptive outcomes following the intervention. In the absence of a comparison group and a specific inferential test of the intervention's impact, the results should be interpreted as an indication of operational progress rather than definitive causal evidence.

## 4. CONCLUSION

This study develops a halal certification implementation strategy model for culinary MSMEs in South Tangerang City by integrating the Technology-Organization-Environment (TOE) framework with an assessment of internal readiness and ecosystem support. The assessment reveals a gap between the use of halal-certified ingredients and the administrative capacity required to comply with the 11 SJPH criteria and use the SIHALAL platform.

The structural model shows that the technology ($\beta = 0.284$), organization ($\beta = 0.412$), and environment ($\beta = 0.356$) contexts are positively and significantly associated with SJPH implementation, with $R^2 = 0.685$. In the pilot involving 35 MSMEs, administrative readiness increased by 58 percentage points; 22 MSMEs reached the STTD stage, and 10 MSMEs were recorded at the halal determination/certificate stage. These pilot results support the practical potential of the Four-Tier Halal Strategy Model; however, its causal effectiveness and the sustainability of its impact require further testing through a more robust evaluation design.

This study employed purposive sampling involving 75 MSMEs in a single city; therefore, generalization to other regions should be made with caution. In addition, the assistance pilot involved 35 MSMEs, and this manuscript does not provide information on a comparison group. Consequently, the pre- and post-intervention changes indicate descriptive progress but do not isolate the effect of the model from other factors. Future research should report the complete outer loading, AVE, Cronbach's alpha, composite reliability, and HTMT values from the SmartPLS output, and employ an evaluation design that includes a comparison group or follow-up measurements.

Recommendations and Policy Implications:

a. South Tangerang City Government (Office of Cooperatives and MSMEs): The government is encouraged to adopt this readiness assessment instrument as a filtering tool for allocating free halal certification quotas, thereby ensuring that local budget allocations are more accurately targeted.
b. Halal Centers and PPH Facilitators: Their role should shift from merely verifying administrative documents to serving as continuous incubation facilitators who assist MSMEs in improving the management of their production facilities.
c. Future Researchers: Future studies are encouraged to expand the research coverage to other regencies/cities and examine the long-term economic impact of halal certification on MSME revenue growth and access to export markets.

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