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Research paper

Measuring the Performance of Poultry Slaughterhouse Certification in Supporting Halal Ecosystem: An Empirical Study in Jember Regency, Indonesia

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Abstract

This study explores critical aspects of halal supply chain management within Indonesia's poultry sector, with a specific focus on small and medium enterprises operating poultry slaughterhouses. The research addresses the challenges and opportunities in achieving consistent halal certification standards across the supply chain, from raw material sourcing to end-product distribution. We obtained data from consumers, academicians, halal officers, slaughterhouse operators, restaurants, and poultry slaughterers and employed quantitative analysis supported by a Strengths, Weaknesses, Opportunities, and Threats (SWOT) framework, ANOVA, and regression. The findings reveal that storage is the most critical and well-implemented component, followed by transportation and packaging, while technology remains the weakest link, indicating substantial room for improvement. Consumer expectations emerged as the highest across all value chain components, particularly regarding contamination prevention and temperature control. The SWOT analysis highlights strengths such as public awareness and sanitation practices, alongside opportunities in digital innovation, e.g., blockchain and Internet of Things, while exposing weaknesses in monitoring systems and storage infrastructure. The study concludes that a successful halal supply chain requires an integrated approach—aligning technical standards, enhancing infrastructure, enhancing technology, and fostering multi-stakeholder collaboration. Strengthening these elements is essential not only for ensuring halal integrity but also to enhance Indonesia's competitiveness in the global halal market.

Keywords: *Halal Supply Chain; Poultry Slaughterhouses; Halal Certification; Consumer Perception; Technological Integration.*

1. Introduction

The certification of Poultry Slaughterhouses (PSH) plays a pivotal role in Indonesia's ambition to establish itself as a global halal hub. As the world's largest Muslim-majority nation, with approximately 270 million Muslims, accounting for 87% of its population, Indonesia ranks as the second-largest consumer of halal products globally. In 2020 alone, its halal consumption reached US$1.9 trillion, contributing 11.34% to global halal spending. Despite this impressive market potential, Indonesia's position as a global halal industry leader remains underdeveloped, with various structural and implementation gaps still impeding progress (Muchtar & Amalia, 2025; Adenan, et.al., 2025; Soseco, et.al., 2024).

One of the most pressing challenges is the implementation of halal certification for PSH, which is vital for several key reasons. First, chicken meat is a staple input across various food sectors, including ready-to-eat meals, processed foods, and bakery items, making the assurance of its halal status essential to maintaining the integrity of the broader halal food supply chain. In Indonesia, beef consumption is relatively low at around 2.4 kg per capita per year, while poultry consumption is higher, with approximately 8.7 kg per capita in 2020 (Badan Pusat Statistik, 2024; Muhammad & Junejo, 2025).

Second, although the importance of halal poultry is well-recognised, empirical studies specifically investigating halal certification in the context of PSHs remain limited, creating a significant gap in the literature. Third, at the regional level—particularly in Jember Regency—the need for PSH and certified halal slaughterers in Jember Regency in East Java Province is increasing, as shown by the growing demand for halal-certified meat products and the limited availability of trained personnel to meet halal standards during slaughtering processes. In Jember, only one PSH is currently certified, and another is in the process of certification. Additionally, there are just 79 certified halal slaughterers available to serve the population in the regency and its neighbours.

As of mid-2023, Jember Regency had an estimated population of 2,600,663 people, comprising 1,298,852 males and 1,301,811 females. This figure reflects a steady increase from previous years, with the population recorded at 2,536,729 in 2020. Notably, approximately 70%

of Jember's population is in the productive age range of 15 to 64 years, indicating a significant portion of the populace is of working age. The regency spans an area of 3,314.13 square kilometres, resulting in a population density of about 784.72 people per square kilometre.
Existing studies have generally focused on broader halal certification frameworks, for example, Darmalaksana (2023), Hulwati et.al. (2025), and Suryawan et.al. (2022). Insufficient attention to the unique requirements, constraints, and performance measurement indicators specific to PSHs. Little is known about the regional implementation challenges, institutional readiness, or the strategic pathways needed to improve certification uptake at the local level. This study addresses these gaps by examining the performance measurement of PSH halal certification and developing strategic recommendations to enhance its effectiveness in supporting Indonesia's halal ecosystem agenda.
This study provides a deeper understanding of both systemic barriers and latent opportunities in PSH halal certification, as well as gives insights for policymakers, halal certifying bodies, industry practitioners, and local governments. By doing so, it contributes not only to the academic discourse on halal certification but also provides practical solutions aligned with Indonesia's broader halal industry development goals.
The rest of the paper is organised as follows. The next section briefly describes a literature review. Then, section three describes the data and methods. In section four, we present the results and discussion, with conclusions in section five.

2. Literature review

This study is guided by the Halal Supply Chain Management Theory (HSCMT), which extends conventional supply chain management by integrating Islamic principles, halal assurance, and stakeholder trust across all stages of the supply chain (Tieman, 2011; Demirci et al., 2016). HSCMT emphasises end-to-end halal integrity in the supply chain activities such as in packaging, storage, transportation, and monitoring. Besides, it helps to improve certification integrity, consumer trust, technological integration (e.g., IoT, blockchain), and multi-stakeholder coordination beyond the traditional supply chain management by integrating Islamic principles and law (shariah), Halal Assurance Systems (HAS), halal-critical control points (CCPs), and faith-based consumer behaviour.
In line with this, Indonesia's halal governance structure is supported by a legal framework, primarily Law No. 33 of 2014 on Halal Product Guarantee. This law mandates the halal certification of products and services used or consumed by the public, including food, beverages, cosmetics, pharmaceuticals, chemicals, biologicals, and genetically modified products. Importantly, Law No. 11 of 2020 on Job Creation strengthens the mandate by requiring micro and small enterprises to also comply with halal certification standards, thereby broadening the halal economy's base and ensuring consistency in regulatory coverage (Prayuti, 2020).
At the operational level, the Halal Assurance System (HAS) functions as an integrated quality management system developed to ensure the ongoing compliance of materials, processes, human resources, and facilities with halal standards. It outlines clear guidelines on halal-critical control points (CCPs), which are essential in identifying areas vulnerable to non-compliance. Recent studies (Wahyuni, 2024; Bachtiar et al., 2024) highlight that HAS depends not only on structural enforcement but also on core ethical principles such as honesty, trustworthiness, transparency, and collaborative participation. These values are critical for internalising halal practices as part of institutional culture rather than just a compliance mechanism.
The religious foundation of halal is rooted in Qur'anic guidance, which instructs believers to consume what is lawful and wholesome as stated in Al-Baqarah (2:168, 2:172), Al-Ma'idah (5:88), and An-Nahl (16:114). These verses highlight the comprehensive nature of halal, encompassing not only ingredients but also processes, intentions, and ethical treatment, both of animals and of fellow humans throughout the supply chain. Consequently, halal certification is not only a legal or economic activity but a moral imperative and an expression of religious observance.
Further, the halal ecosystem in Indonesia is conceptualised as a multi-stakeholder system comprising producers, regulators, certifiers, religious authorities, technology providers, and consumers. A study by Marnita (2024) and Almunawar (2025) asserts that positioning Indonesia as a global halal hub requires more than strong laws—it demands strategic alignment, cross-sector collaboration, and inclusive policy frameworks that elevate both grassroots participation and high-level governance.
This holistic view of halal—spanning regulatory, spiritual, and operational dimensions—provides the analytical lens through which this study examines the perception–reality gap between consumers and practitioners in halal-certified processes. Addressing this gap requires not only improving infrastructure and monitoring but also aligning public understanding with the complex realities of halal implementation. Thus, this literature review frames halal not merely as a certification output, but as a dynamic, integrative system where faith, policy, and practice intersect.
In the specific context of PSH, several key criteria have been identified to evaluate the performance and implementation of the halal supply chain (Irfan et.al., 2023): First, Processing. The processing stage is a critical control point in the halal supply chain. It encompasses slaughtering, cutting, cleaning, and handling processes that must strictly adhere to Islamic principles. For Small and Medium Enterprises (SMEs), this stage is often considered a Critical Success Factor (CSF) due to its direct impact on halal integrity. Second, Packaging. Beyond functionality, packaging also plays a strategic role in ensuring the halal status of products throughout the supply chain. It serves as a barrier against contamination and reflects consumer assurance. Sustainable and shariah-compliant packaging is increasingly emphasised in halal logistics literature.
Third, Storage. Halal-compliant storage is essential for maintaining product purity and preventing cross-contamination with non-halal items. Proper segregation, temperature control, and sanitation are crucial, especially in multi-product facilities, to uphold halal integrity from production to distribution. Fourth, Transportation. Transportation must also be halal-compliant, with systems in place to avoid mixing halal and non-halal goods. Technological, organisational, and environmental factors influence the successful implementation of halal logistics practices, particularly in cold-chain transport relevant to poultry distribution.
Fifth, Fundamental Aspect. These refer to the foundational requirements of halal supply chain implementation, such as employee training, religious knowledge, infrastructure availability, and institutional commitment. These elements form the backbone of any successful halal assurance programme for SMEs and PSH. Sixth, Supporting Policy. Policy support from the government and certification bodies is vital. Regulations must be clear, enforceable, and aligned with industry capabilities. The literature identifies strong policy frameworks as a significant CSF in promoting and regulating the halal industry. Seventh, Technology. The integration of technology enhances traceability, transparency, and efficiency in the halal supply chain. Innovations such as blockchain, digital certification systems, and real-time monitoring tools offer promising solutions for overcoming challenges faced by halal certification bodies and PSH, especially at the regional level.

3. Methods

3.1. Data

The research population comprised stakeholders directly involved in or affected by the halal ecosystem in Jember Regency. These included academicians, halal officers, poultry slaughterers, representatives from poultry slaughterhouses (PSH), restaurant owners, and consumers. A purposive sampling technique was used to ensure representation across various sectors of the halal value chain, resulting in a total of 73 respondents, distributed as follows: 19 academicians, 10 halal officers, 6 poultry slaughterers, 9 PSH representatives, 14 restaurant owners, and 15 consumers.

3.2. Methods

This study adopted a mixed-method research design, integrating both qualitative and quantitative approaches to obtain a comprehensive understanding of halal certification performance in poultry slaughterhouses (PSH) within the Jember Regency. The qualitative phase involved in-depth interviews and Focus Group Discussions (FGDs) with key stakeholders to explore perceptions, challenges, and contextual insights. The quantitative phase employed survey methods to systematically measure the performance components of halal certification.
Data collection involves a triangulated approach that was used to ensure the validity and depth of data collected for the study. The first method involved in-depth interviews with key informants. These interviews were designed to identify and refine the components related to the measurement of halal certification performance, providing valuable insights from experts and practitioners in the field. Next, Focus Group Discussions (FGDs) were facilitated among multi-stakeholder groups. These discussions aimed to collect perspectives on the implementation challenges and opportunities related to PSH certification. The FGDs provided a platform for diverse viewpoints, allowing for a comprehensive understanding of the issues faced by various stakeholders.
Structured questionnaires were then distributed to stakeholders, allowing for a quantitative assessment of the performance of key certification components. The questionnaires employed Likert-scale metrics, which made the data easier to analyse and helped quantify perceptions and experiences related to halal certification performance. Lastly, field observations were conducted at selected PSH sites and related facilities. These observations allowed for the verification of qualitative insights, provided an opportunity to cross-validate the survey findings, and ensured that the data was context-relevant, further strengthening the study's conclusions.
In data analysis, the study applied three distinct analytical techniques. The first method, qualitative analysis, utilised thematic analysis to process transcribed interviews and FGD data. This approach helped identify key themes and critical components related to halal certification performance. In addition, observational data were used to confirm and contextualise the findings from the interviews and FGDs. The result is then visualised in a Radar Chart (Web Chart), which helps the audience assess performance across seven critical halal supply chain components: Process, Packaging, Storage, Transportation, Fundamental Aspects, Supporting Policy, and Technology. Each component was scored based on stakeholder perceptions, creating a visual representation that highlighted both strengths and areas requiring improvement.
The second technique, quantitative analysis, was conducted using a Strengths, Weaknesses, Opportunities, and Threats (SWOT) Matrix Analysis to develop a strategic framework for the advancement of the Indonesian Halal Ecosystem in the study area. This analysis mapped out each component of the strengths, weaknesses, opportunities, and threats identified from both the qualitative and quantitative data, leading to actionable strategic recommendations to enhance the halal certification system. We also support the findings by implementing One-Way ANOVA (Analysis of Variance), which is used to determine whether the mean scores of each component differ significantly across stakeholder groups (e.g., consumers vs. slaughterers). The hypothesis is:
H_0: All stakeholder groups rate the component equally (no difference in means).
H_1: At least one stakeholder group rates the component differently.
We then applied the regression method, which presents an analysis of how different stakeholder groups influence the Likert-scale ratings on halal certification components.
The mathematical equation is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \varepsilon$$

Note:
Y = Dependent variable
$\beta_0, \beta_1, \beta_2$ = Slope coefficient
X_1, X_2 = Independent variables (prediction)
ε = Error term

4. Results and discussion

4.1. Overview of Jember Regency

Jember Regency, located in the southeastern part of East Java Province, lies approximately 900 km from Indonesia's capital, Jakarta, and about 200 km from the provincial capital, Surabaya. It is one of Indonesia's largest administrative regions, with a population of approximately 2.6 million people (Badan Pusat Statistik Kabupaten Jember, 2023). The regency spans 3,293.34 square kilometres and comprises 31 sub-districts.

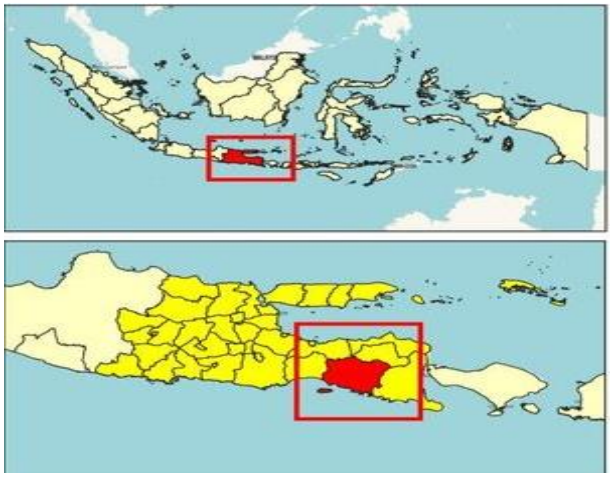

Fig. 1: Map of Jember Regency, Indonesia.

Geographically, the region is diverse, featuring coastal areas in the south, fertile agricultural lowlands, and hilly terrains in the north and east. Jember is also traversed by several rivers and lies within a volcanic and tectonically active zone, which contributes to the richness of its soil. Jember benefits from a tropical climate, with distinct wet and dry seasons, making it suitable for agriculture, especially for crops like tobacco, rice, maize, and coffee.

Agriculture, animal husbandry, and agro-industry play a crucial role in regional development, with poultry farming being one of the most dynamic sectors. In 2022, Jember reported over 6.8 million broiler chickens in production, ranking among the top poultry-producing regencies in East Java (Badan Pusat Statistik Jawa Timur, 2023).

4.2. Quantitative findings: frequency and mean scores

Table 1 presents the results of respondents' evaluations of seven components related to halal certification performance, based on a Likert-scale survey. Each component was assessed through a series of questions, and respondents rated each item on a scale from 1 (strongly disagree) to 5 (strongly agree).

Table 1: Respondent Frequency and Mean Score per Component

No.	Components/ Aspects	Number of Questions	Respondent Frequency					Total	Means
			1	2	3	4	5		
1.	Process	10	23	80	164	255	208	730	3,747
2.	Packaging	8	9	36	135	245	159	584	3,872
3.	Storage	12	9	38	144	320	365	876	4,135
4.	Transportation	9	14	23	141	254	225	657	3,994
5.	Fundamentals	15	9	119	239	421	307	1095	3,820
6.	Supporting Policy	12	10	74	262	437	273	1056	3,842
7.	Technology	11	13	100	208	304	178	803	3,665

Source: Authors' Calculation.

Table 1 shows that the process component received a mean score of 3.747, indicating a generally positive perception. Most responses clustered at score 4, with a significant portion also selecting score 5. Despite this positive trend, the relatively high standard deviation suggests some variation in stakeholder experiences or expectations, possibly due to differences in operational practices or levels of compliance across slaughterhouses.

The packaging component was perceived slightly more favourably than the process, achieving a mean score of 3.872. Scores were heavily concentrated at the upper end of the scale, particularly at scores 4 and 5, reflecting a strong consensus of satisfaction and confidence in the packaging procedures used within the halal supply chain.

Storage emerged as the most positively perceived component, with the highest mean score of 4.135. It was the only component for which the mode was 5, and most responses were clustered within the 4–5 score range. This suggests widespread agreement on the effective implementation and importance of proper halal storage practices, including segregation from non-halal items and adherence to cleanliness standards.

The transportation component also received favourable evaluations, with a strong mean score of 3.994. Responses were predominantly concentrated at scores 4 and 5, with minimal scores reported below 4. This indicates a relatively consistent and positive perception of transportation practices, particularly concerning cleanliness, segregation, and timeliness within the halal supply chain.

Fundamental aspects, which encompass core religious principles and operational requirements for halal compliance, recorded a mean score of 3.820. A significant concentration of responses fell within the 4–5 score range, although a broader distribution of scores, including some lower ratings, suggests variability in stakeholders' understanding or implementation of these foundational elements, possibly due to differences in training or awareness.

The supporting policy component received a mean score of 3.842, reflecting a broadly positive perception. The distribution of responses was skewed towards higher scores, indicating general recognition of the relevance and effectiveness of existing regulatory frameworks and institutional support. The relatively low standard deviation further reinforces this consistency in perception.

Finally, technology was the lowest-rated component, with a mean score of 3.665. While score 4 was the most frequently selected, a notable proportion of responses rated this aspect as average (score 3). This highlights a clear area for development, suggesting the need for more robust digital integration and the adoption of technologies such as traceability systems, Internet of Things (IoT) monitoring, and halal blockchain solutions across the value chain.

Visually, the mean score per component is summarised in the Radar Chart (Figure 1).

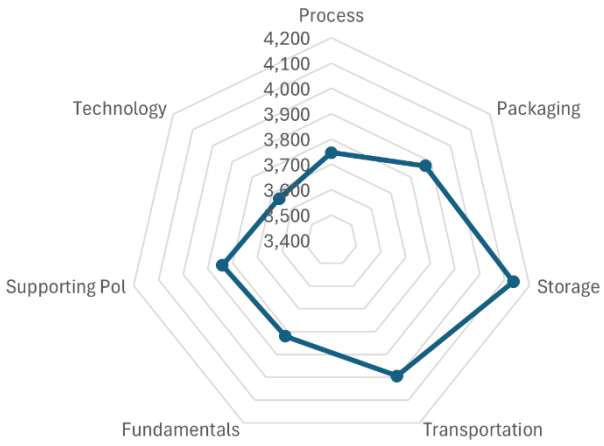

Fig. 1: Radar Chart of Halal Ecosystem Components.

The Radar Chart illustrates the comparative performance of each component. Storage ranks highest, particularly valued by consumers for its role in preventing cross-contamination between halal and non-halal products.

4.3. SWOT matrix analysis

An integrated SWOT analysis was conducted to connect critical value chain components with stakeholder perceptions.

Table 2: Mean Scores Per Component by Stakeholder Group

No.	Aspect/ Components	Con-sumers	Acade-micians	PSH Representative	Restau-rant	Halal Officers	Slaugh-terers
1	Process	4.27	3.45	4.08	3.64	3.54	3.48
2	Packaging	3.94	3.8	4.22	3.82	3.73	3.77
3	Storage	4.63	4.31	4.19	3.93	3.78	3.35
4	Transportation	4.23	4.16	4.3	3.7	3.79	3.46
5	Fundamental	4.23	3.42	4.22	3.72	3.75	3.8
6	Supporting Policy	4.06	3.49	4.22	3.81	3.88	3.32
7	Technology	4.02	3.51	4.06	3.48	3.47	3.42

Table 2 shows that consumers consistently gave the highest ratings across all seven components, particularly in storage (4.63), process (4.27), and transportation (4.23). This suggests a generally positive public perception, likely based on external signs such as cleanliness, labels, and verbal assurances. In contrast, slaughterers and academicians tended to give the lowest ratings, indicating that those involved in implementation or technical evaluation observe more critical issues on the ground.

Among all components, storage received the highest overall scores, especially from consumers and academicians. However, slaughterers, who are directly involved in operational execution, rated it much lower (3.35), highlighting potential issues such as limited cold chain capacity or poor separation of halal and non-halal items. Similarly, in the transportation category, PSH representatives gave high scores (4.30), but slaughterers rated it only 3.46, again pointing to a disconnect between managerial self-assessment and frontline experiences.

The technology aspect is the lowest-rated component overall, with scores ranging from 3.42 (slaughterers) to 4.02 (consumers). This indicates a widespread recognition of technological gaps in halal certification processes, such as limited use of traceability systems, digital audits, or real-time monitoring.

In evaluating fundamental aspects—such as staff training, religious knowledge, and SOP alignment—academicians rated the component lowest (3.42), possibly due to their greater awareness of institutional or curricular limitations. PSH representatives, on the other hand, consistently rated all components higher than most other groups, suggesting either internal confidence or a tendency toward optimistic self-assessment.

Table 2 also reveals a perception–reality gap. While consumers express high confidence in halal certification components, those more directly involved in operations, such as halal officers and slaughterers, identify significant challenges. This discrepancy highlights the importance of improving transparency, investing in digital infrastructure, and aligning stakeholder perceptions through better communication, traceability, and training.

Based on the stakeholder evaluation table in Table 2, the SWOT analysis of the halal certification performance in Poultry Slaughterhouses (PSH) in Jember Regency can be summarised as follows:

Strengths (S): The high ratings from consumers across most components—particularly in storage (4.63), process (4.27), and transportation (4.23)—highlight strong public trust and awareness regarding halal integrity. PSH representatives also rated these components highly, suggesting internal confidence in their practices. This public perception serves as a valuable asset for positioning PSH as a credible provider in both domestic and export markets.

Weaknesses (W): Despite positive consumer perception, operational stakeholders such as slaughterers and halal officers rated most components lower, particularly storage (3.35 for slaughterers) and technology (3.42 for slaughterers, 3.47 for halal officers). This indicates gaps in cold chain infrastructure, real-time monitoring, and technological integration. Additionally, academicians gave the lowest scores in fundamental aspects and processes, suggesting insufficient institutional training and compliance with SOPs.

Opportunities (O): There is significant room to improve technological infrastructure, such as through IoT-enabled monitoring, blockchain-based traceability, and digital dashboards. Growing consumer demand for halal-certified products, especially those emphasising cleanliness and transparency, opens up market expansion opportunities, both domestically and internationally. Public and private funding support for halal ecosystem development, especially under Indonesia's halal roadmap, can be leveraged to boost infrastructure and training.

Threats (T): The perception–reality gap between consumers and implementers poses a threat to long-term trust in halal systems. If this gap becomes more visible—e.g., through social media exposure of operational weaknesses—public confidence could be undermined. Additionally, weak enforcement, limited local government capacity, and lagging technology adoption may limit PSH's ability to meet evolving halal standards or compete globally.

Based on the SWOT analysis above, several strategic directions are proposed to strengthen the halal certification ecosystem in Jember's poultry slaughterhouses.
First, S–O Strategy: Leverage high consumer trust in storage and overall halal compliance to market Jember PSH as export-ready halal hubs. Promote this strength through branding, traceability apps, and "Ultra Halal" standards, supported by digital platforms like blockchain.
Second, W–O Strategy: Address internal weaknesses by investing in cold storage, IoT-based monitoring, and SOP standardisation. Tap into government and donor funding schemes to finance infrastructure upgrades and staff capacity building.
Third, S–T Strategy: Use strong consumer engagement to build trust-based risk mitigation protocols. Introduce contamination prevention systems, public halal literacy campaigns, and policy compliance teams to prevent regulatory or reputational risks.
Fourth, W–T Strategy: Strengthen PSH by investing in quality management systems, human resource training, and partnerships with universities and tech startups. Deploy early-warning mechanisms to quickly identify and respond to operational failures that could erode public trust.

4.4. Regression results

Table 3 shows One-Way ANOVA (Analysis of Variance) to test mean score differences across stakeholder groups.

Table 3: ANOVA Result

Source	Partial SS	DF	MS	F	Prob>F
Model	2.923	5	0.584	0.61	0.693
Stakeholder	2.923	5	0.584	0.61	0.693
Residual	5563.467	5,795	0.960		
Total	5566.390	5,800	0.959		

The ANOVA result examines whether there are statistically significant differences in the average scores given by different stakeholder groups, such as consumers, academicians, PSH representatives, restaurant owners, halal officers, and slaughterers, on a particular outcome (likely related to halal certification components).
The analysis yields an F-statistic of 0.61 with a p-value of 0.6931. This p-value is much higher than the conventional significance threshold of 0.05, which indicates that the differences in mean scores across stakeholder groups are not statistically significant. In other words, there is insufficient evidence to conclude that stakeholder group membership affects how the scores are distributed.
Additionally, the R-squared value is very low (0.0005), meaning that only 0.05% of the variation in the dependent variable is explained by the stakeholder group. The adjusted R-squared is slightly negative (-0.0003), which can happen when the model does not improve upon the mean-only model and might even perform worse. This further confirms that the stakeholder variable has little to no explanatory power in this context.
Overall, the findings suggest that the scores assigned to the halal certification components are broadly similar across stakeholder groups. The lack of significant difference may imply that perceptions of halal compliance are relatively consistent, regardless of stakeholder background, or that the variation within each group is too large to detect differences between them. Further analysis could explore specific components or use a two-way ANOVA to examine interactions between stakeholder groups and particular aspects of certification.
We then test to see which groups differ by estimating a post hoc test in Table 4.

Table 4: Pairwise Comparison

Likert score stakeholder	Contrast	Std. Err.	Tukey [95% Conf. Interval]	
2 vs 1	0.016	0.038	-0.092	0.123
3 vs 1	-0.027	0.043	-0.149	0.095
4 vs 1	-0.054	0.045	-0.181	0.073
5 vs 1	0.010	0.039	-0.100	0.120
6 vs 1	-0.019	0.052	-0.167	0.130
3 vs 2	-0.043	0.045	-0.171	0.085
4 vs 2	-0.069	0.047	-0.202	0.063
5 vs 2	-0.006	0.041	-0.122	0.111
6 vs 2	-0.034	0.054	-0.188	0.119
4 vs 3	-0.026	0.051	-0.171	0.118
5 vs 3	0.037	0.046	-0.093	0.167
6 vs 3	0.009	0.057	-0.155	0.173
5 vs 4	0.063	0.047	-0.071	0.198
6 vs 4	0.035	0.059	-0.133	0.203
6 vs 5	-0.028	0.054	-0.184	0.127

Note: stakeholder code: 1 = Academician, 2 = Consumer, 3 = Halal Officer, 4 = PSH Representative, 5 = Restaurant, and 6 = Slaughterer.

Table 4 shows the results of pairwise comparisons of mean Likert scores across six stakeholder groups involved in evaluating halal certification components. Each stakeholder group is coded numerically (e.g., 1 to 6), and the analysis compares every possible pair to assess whether there are statistically significant differences in their average scores. In total, there are 15 comparisons. For each comparison, the table reports the estimated difference in means, the standard error of that estimate, and the 95% confidence interval. For instance, the comparison between group 2 and group 1 shows a mean difference of 0.0156, with a confidence interval ranging from -0.0920 to 0.1231. Because this interval includes zero, it indicates that the difference is not statistically significant. This pattern holds for all 15 pairwise comparisons: in every case, the confidence intervals for the mean differences include zero.
These results suggest that there are no meaningful differences in how the various stakeholder groups rated the components on the Likert scale. While the point estimates of the differences in means vary slightly—some groups gave marginally higher or lower ratings than others—these variations are not large enough to be considered statistically significant at the 5% level after adjusting for multiple comparisons using Tukey's method.
We then estimate the regression analysis of how different stakeholder groups influence the Likert-scale ratings on halal certification components (Table 5).

Table 5: Regression Estimations

likertscore	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
stakeholder						
2	0.016	0.038	0.41	0.68	-0.058	0.090
3	-0.027	0.043	-0.64	0.523	-0.111	0.057
4	-0.054	0.045	-1.21	0.228	-0.141	0.034
5	0.010	0.039	0.25	0.801	-0.066	0.085
6	-0.019	0.052	-0.36	0.72	-0.121	0.084
constant	3.872	0.025	155.3	0	3.824	3.921

Note: stakeholder code: 1 = Academician, 2 = Consumer, 3 = Halal Officer, 4 = PSH Representative, 5 = Restaurant, and 6 = Slaughterer.

Table 5 shows that, looking at the individual coefficients, none of the stakeholder groups (groups 2 through 6) show a statistically significant difference in scores compared to the reference group. For example, group 2 has a coefficient of 0.0156, indicating a very small increase in the average score relative to group 1, but the p-value of 0.680 and a confidence interval that includes zero mean that this difference is not meaningful. Similar non-significant results are observed for groups 3 through 6, with all estimated coefficients being small and statistically insignificant (all p-values well above 0.05).

The constant in the model is 3.872, representing the average Likert score for the reference stakeholder group. This value serves as the baseline from which other group differences are measured. The results indicate that the average Likert rating hovers around 3.87 across all stakeholder groups, with only minor, statistically unimportant deviations.

In summary, the quantitative approach (ANOVA and regression) confirms that stakeholder group membership does not significantly influence the Likert-scale evaluation of halal certification components. The consistency of perceptions across all groups implies a general agreement on the assessment criteria or perhaps a uniform understanding of the certification standards. The lack of statistically significant differences and the minimal explanatory power of the model suggest that other factors, not stakeholder category, are more likely to drive variations in perception.

4.5. Perception–reality gap in stakeholder evaluations

The perception–reality gap refers to the divergence between what consumers believe to be true and what practitioners experience within a given system. In the case of halal certification in Indonesia, particularly in regional areas like Jember Regency, this gap is significant. While stakeholder evaluations show generally favourable perceptions from consumers, those directly involved in halal operations, such as slaughterers, halal officers, and PSH operators, often provide more critical assessments. This discrepancy highlights a fundamental divide in how halal compliance is understood by different stakeholder groups.

One of the key causes of this gap is information asymmetry. Consumers typically rely on visible indicators such as clean packaging, halal labels, and verbal assurances when assessing halal integrity. These surface-level cues do not necessarily reflect the real conditions in slaughterhouses or storage facilities. In contrast, practitioners on the ground encounter operational shortcomings daily, including inadequate cold storage, limited staff training, and weak monitoring systems. Without access to this behind-the-scenes information, consumers may develop overly optimistic views that do not align with reality.

Another contributing factor is the tendency to place symbolic trust in certification authorities. Institutional endorsements and logos often create a false sense of confidence, leading consumers to assume compliance even when deeper systemic issues persist. This is further compounded by limited communication between consumers and practitioners. There are few formal channels through which field-level challenges can be communicated to the public or policymakers, reinforcing misunderstandings and leaving the real concerns of practitioners unheard.

The implications of this perception–reality gap are serious. First, there is a risk of public trust erosion. If operational failures, such as poor hygiene or improper storage, become public knowledge, especially through social media, consumer confidence in halal certification could quickly deteriorate. Second, the gap can result in policy misalignment, where decisions based solely on consumer satisfaction fail to address the infrastructure and training deficits highlighted by practitioners. This misalignment can lead to ineffective interventions and continued operational inefficiencies.

Additionally, the gap may create market distortions. Producers who know that consumers focus mainly on superficial indicators may cut corners without improving actual compliance. This undermines the integrity of Indonesia's halal certification system and could damage the country's ambition to become a global halal hub. The international community may question the reliability of Indonesian halal products if these discrepancies are left unresolved.

To address this gap, the halal ecosystem in Indonesia needs greater transparency and stakeholder engagement. One solution is to implement digital traceability systems, such as QR codes that link to halal process data. These tools can empower consumers with more accurate information about slaughtering, storage, and transportation. Furthermore, real-time monitoring technologies—like digital dashboards and cold-chain temperature sensors—should be adopted at PSH to support compliance and regulatory oversight.

Beyond technology, community-based outreach is essential. Initiatives like PSH open days, halal slaughterers' education campaigns, and school-based halal literacy modules can help align public understanding with operational realities. Lastly, collaboration among key institutions—such as BPJPH, MUI, local governments, and universities—is needed to ensure that feedback from the ground informs national policy. These efforts will help bridge the knowledge–practice divide and build a more robust, credible halal certification system.

Hence, recognising and narrowing the perception–reality gap is essential to improve halal assurance performance and to position Indonesia, especially in regions like East Java, as a global leader in the integrity and innovation of halal systems.

5. Conclusion

This study provides essential insights into halal certification implementation at Poultry Slaughterhouses (PSH) in Jember Regency, Indonesia. The findings show the respondents give a positive assumption on seven key halal supply chain components (process, packaging, storage, transportation, fundamentals, supporting policy, and technology). Storage ranked the highest perception, followed by transportation and packaging, while technology scored lowest. The perception–reality gap in Indonesia's halal certification ecosystem reveals a critical disconnect between consumer assumptions and practitioner experiences. While consumers often rely on visible cues and certification symbols to assess halal integrity, practitioners face operational constraints such as inadequate infrastructure, inconsistent monitoring,

and limited training. The SWOT analysis revealed five strategic priorities: integrating blockchain and IoT, enhancing human resource capacity, developing infrastructure, aligning SOPs with global standards, and strengthening consumer engagement.

However, despite these insights, this study also has limitations. While it identifies core trends and structural barriers, it does not explore the economic implications of halal certification, e.g., through no cost-benefit analysis. The study also remains geographically narrow, focusing solely on Jember, with no comparative lens to other regions. Moreover, it overlooks the role of certification in enhancing market access, competitiveness, and export readiness.

Future research should explore impact evaluations of blockchain or IoT adoption in poultry slaughterhouses, as it could assess their effects on certification efficiency, consumer trust, and supply chain resilience. Comparative studies across districts or provinces could identify region-specific constraints and best practices in halal certification implementation. Additionally, evaluating the cost-effectiveness of policy instruments (e.g., grants, audits, or tax incentives) would help determine which interventions offer the best return for promoting halal compliance among SMEs.

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